Cairn Duhie Wind Farm

Appendix 4.1: Outline Borrow Pit Management Plan

REVISION HISTORY

Issue	Date	Author	Nature And Location Of Change
01	19th Aug '20	Calum Campbell	First Issue.
02	9th Nov '20	Calum Campbell	Updating section 3.1 to reflect Pell Frischmann journey estimates.
03	16th Dec '20	Calum Campbell	Annex format updated following comments from LUC.

CONTENTS

ANNEXES

ANNEX 1 - DRAWINGS

ANNEX 2 - SAFETY & ENVIRONMENTAL REQUIREMENTS FOR CONTRACTORS

ANNEX 3 - EMERGENCY PROCEDURE IN THE EVENT OF A CONTAMINANT SPILLAGE

1 INTRODUCTION

This Borrow Pit Management Plan (BPMP) is submitted by RES Ltd (RES). The principal objective of this document is to provide details of the proposed borrow pit management arrangements during the construction of the Cairn Duhie Wind Farm.

The borrow pit is proposed as a potential source of locally won rock for use primarily in the construction of tracks, hardstand areas and foundations proposed in Cairn Duhie Wind Farm. It is estimated that the infrastructure at Cairn Duhie Wind Farm will require approximately 54,000m^3 of stone however this requirement is yet to be confirmed through detailed design.

Utilising approximately 49% of the consented borrow pit search area (see drawing *02914-RES-ERW-DR-CO-002: Borrow Pit GA* included in Annex 1) is expected to yield approximately 54,000m^3 of a Sandstone/Siltstone rock material.

2 METHODS OF WORKING

2.1 Location of Borrow Pits

The proposed borrow pit search area is within the network of tracks across Cairn Duhie Wind Farm.

A *Geotechnical Desk Study* was carried out in September 2011 and identifies that Ardclach Granite Pluton has been defined and is potentially suitable for construction purposes.

Borrow Pit

The borrow pit is located to the east of the site entrance and south of T12. The centre of borrow pit is at approximate grid reference E288945, N911204. The borrow pit search area covers approximately 3.6ha.

2.2 Programme of Implementation

An approximate sequence of works is outlined below:

Table 2. Outline Programme of Implementation

Stage of Construction	Considerations
Set out the borrow pit phases with the use of suitable survey equipment i.e. GPS (RTK) equipment.	The contractor shall ensure that markers which are to be used for setting out purposes are not harmful to the environment i.e. untreated wooden pegs or similar. Where possible, paints or other manmade materials will be limited.
Prior to commencement of extraction works, fence off area with temporary stock proof fencing.	Access and egress points will be provided for pedestrian access.
Set out and install SuDS features, initially the surrounding cut-off drains and associated SuDS works as appropriate within the proposed borrow pit areas.	SuDS will ensure that any suspended solids generated during construction are effectively mitigated and that down-catchment areas are not deprived of water supply.
Remove the top layer of vegetated material. Store the minimal topsoil deposits for later restoration of the areas.	This material will be removed and re-used to cover and promote natural re-vegetation of the reinstated borrow pits.

Stage of Construction	Considerations
Excavate to rockhead level and utilise overburden to form a surface water diversion bund adjacent to the cut-off drain. Additional overburden will be stockpiled within the proposed borrow pit areas.	If suitable, this material will be re-used as for partial backfill of the borrow pits.
Ripping may occur in the weathered zone of bedrock. Where rock becomes more competent, establish a first line blast to form a productive face. Utilise pattern blasting to loosen rock where required to extend the borrow pit in the desired formation.	Typically, face height will not exceed 15m or 70° slope angle and will generally follow HSE The Quarry Regulations.1999 guidance where appropriate. The peak of the existing land formation will not be removed.
Crushing/screening/grading of extracted rock prior to temporary stockpiling for removal and utilisation	Control of noise and dust emissions.
Stockpiles of aggregate or overburden, where present, will remain below 5m in elevation beyond existing topography and will rest at their natural angle of repose.	Suspended sediment in surface run-off will be diverted to either the sump at the back of the areas or the rock filled drain at the entrance.
Extraction of stone and formation of steeply graded 1.5m high faces and 0.5 m wide benches to sloping base of pit. Additionally, formation of 'roll-over' slopes along the more elevated parts of each pit.	In order to mitigate potential effects of the extraction on visual amenity a 'roll-over' slope would be formed along the more elevated parts of each pit. This slope would be in keeping with existing topography in the vicinity and would be restored to a condition which will ensure its assimilation into the adjoining landscape.
Restoration will take place, initially using overburden materials but also local peat where appropriate, to backfill local depressions to near ground level.	Reinstatement to mimic adjacent land forms, geology and hydrogeology as far as practicable.
Vegetated material will be placed in areas where excavation faces are exposed.	It is important that this is undertaken promptly after borrow pit operations cease to speed up the re-vegetation process.

2.3 Operational (Extraction) Activities

The work at the borrow pit identified comprises the extraction of suitable materials for use as aggregate for tracks, hardstand areas and foundations on Cairn Duhie Wind Farm.

Key extraction activities at the borrow pit include rock breaking/blasting, crushing, screening/grading, stockpiling and haulage away from the borrow pits.

Once works onsite have begun it is estimated that the duration of extraction from the borrow pit is approximately 8 months. The daily operation and management of the borrow pit will be the responsibility of the contractor, however, in general the methodology set out below for careful management of the borrow pit will be adhered to minimise potential environmental impact.

In order to make the above possible, it will be necessary to implement a working method which ensures that provisions are in place to manage topsoil or peaty topsoil removal and re-use for restoration and overburden removal and storage. Provisions for the control of surface run-off

during and post construction and the re-vegetating of working faces post construction are also included. Further details on these issues are provided in the following sections.

Blasting can give rise to both ground-borne vibration and airborne pressure waves, referred to as air overpressure. Blast-generated air overpressure levels are not anticipated to be high at residential locations due to the separation distances involved. The levels of vibration due to blasting are expected to be below the satisfactory magnitude of 6mms^{-1} defined in *BS 6472-2: 2008 'Guide to evaluation of human exposure to vibration in buildings, Part 2: Blast-induced vibration'* for daytime periods at residential locations. Considering this, it is proposed that the following mitigation measures are implemented:

- Good practice on blasting, as recommended by Planning Advice Note (PAN) 50 'Controlling the environmental effects of surface mineral workings', shall be followed;
- The vibration and air overpressure reduction methods outlined in Section 8.6.9.2 of BS 5228-2: 2009 shall be adhered to where appropriate;
- Advance warning shall be given to nearby residents;
- Blasting should only occur between the hours of 0800-1800 on Mondays-Fridays or between the hours of 0800-1200 on Saturdays; and
- No more than three blasts per day should occur.

As a worst case, it is anticipated that blasting may occur up to 2-3 times a week for the first three months, then a gap of around 2 months followed by blasting of up to 2-3 times a week, tapering off to every other week and then more infrequently.

Once operations are sufficiently underway, restoration will take place progressively behind the working areas to encourage re-vegetation. This will minimise any impact to the surrounding environment by minimising the working areas at any point.

General site best practice will be applied through operation activities including:

- Use of fuel will be controlled to the minimum practicable by adequate management systems;
- Vehicle engines will be switched off when not in use;
- All vehicles will be properly maintained;
- Staff will be briefed on fire risk from cigarettes etc in dry conditions. Designated safe smoking areas will be located away from the borrow pit, with the finalised locations to be confirmed prior to site works commencing; and
- No fires to be lit on site.

2.4 Soil & Peat Material Handling

A geotechnical site investigation has yet to be carried out for Cairn Duhie Wind Farm therefore a detailed description of the type of soils and rock to be extracted from the borrow pit, including details of the existing water table and volumes of de-watering cannot be confirmed.

A *Geotechnical Desk Study* was carried out in September 2011 and identifies that Quaternary Geological maps of the area show the soils to be Glacial Diamicton (Glacial Till). There are also deposits of glacial sands and gravels in the vicinity.

Additionally, there are also some alluvial deposits associated with the streams which traverse the site.

The water table level at the borrow pit location is currently unknown however details and design philosophy behind borrow pit dewatering to settlement ponds and surround SuDS is detailed in Section 3.4.

The borrow pit has been positioned where rock is most likely to be close to the surface and away from any area with significant risk of peat slide.

Peat depth probing surveys have been carried out across the site and indicate that the borrow pit search area is located in largely shallow (<1m deep) peat, but with sections in slightly deeper (<1.5m deep) peat.

A *Peat Stability Risk Assessment* was carried out in June 2013 and concluded that the borrow pit location was in an area of very low risk to peat slide. On removal of the peat for borrow pit area, the risk from peat movement will be mitigated through removing material from the higher areas down to avoid undermining or surcharging any peat materials. Peat arising from borrow pit activities will not be stored for any prolonged period and will be utilised in the restoration of the borrow pit areas.

Overburden will be temporarily stockpiled within a suitable area of the proposed borrow pit until the restoration phase commences. Where relevant, overburden will remain separate from peat deposits and will sit at an angle no greater than its natural angle of repose, not protrude beyond 5m in height above the existing topography and will be laid in layers of not more than 1m thick. Where possible, stockpiles will be placed to the side and on the flattest accessible areas and will avoid any placement on peat deposits.

Other overburden sub-soils will be utilised for the construction of a surface water diversion bund up topographic gradient, where practical.

2.5 Aggregate Material Handling

Where appropriate, stockpiles of aggregate will be temporarily stored in proximity to the crusher. To minimise environmental impact, the borrow pit will be worked in discrete cells. As such, the location of the processed material stockpiles will be transient according to the working phases, however, all of these locations will be at least 100m from the nearest watercourse.

Aggregate stockpiles will be formed to a maximum height of 5m above surrounding topography. They will be shaped as it is being built to shed water and sit at an angle no greater than its natural angle of repose.

2.6 Welfare Provision

Welfare facilities for the borrow pit will be located at the temporary construction compounds (within Cairn Duhie Wind Farm).

2.7 Security

Security arrangements at the borrow pit area will be agreed through consultation with the selected contractor and landowner. It is envisaged that the borrow pit area will be delineated by post and wire fencing to prevent access.

If deemed necessary, security measures may take the form of locking of the areas, CCTV and/or security personnel.

2.8 Safety

Training/induction will be undertaken for all site staff prior to working on site. Method statements will be communicated to all relevant personnel through activity plans including:

- Provision of ongoing training and review of relevant procedures with site staff throughout the contract, including through the use of toolbox talks;
- Provision of ongoing monitoring of the effectiveness of mitigation and procedures and update as required;

- Provision of ongoing monitoring, review and update of environmental control measures in method statements.

2.9 Environmental Inspections and Geotechnical Assessments

During operation, an on-going system of formalised assessment will be completed by a suitably qualified Geotechnical Engineer. They will be responsible for monitoring site workings and responding to changing ground conditions accordingly.

Environmental inspections are to be carried out by personnel based at the borrow pits and by the project's Environmental Clerk of Works (ECoW).

2.10 Working Hours

Construction traffic will adhere to programmed activities and agreed working hours specified for Cairn Duhie Wind Farm (Monday to Friday from 0700 to 1900 and Saturdays 0700 to 1200, with no working permitted on Sundays or public holidays). No construction traffic will undertake works beyond the agreed activities and hours unless by prior agreement.

Blasting should only occur Mondays through to Fridays between the hours of 0800-1800 or Saturdays between the hours of 0800-1200.

3 ENVIRONMENTAL AND HYDROLOGICAL ASPECTS

3.1 Access and Traffic Management

It is anticipated that 50% of the required stone to build the wind farm infrastructure will be stone won from the borrow pit, resulting in a reduction of approximately 4,134 heavy goods vehicle (HGV) journeys. It is expected, however, that a higher percentage of stone will be won on-site, further reducing the number of required HGV journeys.

Traffic associated with the borrow pit will be contained entirely within Cairn Duhie Wind Farm except for the delivery of plant to Cairn Duhie Wind Farm to extract and transport material around the wind farm.

During the operation of the borrow pit, vehicles accessing the areas will be limited to the vehicles used by persons working at the site, site visitors and the HGVs required to deliver plant and materials or transport the aggregate from the borrow pit to the construction working areas.

3.2 Ecology

3.2.1 General

The borrow pit location and extents was selected to minimise impact on any ecological and visually sensitive areas. To discourage site staff from potentially impacting upon the surrounding environment, the working areas, associated access tracks and storage areas will be marked by a fence or marker posts at all times during the operation of the borrow pit. No excursion beyond the delineated boundary will be permitted without authorisation. The Cairn Duhie Wind Farm Ecological Clerk of Works (ECoW) will undertake pre-construction surveys and will monitor the construction works in accordance with the approve Scope of Works submitted to the Council for the main Wind Farm site.

3.2.2 Ornithology

Ornithological commitments apply to the Cairn Duhie Wind Farm as a whole and are relevant but not specific to the borrow pit areas. Should any evidence of nesting be discovered, a buffer (10 m) will be established and clearly delineated around the nest and works in that area stopped until the birds either fledge or the nesting attempt ends, e.g. as the result of nest predation.

All contractors will be required to comply with all relevant ornithological commitments set out above.

3.2.3 Flora and Fauna

Protected species commitments apply to the Cairn Duhie Farm as a whole and are relevant but not specific to the borrow pit area. Notwithstanding the above, should any evidence of a protected species having colonised the location since the walkover be discovered (e.g. a badger sett) an appropriate buffer (e.g. 30 m for badger) will be established and clearly delineated around the identified feature and works in that areas stopped and the ECoW contacted to organise how to proceed.

In order to ensure that no reptiles are affected during the establishment of the borrow pit, all vegetation on the borrow pit area will be cut short in the week before any vegetation removal. Site contractors will be made aware of the species that could be present and to cease works if any reptiles are seen whilst the advice of the ECoW is sought.

No particular floral recommendations apply to the borrow pit location. Floral mitigation is focussed on ensuring no impacts on surrounding habitats, as set out above.

All contractors will be required to comply with all relevant flora and fauna commitments set out above.

3.3 Archaeology

The proposed extraction of aggregate from the borrow pit will not affect any known archaeological or cultural heritage sites. Furthermore, given the small scale and temporary nature of the proposed works, it is considered that the proposed development will not give rise to any significant indirect impacts upon archaeological or cultural heritage receptors in the vicinity of the site. Although considered unlikely, the potential for unidentified remains being present is a possibility. Therefore, site staff will be briefed on the nature of common archaeological finds including:

- Brick or tile fragments;
- Coins or pottery;
- Bone fragments or skeletons;
- Timber joists or post holes;
- Brick or stone foundations;
- In-filled ditches.

If any other suspected archaeological features are uncovered during excavation of spoil, excavation activities will cease and the Construction Site Manager informed immediately.

3.4 Drainage and Surface Water Management

The borrow pit location has been selected away from watercourses and beyond a 100m buffer area defined for site selection.

Cut-off drainage and or face crest bunding will divert surface flow around the operational areas and leave only incident rainfall to collect in the borrow pit. All cut-off drains will be constructed in advance of any operations occurring within the site.

Borrow pit floor level will slope gently down to the rear of the area forming a natural pool to retain any surface water and enable suspended sediments to settle out. Water collected in a sump in the low point of the borrow pit will then be pumped to a SuDS settlement lagoon (located within the proposed borrow pit areas, out of the rock extraction area) sequence prior to natural drainage. Diverted surface flow will also be retained and treated through a SuDS settlement

lagoon sequence. No water from excavations and dewatering activities will be allowed to enter surface waters directly.

Staff will be briefed on the location of these features and importance of preventing water run-off from exiting the borrow pit and will be given regular tool box talks about the risks of working near water and the potential to cause pollution.

Stockpiles (of superficial deposits and aggregate) will be located in suitable locations to ensure that there is no risk of material washing out and contaminating watercourses.

No refuse or debris will be stored at the borrow pit, however, it will be gathered daily and stored in secure skips located at the temporary construction compounds (within Cairn Duhie Wind Farm), prior to regular removal to avoid risk of polluting watercourses.

The source of any water used to suppress dust will be in accordance with legal requirements and if doubt exists about what is permissible consultation with SEPA will occur.

All plant and equipment will be maintained appropriately including checking for leaks and cleaning/removing visible oil.

Any contaminated soil will be disposed of to a licensed waste disposal site in accordance with legal requirements.

There will be no sewage discharges from the borrow pit.

Following completion of the interim site restoration, the borrow pit site will be inspected by suitably qualified personnel, to ensure that any drainage features retained within the site are functioning properly and that the site is in good condition.

3.5 Waste Management

There is no waste developed by works at the borrow pit anticipated, natural soils will be either utilised as dressing material or stockpiled for restoration.

No facilities will be present within the borrow pit, no hydrocarbon storage will take place. A diesel-powered pump will be situated on a drip tray. Regular inspections will take place to check for leaks and drips. The drip tray will have the capacity to safely store at least 110% of total fuel capacity of the pump.

3.6 Noise and Vibration

A *Construction Noise Mitigation Plan* will be undertaken for Cairn Duhie Wind Farm and will be included as an Annex of the *Cairn Duhie Wind Farm – Construction* Environmental *Management Plan*. The report will include an assessment of the of construction noise for the borrow pit and associated construction of infrastructure for Cairn Duhie Wind Farm. The report will assess the noise and vibration impact upon the most acoustically sensitive residential properties during the construction period.

Primary activities for which noise arises during the construction period are from the excavation of the borrow pit and the construction of access tracks and roads. Noise from vehicles on local roads and access tracks will also arise due to the transportation of aggregate.

For all activities, measures shall be taken to reduce noise levels with due regard to practicality and cost as per the concept of 'best practicable means' as defined in Section 72 of the Control of Pollution Act 1974

3.7 Dust and Air Pollution Management

The main activities on site that may cause dust emissions include the following:

- Excavation and movement of site won material;

- HGV movement on borrow pit haul roads;
- Crushing of site won material;
- Stockpiles.

The potential issue of dust creation during the works will be weather and season dependant, therefore detailed dust management methods will be subject to the works programme and contractor working methods.

Dust management will be carried out at all times in accordance with industry best practice measures to ensure that any local sensitive receptors are not affected by nuisance levels of dust from the works.

The Construction Site Manager will be responsible for undertaking and recording the following daily checks to manage dust emissions:

The following methods of dust suppression will be implemented during the construction phase of the borrow pit:

- Site tracks to be damped down using bowser or other suitable system;
- Speed limits to be put in place to ensure low vehicle speeds;
- Damping of dry excavations and cutting/crushing activities which generate dust; and
- Programming of works to minimise the time that materials are exposed.

3.8 Responding to Environmental Incidents

Environmental controls will be implemented through the *Safety & Environmental Requirements for Contractors* included in Annex 2 and should any incidents occur contracts will comply with the *Emergency Procedure in the Event of a Contaminant Spillage* and included in Annex 3.

3.9 Daily Check Management

A daily management check will be implemented and will generally follow the example in Table 3 below.

Table 3. Daily Checks

Daily Check	Description
Weather forecast	Check the local weather forecast at start of working day to identify likely daily weather conditions.
Sensitive receptor	Identify which sensitive receptors may be affected by dust pollution from the site.
Dry weather	Apply water bowsers to excavations, haul roads and soil storage areas regularly throughout the day.
	Undertake regular visual checks throughout the day to ensure dust at the above locations is being suppressed.
Wind	Cover open skips and stockpiles containing loose fines.
	In the event that dust is being blown off-site, cease dust generating activities until wind conditions improve or dust is suitably managed
On-site activities	Undertake regular visual checks throughout the day of dust management during excavation, crushing and regular movement of HGVs on haul roads.

Daily Check	Description
	Focus water bowsers on areas where dust is being generated.
Neighbour notification	In the event that there is a risk of dust being transported off-site despite the above management measures being put in place, inform neighbours in advance of risk and what management measures have been put in place.
	Actively monitor dust management and where dust pollution is likely to affect neighbours, cease all activities until suitable management procedures can be implemented.
Complaints	A record will be kept on site of all dust related complaints and remedial actions taken.
	If required, staff will be briefed on changes required to working practices to ensure the incident is not repeated.

In addition to the above daily checks, the following dust management will be followed on site:

- All staff will be trained in the importance of dust management procedures;
- Activities on site will be planned to ensure risk of pollution from wind-blown dust is reduced to minimum;
- Stockpiles (of fines and aggregate) will be no greater than 5 m above surrounding topography. The material will be tipped to ensure that the sides of the stockpiles are stable;
- Only appropriate plant will be used and all equipment will be regularly maintained;
- No unauthorised burning of materials will be permitted on site;
- Regularly monitor the performance of dust management procedures at the site.

4 RESTORATION AND AFTERCARE PLANS

All restoration works will be undertaken following consultation with RES, The Highland Council, SEPA and other consultees.

4.1 Restoration Landform

The excavation of borrow pit can result in anomalous steep sided voids and rectilinear exposed extraction faces. This can result in loss of visual amenity and ecological interest. In order to avoid this the borrow pit will incorporate a gently graded 'roll-over' slopes consistent with those of the existing landscape and will remove the most elevated and potentially visible faces in each pit. The 'roll-over' slopes will also provide a suitable landform for the replication of previous habitats. Lower faces will be covered by restoration materials placed in the excavation void. However, one exposed face may be retained and will be subject to restoration blasting and/or mechanical amendment to achieve a more natural and irregular finish which provides for ecological niches.

4.2 Restoration Materials

Initially, the excavation void will be partially filled by selected moisture retentive overburden released from both the borrow pit excavation and, if necessary, from construction works elsewhere from the Cairn Duhie Wind Farm. This material will then be topped by a combination of acrotelmic and catotelmic peat. The peat material will be placed at a total maximum thickness

of 2m and surfaced with translocated acrotelmic peat turfs from the borrow pit excavation and/or from a suitable donor site within the broader Cairn Duhie Wind Farm.

Restoration of the roll-over slope will be undertaken by direct translocation of 'in-situ' turf and substrate

The restoration will be connected hydrologically to with adjoining areas of existing peatland by means of the breaking out of any impermeable barrier between existing peatland habitats and those within the borrow pit.

The borrow pit will be enclosed by suitable stock-proof fencing to prevent incursions.

4.3 Aftercare and Monitoring

The restored site will be subject to a programme of annual aftercare throughout the operational life of the Cairn Duhie Wind Farm. Key priorities during the aftercare period will comprise:

- Annual NVC and hydrological monitoring of habitats in the borrow pit;
- Hydrological monitoring shall consist of groundwater level measurement and monitoring of peat turves for drying/shrinkage. If necessary (e.g. in the event of a period of drought during the early establishment of the peat habitats) artificial hydration can be initially applied to prevent peat desiccation. If turf shrinkage occurs, remediation shall consist of backfilling gaps between the turves with selected peat materials and limited hydration as appropriate;

5 SITE PLAN

As the development of the borrow pit is largely governed by the required aggregate quantities needed for Cairn Duhie Wind Farm construction at any given time; the overall indicative site plan has been provided. *02914-RES-PRO-DR-PT-001 infrastructure Layout* is included in Annex 1.

Further development of the site operation plan with the borrow pit contractor (not yet confirmed) will be required before detailed site operation plans can be produced for submission.

ANNEX 1 - DRAWINGS

EIA-R Reference	Drawing Name	Drawing Number
Figure 4.1	Infrastructure Layout	02914-RES-PRO-DR-PT-001
Figure 4.12	Borrow Pit General Arrangement	02914-RES-ERW-DR-CO-002

Safety & Environmental Requirements for Contractors on all activities (RSWP 005)

Document Nº: ***01059R00038***

Revision History

Issue	*Date*	*Nature and Location of Change*
1-13		*Previous revision histories to this document can be found in revision 13*
14	*12/09/15*	*Document completely redrafted as part of lean review / FFF process, to incorporate previous departmental 'Safety Requirements' versions and Environmental Requirements of Contractors document.* *Reviewed extensively by all the UK Geographic Business Units during this process and this document now replaces;* *RSWP 011 Safety Requirements of Contractors Construction (Eire) 01059R00039* *RSWP 022 Responsibilities of Contractors Working on RES Offices 01059-000095* *RSWP 027 Safety Requirements of Contractors Generation 01059-000654* *RSWP 031 Safety Requirements of Contractors Development 01059-001264* *Environmental Requirements of Contractors 01226R00016*
15	*19/08/16*	*Document title changed by removing RSWP 005 from start and putting at end; Safety & Environmental Requirements for Contractors on all activities (RSWP 005)*

CONTENTS

1 PURPOSE

The purpose of this document is to promote; Health, Safety, Environment, Safety Leadership and Sustainability of our Contractors, Consultants, RES employees and the general public by setting out the minimum expectations when working on RES managed contracts.

This document shall be supplied to all Contractors and Consultants tendering for any contracts relating to works or services on any RES site or office, it shall be read carefully and its receipt acknowledged in writing in connection with a specific Contract. No variation shall be permitted without the express permission of the appropriate RES Manager responsible for the works / services; eg. Project Manager, Construction Site Manager, Asset / Site Manager or Office / Facilities Manager, etc.

This document shall be read in conjunction with the relevant Health and Safety (& Environmental - where applicable) Plan for the location of the works.

2 SCOPE

*It should be noted that this document and the References quoted below **do not** cover all possible site activities and it therefore remains the Contractor's / Consultant's responsibility to ensure that their works are carried out in a safe and environmentally responsible manner which complies with **ALL relevant legislation current at that time**. All work activities with significant risks are to be covered by an appropriate written risk assessment and work instruction / method statement that has been reviewed by the appropriate RES Manager prior to works commencing.*

3 RESPONSIBILITIES & REQUIREMENTS

Contractors & Consultants shall comply with all relevant requirements appertaining to their contracted works. Throughout this document any references to Contractor(s) shall also apply equally to Consultant(s) and whilst RES are not typically identified, this does not absolve RES employees from following the same site rules and requirements as our Contractors or Consultants. Where specific training requirements or qualifications are required, Contractors may provide evidence of alternative training subject to it being equivalent to / better than, the RES defined minimum requirements.

4 RES Responsibilities

4.1 Controlling Documentation

*RES shall provide the Health, Safety & Environmental Plan (Pre-tender and construction phase), Project Quality Plan and Site Waste Management Plan. RES shall review all Safe Systems of Work for **all significant risk** activities; including Risk Assessments, Method Statements and Permits to Work - **work will not be permitted without these being in place**. HV Electrical cable and system isolations and documentation shall be controlled through RES Senior Authorised Person (SAP) or RES nominated SAP.*

*RES **shall** audit all aspects of the management of health, safety, quality and environment on site and may carry out appropriate surveys, inspections, tours and sampling at any time. RES may carry out their own accident investigation if deemed necessary to ensure that correct preventative measures are put in place.*

4.2 On Site Responsibilities

Safety requirements & rules shall be displayed on site and readily available for all employees to see. RES shall provide the RES site induction or RES on-line induction (to be advised by RES) prior to visiting, starting works & at refresher intervals and provide support to those who have difficulty with the English language to ensure that all site attendees can demonstrate that they understand the site rules & instructions.

RES shall provide prompt information that could affect health & safety of workers, and/or other 3rd parties, members of the public, ensuring adequate steps to prevent harm to livestock on site, maintenance of site fencing, boundaries & keeping gates closed.

RES shall facilitate agreements on interface responsibilities between other parties - within procedures and appropriate documentation controls, including regular meetings / liaison with RES staff, employees and other contractors to identify and discuss hazards with work activities and how they could affect others.

Unaccompanied site visits will be at the discretion of the RES Site Manager. First Aid facilities and provision of first aid is the responsibility of the contractor unless agreed otherwise, RES facilities will be available for use in case of emergency.

4.3 Wildlife

RES Site Manager shall inform Contractors of any constraints or work time restrictions due to the protection of wild life, i.e. nesting sites, habitat issues. If unexpected wildlife is encountered during work activities, i.e. bird nest / badger sett etc, work is to be temporarily suspended and the Site Manager informed. No work shall take place until clearance has been given by RES to resume.

5 Contractor / Consultant Responsibilities & Requirements

5.1 Controlling Documentation

Contractors shall provide the Health & Safety management & site controls applicable to employees, visitors, third parties, Quality management & associated documentation for services, equipment, materials, products, Environmental management & associated documentation for services, equipment, materials, products. Contractors shall conform to the Project; Health, Safety (& Environmental) Plan, Quality Plan and Site Waste Management Plan. Contractors shall provide the Inspection & Test Plan appropriate for their works and any associated documentation required to support conformance to contract specification.

*Safe Systems of Work for **all significant risk** activities shall be provided, including; Risk Assessments, Method Statements and Permits to Work - **work will not be permitted without these being in place**.*

5.2 On Site Responsibilities

Safety requirements & rules shall be displayed on site and be readily available for all employees to see, with delivery of toolbox talk records provided to RES. Contractors shall ensure that all site attendees complete a RES site induction or have undertaken a RES on-line induction (to be advised by RES) prior to visiting, starting works & at refresher intervals - including provision of support to those who have difficulty with the English language; everyone attending site must demonstrate that they understand the site rules & instructions. Contractors shall provide safety training & skills competency records (nationally recognised training bodies) - including matrix of training requirements and supporting certificates, CITB cards etc for all employees.

Contractors shall provide communication devices for contact and emergencies; to suit site requirements (mobile phone signals may not work), provision of prompt information that could affect health & safety of workers, and/or other 3rd parties, members of the public.
*Implementing adequate steps to prevent harm to livestock on site, maintenance of site fencing, boundaries & keeping gates closed. A fencing & gates / gated scheme **shall** be developed and agreed with the landowner, including location, temporary or permanent. Agreeing interface responsibilities between other parties, defining within procedures and appropriate documentation controls.*

Undertake regular meetings / liaison with RES staff, employees and other contractors to identify and discuss hazards with work activities and how they could affect others. Agreement to start works on site is through the consent of the RES Site Manager. When required, work instructions and risk assessments are to be provided to all employees undertaking the work who fully understand and agree with the requirements. Keep adequate records for site works including nature of work, duration, etc and making available to RES as required.

*Visitors to be accompanied on site **at all times** by a fully inducted employee, (visitors shall receive a full induction if visiting site more than once and unaccompanied site visits shall be at the discretion of the Site Manager).*

Contractors shall appoint a Competent Safety Representative (responsible for all safety issues for their company inc. electrical safety rules if applicable) and Site Supervisor(s) normally (black coloured hard hat required on construction sites) trained to nationally recognised standards, E.g. SSSTS, IOSH Managing Safely, Black / Gold CITB Card.

5.3 Site Accommodation

Temporary electrical systems are to be designed, inspected & tested by the Contractor, who shall provide the forms of Completion, Inspection & Testing required by the Wiring Regulations BS7671. Housekeeping relating to accommodation, storage and vehicles is to be of a high standard including regular cleaning. Areas for storage of plant, equipment, materials along with rules for use and access are to be in agreement with / designated on site by the RES Site Manager - Contractor shall provide all details of site requirements and what is being used on site (including any reinstatement of area after use).

All access tracks and entry routes are to be kept free of obstacles and well maintained - this includes controlling dust. Petrol or diesel engine plant is not to be used within buildings unless exhaust gases are piped to open air or an alternative approved. LPG is only to be used in accordance with legislation.

5.4 Site Security

*Contractors **shall** use designated means of access and egress on the site, daily site records of employees **shall** be collected to aid security in the event of a fire or other emergency. Where security is used on site it **shall** be the duty of the gate / guard person to ensure vehicles and people are logged and have undergone induction.*

5.5 Safety Audit(s)

*Contractors shall make available all information and records as required by an auditor in the undertaking of their activities. The Contractor **shall** co-operate at all times in the undertaking of such health, safety, quality or environmental related audits and follow up actions. The Contractor **shall** undertake their own audits and inspections as agreed by both parties. Any actions identified from the audits shall be planned, communicated and agreed to rectify the issue(s).*

5.6 Alcohol, Drugs & Smoking

*The supply and consumption of alcohol & drugs is **prohibited** on site. Any misbehaviour at work such as; being under the influence of alcohol or drugs, shall be classed as gross industrial misconduct. Accident investigation on site may require the need for alcohol or drug tests to be undertaken by the employer.*

Any person prescribed medication by their GP must be fit for work. The Site Manager needs to be informed of such instances and arrangements made for storage of their medication on site. A record of their capability for work may also be required.

5.7 First Aid

*First aid facilities and provision of first aid is the responsibility of the contractor unless agreed otherwise. All First Aid treatments must be reported and logged, no matter how small. Notification of first aid arrangements **shall** be displayed and employees and other 3rd parties **shall** be informed of the arrangements.*

5.8 Accident Reporting & Investigation

*All accidents **shall** be reported and recorded in their company and the RES site accident book / recording system. The RES Site Manager **shall** be informed of all accidents, incident and near misses. The RES accident procedure shall be followed. Any notifiable accidents, specified injuries or conditions, or dangerous occurrences which are reported by the contractor under RIDDOR regulations, **shall** be reported without delay to the RES Site Manager.*

*The Contractor **must** encourage near miss incident and hazard reporting, active recognition and reporting is a key function in Safety Leadership and a mandatory responsibility of everyone on site. The Contractor's Health and Safety Advisor is to carry out a full investigation of all accidents and issue a report to RES.*

5.9 Lone Working

*A risk assessment **shall** be produced to determine the risks of lone working and to mitigate any risks - lone working should be avoided where possible. Where persons are required to work alone, i.e. surveys, a lone working procedure shall be in place and communicated to all parties. The procedure shall be agreed with the Site / Project Manager.*

5.10 Excavations, Barriers & Existing Underground Services

No mechanical excavation work shall take place within one metre of live High Voltage Cables, nor within 500mm of any known live utility services. Contractors shall provide early notice of their intended work near live services, confirming location of underground services and preparing safety document controls, barriers around all opening, trenches, excavations to prevent access into the areas.

Permission to remove / open mesh, coverings, gratings shall be obtained and removed items are to be replaced as soon as possible. Report any broken or damaged gratings etc and put in place controls to prevent any risk of injury etc. Provide all shoring and support to excavations to prevent collapse as per HSG 150.

Excavated materials not suitable for backfill are to be disposed of in accordance with the Site Spoil Management Plan. Drilling, spikes or posts are to not to be driven into the ground without a permit to break ground as issued by the Site Manager.

*There must be no alterations to any RES supplied barriers, screens or notices. Warning lights and reflective surfaces **shall** be placed on barriers around excavation works. Inspection reports are **to be** undertaken **prior** to entry of excavations, upon completion of shuttering and after additional works, alterations or dismantling as per HSE CIS 47. Weekly inspections are required and **evidence** submitted to RES. Excavation tags to be positioned at all **access**/egress points to all excavations and be updated at each inspection.*

Segregation of plant and pedestrians shall be maintained; barriers are to be installed at access points and within excavation, along with appropriate signage. Stop blocks to be used with reversing of vehicles up to an excavation.

Pumps to be used to remove water from excavations shall be regularly inspected for stability; pumped water, whether ground or rain is not to be pumped into a watercourse or drain, water is to be managed

in accordance with the site drainage plan (typically settlement lagoons).

5.11 Lifting Operations – Mobile cranes or similar type of equipment & lifting accessories

All lifting operations shall be managed in accordance with BS 7121; which shall include preparation of: risk assessment, method statement and lifting plan; and shall be agreed by all parties prior to works taking place. The lifting plan shall cover crane mobilisation, assembly and travel on site as well as any unloading and lifting activities. All crane movements on site are subject to 'Permit for Movement of Heavy Plant'.

All lifting equipment shall be fully certified and in date; copies of all certification and inspection reports shall be provided to RES prior to the works taking place. Safe Working Load (SWL) shall be clearly marked on ***all*** *lifting equipment and ancillaries, along with test date. Structural steelwork shall not be used for lifting point or anchorage without agreement of RES (only permitted in exceptional circumstance and has been subject to structural review – Structural Engineer report required).*

All temporary points for attachment to be load tested prior to use and record of test provided to RES, method of testing to be agreed. All testing shall be undertaken by an approved Test Engineer to British standards; approved on Lifting Equipment Engineers Association (LEEA) or similar organisation. Persons are not allowed to ride on a hoist unless it has been designed to carry passengers and fitted with interlock gates / safety devices. All persons operating hoists are to be fully trained and have recorded evidence of training to a national recognised standard.

RES lifting operations checklist shall be used unless contractor has their own approved requirements. All crane lifts shall be planned by a competent Appointed Person (AP), an approved Crane Supervisor ***MUST*** *be on site if the AP is not able to monitor the lifting. Lifting plans including method statement / risk assessment shall be reviewed by RES.*

5.12 Scaffolding / Ladders

Only competent and fully trained persons ***shall*** *be used to erect, dismantle and modify/alter and inspect scaffolding (CISRS – tube & clip, PASMA – system). All scaffolding* ***must*** *display an in date SCAFFTAG or similar signage tag at point of access detailing scaffold status. All scaffolding* ***shall*** *be designed, erected, maintained, examined and recorded for the type of scaffold used – where necessary scaffold should be earthed.*

All trained scaffold erectors ***shall*** *wear securely attached safety harnesses connected to suitably tested fixed points as appropriate to risk assessment requirements. Scaffold boards* ***shall*** *be clamped into place wherever possible; any gaps in scaffold boards* ***shall*** *be covered with an appropriate secured material strong enough for the application and activity. Scaffolding* ***shall*** *be redesigned for all work activities, adjusted and inspected prior to use for each phase of work, scaffolding is not to be used until it has been cleared for the work activity.*

Permission to use a scaffold erected by others must be obtained from the Site Manager and only after an inspection has been carried out. Incomplete and unsafe scaffolding ***must*** *not be used and appropriate measures shall be put in place to prevent usage and when site is unattended access routes to scaffold to be removed to stop persons climbing scaffold.*

All ladders used on site ***shall*** *be in good condition and have a system of regular inspection; register to be kept on site. Metal ladders* ***shall*** *not be used in the vicinity of electrical equipment or scaffold.*

Scaffold inspections ***shall*** *be carried out by a competent person before use and then weekly (7 Days). Inspections will also need to be carried out following any modification or alteration to scaffolding; reports to be provided to RES weekly.*

5.13 Work at Height

Any work at height or below ground level activity, ***shall*** *require a method statement & risk assessment and be reviewed by RES prior to starting the work. A safe access & safe work place* ***shall*** *be provided via use of crawling boards, ladders, barriers, handrails, toe boards, edge protection as applicable. All materials* ***shall*** *be prevented from falling. Warning notices shall be displayed, along with exclusion zones at all levels, access routes etc.*

The Work at Height hierarchy; Avoid, Prevent, Minimise should be implemented; 'collective' protection methods shall take priority to

individual personal protection, with fall arrest equipment only being used if all other forms of protection cannot be achieved.

If Fall Arrest is to be used, persons must be fully trained in its use; it shall be inspected before / during use and have appropriate tested attachments; relevant records of equipment tests / dates to be provided. 100% attachment of the equipment is required during working at height, including double lanyards or other fall arrest equipment if collective measures are not implemented, method statement shall include Emergency Plans to rescue a suspended casualty. The Contractor shall inspect all equipment to ensure compatibility between each item being used.

*MEWPS, mobile scaffold, podium steps **shall** be used where possible, ladders shall only be used for short duration low risk work, for no more than 30 minutes and only where stability can be achieved.*

5.14 Risk & Environmental Controls

Contractors shall identify all potential environmental risks and report to the Site Manager, inform all employees of the site environmental rules and inform RES of environmental incident or potential incident as soon as practicable. Provision of information to RES for carbon counting / sustainability targets and records, typically: vehicles on site, mileage covered, fuel used (site equipment), materials used, visitors and travel details, etc.

5.15 Environmental Plan

Contractors will be required to provide relevant documentation for inclusion into the RES Environmental Plan when applicable, all contractors are to comply with the RES Environmental Plan at all times.

5.16 Existing Features (Sites)

*Any disturbance, remediation or disposal of contaminated land shall only be carried out under the direction of RES and in accordance with the Health, Safety (and Environmental) Plan, areas of contaminated land **shall** be fenced off and all persons made aware of its location and hazardous nature. Where any unexpected or potential hazardous obstacles are encountered, work **shall** cease until specialist advice has been obtained.*

*Underground services **shall** be identified in the site Health, Safety (and Environmental) Plan and controls put in place for the works to be undertaken, i.e. permit to work, risk assessment, etc. If poor conditions of underground services are found after exposure, this is to be reported to RES and the relevant authority.*

*Any old containers found on site should be checked and emptied by a licensed waste carrier before removal. Pollution is often caused through vandalism, theft or fly tipping – the site or working area **shall** be protected by fencing and locked access to discourage unauthorised access. Any instances of tipping on site **shall** be reported to the Site Manager.*

5.17 Discharges to Water

*All employees **shall** be made aware of the following:*

- *Rules about discharges to drains from spillage*
- *Refuelling / storage controls to be in place & location to be away from surface drains (minimum 10m distance)*
- *Use of bunded areas / bunds, double skinned bowsers for storing of fuels, liquids etc – to be checked weekly*
- *Management of any / all spills, spill kits, informing Site Manager etc (included in risk assessment)*
- *Discharge of any fuel, chemicals, silt, etc to a drain or water course is forbidden. Ensure that a suitable method for containing any surface water is provided when working near to a watercourse*
- *Surface water drains should only carry uncontaminated rain water and shall be protected from any other contaminants*

Methods for prevention of pollution to water courses shall be regularly checked and maintained – failing of systems should be reported immediately to RES.

5.18 Hazardous Substances (COSHH)

Contractor shall provide a list of substances, liquids, gases, etc to be used on site or with their work activities, along with quantities to be stored in secure storage containers, clearly labelled with legible warning signs and content details. MSDS & COSHH Risk Assessment & register and controls in place, including emergency plans.

As defined by COSHH Risk Assessment, spill kits are to be located near any hazardous liquids or substances either at point of use or storage area. Emergency procedures and associated equipment shall be provided – 'Kelp' bio-remediation solution shall be

provided for early treatment of any spills after initial clean up.

*Generators **shall** be provided with an internal bund and external fuel tank with fuel cut off float switch, the refuelling area shall be kept empty of water (covered area or inceptor/full retention separator).*

Bowsers are to be stored to minimise risk of collision, run-away and vandalism, with a flexible pipe, tap or valve provided with an appropriate lock for security when not in use. Flexibly delivery pipes for use with refuelling must be fitted with manually operated pumps or a valve that closes automatically when not in use (delivery end).

*Fuel type and capacity shall be displayed, along with no smoking signs and close valve when not in use signs, etc. A responsible person **shall** supervise deliveries, check tank quantities and emptying of tank and residues for safe disposal elsewhere.*

*Switch gear containing SF6 (Sulphur Hexafloride) **shall** be labelled on the equipment and substation door, along with contractor details and any leak **shall** be reported to the Site Manager and acted upon following the emergency contamination spill procedure.*

5.19 Waste Management

*Waste management **shall** follow the waste hierarchy of: Prevent, Reduce, Re-use, Re-cycle, Other recovery before disposal, all wastes shall be stored and segregated at designated disposal points away from watercourses and potential risk areas (cleared from work area as it is accumulated).*

All personnel are to prevent litter from being blown around the site by disposing of rubbish responsibly. Skips must be covered to prevent refuse blowing away and rainwater accumulation. Skips to be replaced when full and disposal shall be in accordance with statutory requirements and RES Site Waste Management Plan, Contractors shall provide appropriate waste documentation.

5.20 Earthworks

Contractors shall work to the site drainage / SuDS design statement for the site. Appropriate drainage / SuDS management methods shall be agreed with the Site Manager where no Construction Method Statement is present.

*Contractors shall make best endeavours to prevent water becoming contaminated at the place of work, activity area and to prevent build up of silt; shall use methods of work that eliminate or reduce workings in channels and do not contaminate surface water. Water containing silt **shall** not be discharged directly into rivers, streams or surface water drains. If silty water does occur and present a hazard, suitable treatment will be required – details of controls to be presented to the Site Manager.*

*Contractor shall prevent water from entering excavations, any cut-off ditches, well point de-watering or pumping shall be in accordance with the site drainage plan. Disturbance to flora and fauna whilst carrying out works **shall** be kept to the minimum and agreed with the Site Manager.*

*Topsoil and vegetation (not part of subsoil) **shall** be retained and stored in accordance with the Site Spoil Management Plan and reinstated on all areas of stripped ground as soon as possible to prevent erosion and leaching.*

Where wet and marshy ground occurs, excavated materials may need to be stored on a geotextile. Turf shall be reinstated wherever possible to maintain the original species mix. Exposed ground and stockpiles / storage shall be kept to the minimum to prevent silt and dust build up, whilst long term storage shall be controlled and stockpiles seeded with recovered seed, covered and silt fences constructed from geotextile where required. In dry weather dust suppression controls will be required to eliminate at source, e.g. watering.

Environmental Agency guidance shall be used as guidance in control measure for works and maintenance in or near water.

5.21 Road Cleanliness

Site roads to be brushed or scraped as required to minimise mud and dust deposits, especially at site entrances and watercourse crossings; mechanical suction brush may be necessary. Wheel wash stations may be required to mitigate debris going onto public highways, private roads or accesses. Used water shall be collected and passed through a silt trap before disposal.

5.22 Drip Trays

Where practicable, drip trays shall be used to contain absorbent granules, sheets or fibres and disposed of to site rules. Once used, drip trays shall be cleaned using appropriate materials and disposed of in accordance with COSHH regulations. Regular checks and cleaning of drip trays to be carried out.

5.23 Concrete

*All concrete disposal shall be as set out in the Site Waste Management Plan (SWMP) when in place or responsibly and in accordance with legislation when no SWMP in place. Cement and wash out water is not to enter any watercourse or aquifer; wash out of cement vehicles **shall** only be permitted in a designated and suitable prepared wash out area(s), clearly signed and to the satisfaction of the RES Site Manager.*

Tools, equipment or materials shall not be washed in watercourses, mortar mixing and storage shall be clear of any watercourses. Any concrete works near to a watercourse shall be approved by the appropriate agency and the RES Site Manager.

5.24 Wildlife

*Wildlife **shall** be protected from entering and becoming trapped in any part of the works on site. For excavations this may mean provision of fences, crossing or escape routes. Due consideration shall be given to hazards presented to personnel from wildlife; adders, wild boar, buzzards, wasps etc.*

5.25 Emergencies

*Environmental emergencies such as spills **shall** be dealt with in accordance with the Environmental Emergency Response Plan - familiarisation with this plan is required before commencement of any works. Any spill kit provided **shall** be made accessible at all times to all site staff.*

5.26 Environmental Assessment

Contractor shall provide an assessment of the likely environmental impacts of their activities (if applicable), along with controls to minimise impact and any corrective measures and actions.

6 APPENDICES

Appendix 1 – References
Appendix 2 – Issue / Receipt for Safety and Environmental Requirements for Contractors on all activities

5.1.1 Appendix 1 – RES References

The following documents may contain useful references.

6 App 1.1 RES Documents

i) RES Health, Safety, Quality & Environmental Management Systems, and associated documentation including all IMS, Safety Procedures, RAWP and documents and templates

7 App 1.2 Project Specific Documents

i) The Health, Safety & Environment Plan (Pre-tend construction phase)
ii) Health & Safety Plan
iii) Quality Plan
iv) Environmental Plan
v) Inspection and Test Plan
vi) Site Waste Management Plan

7.1.1 Appendix 2 – Issue / Receipt for Issue / Receipt for Safety and Environmental Requirements for Contractors on all activities

SAFETY & ENVIRONMENTAL REQUIREMENTS FOR ALL CONTRACTORS

ISSUE DOCUMENT

Issued to
.....
.....

Contract Number and Description
.....
.....

.....
.....

.....
.....

Location
.....
.....

The person named below is the Company Project Manager responsible for overall management of the contract.

Project Manager
.....
Telephone .....

The person named below is the Company Site / Facilities Manager responsible for local management of the contract, who shall be permanently on Location.

Site Manager
.....
Mobile .....

Other Site Telephones
.....
.....

The Site Manager shall always be the first point of contact, if for any reason, he is not available you shall contact the Company Project Manager.

The Company Integrated Management System and Site Rules are available / displayed at:

.....
.....

SAFETY & ENVIRONMENTAL REQUIREMENTS FOR ALL CONTRACTORS

RECEIPT DOCUMENT

RENEWABLE ENERGY SYSTEMS COPY

(To be detached and retained by the Site Manager when this document is issued to a Contractor on site)

I acknowledge receipt of the safe works procedure - Safety & Environmental Requirements for All Contractors.

Contract Number and Description
.....
.....

.....
.....

.....
.....

Location
.....
.....

Signed .....

Contracting Company
.....
.....

Date .....

Contracting Company Head Office Telephone
.....

Local/site Telephone Number
.....

ANNEX 3 - EMERGENCY PROCEDURE IN THE EVENT OF A CONTAMINANT SPILLAGE

Emergency Procedure in the Event of a Contaminant Spillage

Report No: 01276R00001

History

Issue	Date	Nature And Location Of Change
1	13th Nov 2020	First isse

CONTENTS

1.0 OBJECTIVES

This procedure details the emergency procedure to be followed and actions to be taken in the event of a hazardous waste spillage such as oil, fuel and chemicals, occurring on a RES managed premises or site / project in order that the environmental impacts that may be associated with a hazardous waste spillage may be mitigated.

2.0 SCOPE

This procedure covers all UK geographic locations; sites, project or offices for which RES are responsible for or manage.

3.0 PROCEDURE

3.1 Project, Site or Office Locations

		Responsibility
i)	The Contractor shall provide MSDS and COSHH assessments for all substances controlled under COSHH that are to be used or stored on the site. Records of the supplied MSDS & CoSHH Assessments shall be maintained. Note: Substances with hazardous properties such as cement, concrete and curing agents are all controlled by the COSHH.	**C**
ii)	Appropriately sized spill kits shall be provided for the controlled substances that will be used or stored on the site; the contractor shall train personnel in the use of these spill kits and maintain training records.	**C** **RRM**
iii)	The Contractor shall provide oil spill training and awareness to their staff RES have subscribed to an emergency environmental call-off support service from Veolia to be used the event of a major spill, details included in Project Directory or can be provided by the HSQEM.	**C,** **HSQEM**
iv)	In the event of a liquid spill occurring the Contractor shall cease work in the vicinity immediately. If spillage is flammable, extinguish all ignition sources. Identify source of pollution and rectify the problem. The Contractor's trained personnel shall immediately deploy the spill kit in accordance with the manufacturer's instructions. Contractor's personnel shall don appropriate PPE and clean up the spill. All used spill kit materials should be disposed of in the proper manner.	**C**
v)	In the event of a concrete spillage into water channel or surface water, as the waste is highly alkaline it is regarded as Hazardous Waste. Every effort should be made to contain the movement of the liquid cement in the watercourse or drainage channel. Similarly in the event of a Peat / Spoil Movement / Slip into a water course; remove any peat or clay material which has entered the watercourse and transport to a location where it will no longer be a source of pollution. Notify the following agencies; Environmental Agency (region specific; EA, SEPA or NIEA etc), local Fisheries.	**RRM,** **C**

vi)	Place geotextile silt fences/stone barrages at downstream points in the river as required. Constant monitoring should be maintained not only of the water quality (clarity) downstream of the check dams, but also of the excavated peat or clay material. Consideration should also be given to the subsequent movement of the spoil / peat and any preventative / containment measures required.	**RRM**
vii)	The Contractor shall inform the RRM of the incident as soon as possible and certainly no more than 1 hour after the spill.	**C**
viii)	The Contractor is responsible for replacing the used spill kits as soon as possible and no later than 24 hours after use.	**C**
ix)	The Contractor is responsible for ensuring that used spill kits and any other oil / fuel soaked / contaminated material e.g. rags, used during the incident are disposed of in accordance with the Environmental Waste Management Regulations in operation. These materials shall be bagged up and disposed of at a licensed hazardous waste disposal site e.g. taken away by a licensed oil / fuel disposal / broker company.	**C**
x)	The Contractor shall submit copies of the receipt or waste oil certificate to the RRM within 48 hours.	**C**

4.0 REFERENCE DOCUMENTS

i) IMS 20 – Emergency Incident Preparedness and Response HSQE00-001043

5.0 DEFINITIONS

	Abbreviation or term	Explanation of abbreviation or term
i)	C	Contractor: Any company or person employed by RES to carry out any work on a site / project or office location
ii)	COSHH	Control of Substance Hazardous to Health Regulations 2011
iii)	H&S Plan	Health and Safety File maintained by the Site Manager
iv)	HSQE	Health, Safety, Quality & Environment
v)	HSQEM	HSQE Manager (Head of HSQE)
vi)	MSDS	Material Safety Data Sheet supplied by manufacturer
viii)	RRM	Responsible RES Manager (Construction Site – Construction Site Manager, Generation Site – Site / Asset Manager, Office Locations – Office Manager)

Cairn Duhie Wind Farm

Appendix 4.2: Outline Construction and Decommissioning Environmental Management Plan

Revision History

Issue	Date	Author	Nature and Location of Change
01	17th Sept 2020	Calum Campbell	First issue
02	5th Nov 2020	Calum Campbell	Various changes including updating ES to EIA-R & Construction Programme update.
03	16th Dec '20	Calum Campbell	Annex format updated following comments from LUC.

CONTENTS

1.0 INTRODUCTION

This Construction and Decommissioning Environmental Management Plan (CDEMP) is submitted by RES. The principal objective of this document is to provide information on the methodologies to construct and decommission Cairn Duhie Wind Farm (ECU ref: ECU 00002026).

The contractor(s) appointed to construct the project will prepare detailed method statements to construct the works which will incorporate the details outlined in this CDEMP.

This CDEMP sets out the overarching construction management philosophy for the site and provides further details on specific activities that will be undertaken on the site.

1.1 Project Description

The proposed Cairn Duhie Wind Farm includes the installation of 16 wind turbines with a height to blade tip of up to 149.9m and associated infrastructure including; on-site substation, site tracks, crane hardstandings, electrical cables, and temporary infrastructure to facilitate the construction works.

Relevant Drawings of the site infrastructure are included in ***Annex 1***.

Table 1.1: Outline Project Programme

TASK	CONSTRUCTION MONTH														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Site set-up															
Site tracks & hard standings															
Substation and control building															
Foundation construction															
Cable installation															
Turbine erection, commissioning & testing															
Reinstatement															
Site demobilisation															
Miscellaneous															

1.2 Community Liaison

Throughout the construction period of the project, RES will maintain an open dialogue with local residents and all other interested parties. RES will ensure the local community is provided with regular updates on the progress of construction and upcoming activities through appropriate channels.

RES has appointed a member of staff responsible for key contact between RES and the community. This person is the nominated point of contact for local residents in connection any issues that may be raised during construction, operation and decommissioning of the wind farm. This person is:

Callum Whiteford
Community Relations Manager
E: Callum.Whiteford@res-group.com
T: +44 (0) 141 404 5560
M: +44 (0) 750 093 7925

Any change to the appointed person shall be communicated to the planning authority and the local community representatives as required.

2.0 GENERAL CONSTRUCTION MANAGEMENT PRINCIPLES

Cairn Duhie Wind Farm will be constructed in accordance with the Environmental Impact Assessment Report prepared during the development stage of the project.

Throughout the development of the project, the aim has been to ensure the design:

- Minimises the extent of infrastructure;
- Avoids sensitive habitats;
- Minimises environmental impacts; and
- Maximises health and safety.

Where appropriate and practicable, local plant and materials will be used in order to maximise the benefit of the wind farm project to the local economy.

2.1 Environmental Management and Pollution Prevention

Specific procedures to ensure that the local environment is protected during construction works are managed through our Environmental Management System Procedures and Policies which is certified to ISO 14001.

2.1.1 Contractors Requirements

Details of the environmental management and emergency procedures to be adopted by Contractors during the construction phase are contained within the RES management system procedure *Safety and Environmental Requirements of Contractors* (01059R00038) found in ***Annex 2***.

2.1.2 Surface and Ground Water Management

A sustainable drainage system (SuDS) will be implemented to provide a series of surface water management techniques to mitigate any adverse impact on the hydrology of the site. The Cairn Duhie Flood Risk Assessment, PWSRA ad Outline Drainage Strategy documents are included as ***Annex 3***.

2.1.3 Water Quality Monitoring

Any potential pollution incident on-site that may impact water quality will be dealt with in accordance with the RES management system, *Procedure in the Event of a Contaminant Spill*, included as ***Annex 4***.

Water quality monitoring will be undertaken on discharge waters during the construction phase to ensure that the development does not impact on local watercourses and rivers.

A bespoke water monitoring strategy will be prepared and implemented by a specialist consultant, detailing monitoring locations, sampling frequency and the methodology for chemical and biological analyses. Site sensitivity will be taken into account when deciding on the level and periodicity of sampling and the proposed monitoring plan discussed and agreed with SEPA prior to implementation.

The exact location of each sampling point will be determined during a walkover survey, and will reflect the point on all relevant controlled waters closest to the proposed active construction areas. Sampling points up- and down-stream of the construction activity will be selected to provide a full profile of the controlled waters.

A baseline report will be prepared following initial pre-construction water quality monitoring. This report will provide details of any contamination concentrations recorded and will be used to depict “uncontaminated background pollution levels” for the site.

In the event of a potential pollution incident, all relevant monitoring points would be visited and re-sampled to determine any changes relative to the baseline data. A report detailing the

findings would be prepared for each incident and recommendations provided for further monitoring and / or requisite mitigation measures.

Following completion of the construction of the wind farm, all sample points will be revisited, re-sampled and analysed for a full suite of analytical parameters and a further report prepared discussing any impacts upon water quality arising from the construction process.

2.1.4 Site Waste Management

A draft *Site Waste Management Plan* is provided in ***Annex 6*** A site-specific *Site Waste Management Plan* will be prepared by the Principal Contractor prior to commencement on-site in accordance with RES management system procedure *Safety and Environmental Requirements of Contractors*, included in ***Annex 2***.

2.1.5 Foul Water Management

Foul drainage will be provided in agreement with the relevant authorities and most likely involve the installation of a septic tank and soakaway. Final design will reflect ground conditions discovered during SI.

2.1.6 Noise Management and Construction Working Hours

The sources of construction noise are temporary and vary in location, duration and level as the different elements of the wind farm are constructed. Construction noise arises primarily through the operation of large items of plant and equipment such as bulldozers, diesel generators, vibration plates, concrete mixer trucks, rollers etc. Noise also arises due to the temporary increase in construction traffic near the site.

BS 5228-1:2009 '*Noise control on construction and open sites; Part 1 – Noise*' is identified as being suitable for the purpose of giving guidance on appropriate methods for minimising noise from construction activities.

For all activities, measures shall be taken to reduce noise levels with due regard to practicality and cost as per the concept of 'best practicable means' as defined in Section 72 of the *Control of Pollution Act 1974*.

The following noise mitigation measures will be implemented where appropriate and in line with further guidance from BS 5228-1;

- Consideration will be given to noise emissions when selecting plant and equipment to be used on-site. Where appropriate, quieter items of plant and equipment will be given preference.
- All equipment should be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable;
- Stationary noise sources shall be sited as far as reasonably possible from residential properties and, where necessary and appropriate, acoustic barriers installed to further reduce the impact;
- The movement of vehicles to and from site will be controlled; and
- Employees will be instructed to ensure compliance with the noise control measures adopted.

Should it be considered necessary to further reduce noise levels, mitigation measures would be considered and appropriate measures will be undertaken.

There are many strategies that could be employed to reduce construction noise levels; BS 5228-1 also states that the 'attitude to the contractor' is important in minimising the likelihood of complaints and therefore consultation with the local community should occur. Non-acoustic

factors such as mud on roads and dust generation, which can also influence the overall level of complaints, will also be controlled as detailed elsewhere in the CDEMP.

In the event that noise complaints are received, the senior RES on-site staff member will contact the complainant and if required, visit the property to discuss the complaint and subjectively assess the noise levels. If the noise complaint is found to be merited, additional mitigation measures will be put in place.

In the event a resolution cannot be reached between RES and the complainant, the planning authority will be informed in order that they can carry out their own subjective assessment and if required agree any additional mitigation.

All noise complaints will be recorded along with actions taken to resolve the issue. These records will be available to the Council on request.

Construction work which is audible from any noise-sensitive receptor shall only take place on the site between the hours of 07:00 to 19:00 on Monday to Friday inclusive and 07:00 to 12:00 noon on Saturdays, with no construction work taking place on Sunday or on a Bank Holiday or Public Holiday. Out with these specified hours, development on the site shall be limited to turbine erection, maintenance, emergency works, dust suppression and the testing of plant and equipment unless otherwise approved in advance in writing by the Planning Authority with the exception of emergency works which shall be notified in writing within 24 hours of their occurrence.

Heavy Goods Vehicle (HGV) movements to and from the site (excluding abnormal loads) during construction of the wind farm shall be limited to 07:00 to 19:00 Monday to Friday inclusive, and 07:00 to 12:00 noon on Saturdays, with no HGV movements to or from the site taking place on a Sunday or on a Bank Holiday or Public Holiday.

2.1.7 Dust Management

The potential issue of dust creation during the works will be weather and season dependant, therefore detailed dust management methods will be subject to the works programme and contractor working methods.

Dust management will be carried out at all times in accordance with industry best practice to ensure that any local sensitive receptors are not affected by nuisance levels of dust from the works.

The following methods of dust suppression will be implemented during the construction phase of the wind farm as required:

- Site tracks to be damped down using bowser or other suitable system;
- Road sweeper to be used to remove loose material from adjacent public roads during construction;
- Cleaning of vehicles, including provision of waterless wheel washing facilities, prior to exiting site onto the public road;
- Soil erosion control measures;
- Speed limits to be put in place to ensure low vehicle speeds;
- Vehicle loads to be covered;
- Damping of dry excavations and cutting activities which generate dust; and
- Sequencing of works to minimise the time that soils are exposed.

2.1.8 Spoil Management

Excavated peat, topsoil and subsoil will be reused within the works either as part of backfilling or reinstatement operations or used to form landscaping verges. Materials will generally be stockpiled close to the location of reuse to limit vehicle movements on-site. Further details of how spoil and peat shall be managed on the site are set out within the *Peat Management Plan* included within ***Annex 5***.

2.1.9 On-Site Fuel and Chemical Storage

All fuel and chemicals will be stored within appropriately specified containers and within specifically designed stores / storage areas and shall include appropriate measures to avoid spillages in line with the relevant legislation and as set out in the Cairn Duhie Pollution Prevention Plan.

2.1.10 Vehicle and Plant Washing

Vehicles, plant machinery and equipment will be cleaned at designated washout areas located conveniently and within a controlled area of the site.

2.2 Temporary Lighting

Temporary lighting will be required at the construction compounds for security purposes and to ensure that a safe working environment is provided to construction staff. In addition, temporary lighting may be required to ensure safe working conditions at tracks, control building and turbine locations during construction.

All temporary lighting installations will be downward facing and all lights will be switched off during daylight hours.

2.3 Peat Slide Risk and Slope Stability

A Peat Landslide Hazard Risk Assessment has been undertaken as part of the Environmental Impact Assessment Report and the design of infrastructure has taken into account the findings of the assessment. In order to minimise the risk of potentially inducing peat landslides during construction at the site the following mitigation measures have been provided:

- Infrastructure should be designed to avoid areas of deeper peat and unsuitably steep sloping ground where possible;
- For sections of track that require track side cuttings into peat, suitable support measures will need to be designed to maintain stability of the adjacent peat terrain;
- The design will be refined through the pre-construction phase following completion of a detailed ground investigation;
- The track layout will be designed to take into account the drainage systems;
- The development of robust drainage systems which will need minimal maintenance and also minimise increased sedimentation into natural watercourses; and
- Redirection/management of existing drainage systems.

2.4 Utilities

Existing utilities and services are present along the abnormal access route, just off the A939 which runs parallel with the western edge of the site boundary. At the proposed site entrance location on the A939, where it is expected that upgrade works are required, underground BT cables are present.

2.5 Post Construction Restoration and Reinstatement

During construction of the infrastructure elements (detailed in Section 3), the vegetated layer will be stripped from the area of the excavation and stored locally with the growing side up. The remaining organic topsoil and subsoils will be excavated down to formation level, or a suitable stratum, and again will be stored local to the point of excavation, but shall remain

segregated to avoid mixing of materials. Topsoil shall be stored in mounds which do not exceed 2m in height, to retain the integrity of the topsoil

Temporary storage areas shall take cognisance of all identified buffer areas and be stripped of vegetation prior to stockpiling in line with best working practices. As construction is progressed the effectiveness of the buffer zones will be reviewed and if necessary adjusted. Alternatively the construction procedure may be reviewed and altered or additional control measures put in place.

Post-construction reinstatement will be undertaken as work progresses to minimise the period of time any organic material is stockpiled. Subsoils shall be used in landscaping and backfilling around structures while the vegetated layer and/or topsoil will be used to reinstate storage and working areas, road verges, drainage swales and embankments. Topsoil/ vegetated layer shall be respread to a minimum depth of 150mm. In addition, following the completion of the works, a final inspection of the wind farm site will be undertaken and in circumstances where reinstatement using vegetation and/or topsoil is unsuccessful alternative methods will be considered.

Upon completion of all construction works, the temporary construction compounds and temporary access tracks (link road to the south of Ferness) will be reinstated to their approximate pre-wind farm condition. All temporary structures and construction equipment will be removed and the granular material that forms the hardstandings will be moved to areas agreed with the landowner or removed from site. Following this, the areas will be backfilled with material stripped and stored during the construction of the wind farm and reseeded as required.

In line with construction best practice and to suit the ground conditions anticipated on-site, the track and hardstanding design has endeavoured to minimise spoil generated during construction.

2.6 *Traffic Management*

Details of the proposed traffic management arrangements are contained in the *Cairn Duhie Wind Farm Outline Traffic Management Plan* (TMP) (02914-1880786), which is included as ***Appendix 10.2*** of the EIA-R. Any operations not covered by the TMP will be performed in accordance with local and national standards and specifications.

2.7 *Health and Safety Management*

The Principal Contractor will be responsible for ensuring that a construction phase health and safety plan is prepared and implemented on-site. All work will be carried out in accordance with:

- The Health and Safety at Work etc. Act 1974;
- The Construction (Design and Management) Regulations 2015; and
- All applicable third party safety guidelines.

2.8 *Environmental*

Once appointed, the Ecological Clerk of Works (ECoW) will be fully engaged in all preparatory works and their terms of appointment extended throughout the construction period into the operational period.

3.0 DESIGN PHILOSOPHY AND CONSTRUCTION METHODS

3.1 Micro-siting of infrastructure

During the detailed design phase, the location of wind farm infrastructure may need to be micro-sited though at this point in the wind farm design process there is no planned micro-siting of infrastructure.

3.2 Site Entrance

All traffic associated with construction of the wind farm will access the site from the A939 using the newly constructed site entrance in accordance with the TMP. Wheel cleaning facilities will be set up at the main entrance to remove mud from the wheels of vehicles leaving the site. Public roads will be inspected daily and a road sweeper will be employed to remove any mud or debris transferred onto the roads from site activities.

The relevant drawing of the proposed site entrance is included in ***Annex 1***.

3.2.1 General Construction Method

The site entrance will be constructed in accordance with the design drawings as follows:

- Traffic management to be installed;
- Topsoil shall be removed and carefully stockpiled;
- New highway drainage shall be installed taking care to ensure that existing drainage will not be compromised;
- Edge restraints where required in the design will be installed;
- Road pavement works to be completed to the design requirements; and
- Line marking, signage, fencing and vehicle restraint systems required as part of the design will be installed.

3.3 Temporary Construction Compounds, Site Tracks and Crane Hardstandings

3.3.1 Temporary Construction Compounds

Temporary construction compounds are required for the provision of site offices, welfare facilities and storage arrangements for materials, plant and equipment. 2 temporary construction compounds are required for different areas and stages of the project.

The temporary construction compounds will be constructed at the locations indicated on drawings in ***Annex 1***.

A temporary enabling works compound will be located at the site entrance to facilitate early construction activities before the creation of the temporary construction compounds. The temporary enabling works compound will subsequently be used as the site gatehouse entrance and as a car park for operatives working on the wind farm.

The temporary construction compounds will be the main compounds for the site with welfare facilities at this location.

An area will be assigned for the storage of fuels and chemicals, ensuring any spillage is captured and appropriately dealt with. Refuelling will be undertaken in line with the requirements as outlined in the *Safety and Environmental Requirements of Contractors* (01059R00038) found in ***Annex 2***.

3.3.2 Site Tracks

The running width of the tracks will be typically 4m on straight sections including shoulders of 0.25m on each side, increasing at corners and passing places to accommodate the swept path of turbine delivery vehicles. The track working area will be kept to the minimum required allowing for working area, safe access, drainage and electrical works.

Site tracks will consist of a compacted stone structure. Where tracks cross over services such as gas pipelines or electricity cables, they will be designed after consultation with the relevant authority and in accordance with their specific requirements.

A number of track designs may be utilised on-site which will be determined during detailed design, dependent on the ground conditions encountered on-site and include:

- Excavated Track, and;
- Floating Track;

Track drainage will be incorporated within the design in accordance with sustainable drainage design principles. Where the road alignment crosses existing drainage channels, crossings appropriate to the location will be designed in accordance with the relevant guidelines.

A buffer zone in accordance with the relevant guidance from SEPA will be maintained around watercourses shown on drawings in ***Annex 1***. Site personnel will be made aware of the buffer zones through the site induction and specific toolbox talks.

Excavated Track

Typical track construction may be used in areas identified where the thickness of soft soils is low, and the underlying layer has adequate load bearing properties. This track system will likely consist of a suitable capping layer and then a suitable running layer.

Floating Track

Floating track construction may be adopted where the ground conditions require. This system involves installing geo-grid directly onto the organic or exposed soil layer and placing layers of suitable stone and additional geo-grid (as required) above until the track design level is achieved.

3.3.3 Crane Hardstandings

The main crane hardstanding area is anticipated to be 40m x 35m. There may be additional temporary hardstanding areas required for the erection of the main crane, lay down of materials and turbine components.

The main crane hardstanding area will be left uncovered for the operational lifetime of the wind farm in line with good practice outlined in the Scottish National Heritage guidance "*Good Practice during Windfarm Construction*". Temporary crane hardstanding elements will be reinstated post construction.

All crane hardstandings will consist of one or a combination of the following:

- A compacted stone structure bearing directly on a suitable formation strata;
- A compacted stone structure bearing on a formation strata strengthened through ground improvement techniques; or

- A compacted stone structure bearing on a strengthened soil mass created by the installation of multiple stone or concrete columns.

3.3.4 General Construction Method

Where competent soils exist close to the existing ground surface the following construction method will typically be followed:

- Track alignments will be established from the construction drawings and marked out with ranging rods, timber posts or steel pins.
- Track corridors shall be pegged out 500 - 1000m in advance of operations.
- Where possible, upgraded access tracks will re-use the structure of the existing track to reduce construction requirements.
- Material will be excavated and stored.
- Cut track construction will be used where soils are identified as being shallow. This cut track system will likely consist of a suitable layer of crushed aggregate, either spread by a dozer or placed by hydraulic excavator, prior to being compacted in layers by vibratory rollers. If ground conditions dictate a geotextile membrane will be applied.
- Floating track construction may be adopted where the ground conditions dictate. This system involves installing a geogrid membrane directly onto the organic vegetated layer and placing layers of suitable stone and additional geogrid layers (if required by the design) above. If ground conditions require a geotextile membrane may be applied also.
- Drainage swales will be excavated adjacent to the tracks where required. Surface water runoff will not be allowed to discharge directly into existing watercourses but will be routed through a Sustainable Drainage System (SuDS).
- A surface water cut off ditch may be installed on the slope above the earthworks footprint where achievable given the topography.
- Where the road alignment crosses existing drainage channels, crossings appropriate to the location will be designed in accordance with the relevant guidelines.
- Depending on depth and type of material, cut slopes are anticipated to be between 1:1 to 1:3.
- Post-construction reinstatement shall be in line with the details of Section 2.5.
- Trenching or excavation activities in open land will cease during periods of intense rainfall. Temporary bunding will be provided as required, to reduce the risk of oil or chemical spills to the natural drainage system.

Where the load bearing properties of the underlying soils are determined to be insufficient, ground stabilisation may be carried out to provide adequate bearing capacity of the formation level. Due to the variable nature of the ground at the site, specific construction methods shall be selected at detailed design stage in consultation with specialist contractors. Such methods may consist of:

- Compaction of the existing in situ soils;
- Lime/cement stabilisation of the existing in situ soils; or
- Installation of stone or concrete columns to provide adequate support.

3.4 Turbine Foundations

Turbine foundations will be designed in accordance with the relevant design standards. Due account will be taken of guidance provided in appropriate codes and standards such as Eurocodes, British Standards and other specialist design documents.

Due to the anticipated load bearing capacity of the near surface soils, gravity base turbine foundations are expected to be used to support the wind turbine.

The foundations will be designed as a reinforced concrete slab. The foundation geotechnical design will be based on information gathered during site investigation, which will be carried out post consent.

3.4.1 Gravity Base Construction Method

The gravity base foundation general construction method would generally be as follows:

- The topsoil will be excavated and stored to one side for reuse during the landscaping round the finished turbine;
- Excavation will be undertaken to competent material. Excavated subsoil material may be stockpiled temporarily adjacent to the excavation for later use as backfill or stored elsewhere on-site. Temporary & permanent drainage shall be installed at the same time as the excavation works;
- In the case where competent material is lower than the required formation level the foundation will likely be over-excavated to competent material and compacted engineering fill placed to the required level;
- Where excavation is required to extend below the water table or in material which does not drain freely, appropriate pumping will be employed to keep the excavation dry. Water pumped from an excavation shall not be discharged directly to any watercourse;
- A layer of concrete blinding will be laid directly on top of the newly exposed formation, finished to ensure a flat and level working surface;
- Steel reinforcement, the turbine anchorage system and cable ducts will be fixed in place and formwork erected around the steel cage;
- Concrete will be placed using a crane, pump or other suitable lifting device and compacted using vibrating pokers;
- Sulphate-resistant concrete (as detailed in the Code of Practice for Concrete Design BS 5328) will be used for the construction of turbine bases to withstand sulphate attack and the resultant alkaline leaching into groundwater;
- The foundation will be backfilled with suitable material, and landscaped using the vegetated soil layer set aside during the initial excavation; and
- A gravel path will be built leading from the access track or crane hardstanding to the turbine door or access steps and around the turbine for maintenance.

3.5 Turbines and Turbine Transformers

3.5.1 Turbines

The turbines will be supplied with a light grey semi-matt finish (RAL colour 7035) or suitable alternative and installed with a height not exceeding 149.9m measured from ground level to the blade tip in the vertical position.

The turbines shall not carry any symbols, logos or other lettering except where required under other legislation. However, RES proposes to add turbine numbers to the base of each tower to aid service engineers during the operational phase of the wind farm.

In line with Health and Safety best practice, turbine manufacturers have indicated a preference to locate a passive infra-red (PIR) detector and light above each turbine door. It should be noted that this lamp will not be permanently lit and would only be switched on by the PIR when personnel approach a particular turbine.

Specific locations for the turbines are as per drawings in ***Annex 1***.

3.5.2 Turbine Transformers

Turbine transformers will be placed internally within the turbine tower.

Oil cooled transformers will be supplied full of oil and will not require topping up on-site. The transformers will be sealed and will be inspected for any damage prior to offloading. Air cooled or cast resin transformers do not require cooling oil.

The transformers will be located within enclosures which shall be locked, accessible by trained and authorised personnel only, and displaying appropriate warning signs.

3.5.3 General Turbine Erection Method

The following general steps will be undertaken in order to erect the turbines on-site:

- Some turbine components will be pre-delivered in sections to the site and offloaded at the crane hardstandings;
- The remaining turbine components will be delivered on a just-in-time basis and be lifted directly from vehicle trailers;
- Turbine components will be lifted by adequately sized cranes (one main crane and one smaller tail crane) and positioned on the foundations / other turbine sections until the entire turbine is erected;
- Upon completion of the erection all fasteners will be tightened and the internal fit out of the turbine undertaken;
- The turbines will then be connected to the wind farm substation; and finally

Turbine testing and commissioning will be undertaken before the turbines will be handed over as complete.

3.6 Control Building and Substation Compound

Cables will export power from the wind turbines to the substation compound and control building before being transferred to the National Grid Transmission Network. The location of the Control Building and Substation Compound is shown on drawings in ***Annex 1***.

The RES control building has been designed, sized and positioned to be sympathetic with the surroundings. The building contains the following rooms; control room, switch room, SCADA room, and equipment store and welfare facilities.

The detailed design of the foundations for the building will be based on the Site Investigation reports and building requirements, and will ensure loads associated with the building are transferred to the appropriate bearing layer in the sub-surface.

The building design, including external appearance, dimensions, surface materials of the substation, etc. will be agreed with the Planning Authority prior to development.

Foul drainage will be provided in accordance with Building Control requirements and in agreement with SEPA.

3.6.1 General Construction Method

The control building and substation compound will generally be constructed in accordance with the following:

- The plan area of the substation control building and compound will be set out and the topsoil stripped and removed to a temporary stockpile;
- The building foundations will be excavated and concrete poured;
- The building structure will be constructed from the foundations, in accordance with current practice and specific design; and
- The internal fit out of the building including installation of services will be completed.

3.7 Cabling Works

All electricity and other service cables between the turbines and the substation / substation control building will be placed underground.

The detailed construction and trenching specifications will depend on the ground conditions encountered but typically cables will be directly buried inside a trench, except at track crossings when cables will be ducted.

3.7.1 General Construction Method

The following construction method will typically be used:

- Trenches will be excavated and a suitable bedding material placed for which to lay the cables upon. The ground is trenched typically using a mechanical digging machine.
- The cables shall be laid directly onto the bedding material;
- The trench will then be backfilled and compacted with suitable material up to the required level and finished with a layer of topsoil to aid in the trench reinstatement;
- A suitable marking tape is installed between the cables and the surface; and
- The cables are terminated on the switchgear at each turbine and at the substation.

3.8 Concrete Batching Plant

An on-site concrete batching plant will be constructed at the location shown on drawings found in ***Annex 1***. The footprint of the batching plant will to be capable of withstanding the bearing pressures required for the plant to be installed there. All plant components will be self-contained with track running gear and can be moved as conventional trailers.

3.8.1 Cement Handling

- Cement will conform to design specification and will be from one source;
- Cement will be delivered to project site in bulk tankers;
- Cement will be pumped into silos by pneumatic blower to an induction pipe mounted on the side of silos;
- Dust filters will be installed on all silos to ensure minimal dust emission to atmosphere during silo filling;
- All silos will be fitted with high low Indicators; in addition, the high level indicator will shut valve on induction pipe when silo full ensuring no overfilling and pressurising of the silo.

3.8.2 Aggregate Handling

- Coarse aggregate and fine aggregate will conform to the design specification;
- Delivered aggregates will be stored on ground bins which will have sub-base bases with suitable fall to prevent ground contamination and allow run off of ground water;
- Aggregates will be fed into covered bins in the batching plant using a front-end loader.

3.8.3 Water Handling

- Water will be potable water stored in several large tanks;

3.8.4 Concrete

- The concrete batching will take place within a sealed unit to control emissions of dust, noise and to provide quality control of the final product;
- Concrete lorries will be washed out in dedicated wash out areas on-site which comprise of lined containers with sufficient capacity to take the wash out material from the lorry;
- This water will be disposed of to a licensed waste facility.

3.9 Communications Mast

The location of the communications is identified on drawings included in ***Annex 1***.

The mast will require its own reinforced concrete foundation and crane pad to enable erection, plus associated electrical and communication plant that service the mast. The foundation construction and mast erection will follow a similar approach to that of the turbines.

4.0 DECOMISSIONING AND RESTORATION PLAN

At the end of the operational life of the wind farm a decision would be made as to whether to refurbish, remove, or replace the turbines. If refurbishment or replacement were to be chosen, relevant planning applications would be made.

4.1 Site Track & Hardstanding Areas

New site tracks and hardstanding areas constructed during development of the wind farm will be reinstated to the approximate pre-wind farm condition, unless otherwise agreed with the Landowner and/or Local Planning Authority. Areas to be reinstated would be treated in the following way:

- The material used to construct the tracks will be taken up and removed to areas identified in the site restoration scheme;
- The areas will be backfilled with suitable fill material, covered with topsoil and reseeded as required; and
- Backfilling of access tracks will be carefully planned in advance to avoid having to unnecessarily move plant and equipment on freshly reinstated land.
- Any tracks which were upgraded during the development of the wind farm would be left unchanged from the conditions used during the operation phase of the wind farm.

4.2 Wind Turbines

The decommissioning of the wind turbines will be the reverse of the erection process involving similar lifting plant and equipment:

- Wind turbines will be disconnected from the cabling and internal components stripped and taken off site;
- It is anticipated that the turbine nacelle would then be taken down and loaded straight onto the back of transport vehicles and removed from site for reconditioning or scrap; and
- The turbine towers and blades would be taken down and either transported directly off site or broken down into smaller components if required.

4.3 Turbine Foundations

It is widely accepted that there is no appreciable effect on the local environment from buried reinforced concrete structures left in-situ due to the inert state of concrete. Therefore, the foundations will be reinstated as follows:

- Following the removal of the wind turbine, topsoil and subsoil will be excavated to expose the top of the foundation and set aside for reuse;
- The reinforced concrete foundation will then be broken out to an agreed depth below existing the ground level and the material will be taken up and removed as identified in the site restoration scheme; and
- The excavation will be then backfilled with suitable fill material, covered with topsoil and reseeded as required.

4.4 Control Building and Substation Compound

The control building and substation compound will be decommissioned by disconnecting and dismantling all the surface plant. Solid structures such as the building and equipment plinths will be demolished, and the foundation will be removed to an agreed depth below ground level. Ducting and cabling that is within the depth to be cleared will be removed.

The fence surrounding the compound will be removed and the area landscaped so it can revert to its original state.

4.5 Electrical Equipment

The electrical equipment will be decommissioned in the reverse of the installation method involving similar plant. The equipment will be dismantled, removed from site and disposed of in an appropriate manner.

4.5.1 Cabling

Cables will remain in-situ to avoid any effect to the local environment through their removal.

5.0 RECORDS

Records, as-built drawings, specifications, operational maintenance manuals and residual risks will be collated and filed in the Project Health & Safety file based upon the requirements of the Construction (Design and Management) Regulations 2015.

ANNEX 1: DRAWINGS

EIA-R Reference	Drawing Name	Drawing Number
Figure 4.1	Infrastructure Layout	02914-RES-PRO-DR-PT-001
Figure 4.2	Typical Turbine Structure	02914-RES-WTG-DR-PT-001
Figure 4.3	Typical Foundation Design	02914-RES-FOU-DR-PT-001
Figure 4.4	Typical Crane Hardstand	02914-RES-ACC-DR-PT-001
Figure 4.5	Proposed Batching Plant Layout	02914-RES-ERW-DR-CO-003
Figure 4.6	Typical Cable Trench	02914-RES-CBL-DR-EE-001
Figure 4.7	Construction Compound	02914-RES-CTN-DR-CO-001
Figure 4.8	Access Track Construction	02914-RES-ACC-DR-LO-006
Figure 4.9	Typical Control Building & Substation Plan	02914-RES-SUB-DR-EE-001
Figure 4.10	Substation Building & Welfare Elevations	02914-RES-SUB-DR-EE-002
Figure 4.11	Site Entrance	02914-RES-ACC-DR-LO-007
Figure 4.12	Borrow Pit General Arrangement	02914-RES-ERW-DR-CO-002
Figure 4.13	Battery Storage Compound	02914-RES-BLD-DR-PT-001
Figure 4.14	PCS & Transformer GA	02914-RES-BLD-DR-PT-002
Figure 4.15	Battery Container Elevation with HVAC	02914-RES-BLD-DR-PT-002
Figure 4.16	Substation Earthworks	02914-RES-ERW-DR-CO-004
Figure 4.17	Woodland & Scattered Tree Management Layout	02914-RES-CTN-DR-CO-002
Figure 4.18	Indicative Grid Connection Route	02914-RES-CBL-DR-EE-002

Safety & Environmental Requirements for Contractors on all activities (RSWP 005)

Document Nº: ***01059R00038***

Revision History

Issue	*Date*	*Nature and Location of Change*
1-13		*Previous revision histories to this document can be found in revision 13*
14	*12/09/15*	*Document completely redrafted as part of lean review / FFF process, to incorporate previous departmental 'Safety Requirements' versions and Environmental Requirements of Contractors document.* *Reviewed extensively by all the UK Geographic Business Units during this process and this document now replaces;* *RSWP 011 Safety Requirements of Contractors Construction (Eire) 01059R00039* *RSWP 022 Responsibilities of Contractors Working on RES Offices 01059-000095* *RSWP 027 Safety Requirements of Contractors Generation 01059-000654* *RSWP 031 Safety Requirements of Contractors Development 01059-001264* *Environmental Requirements of Contractors 01226R00016*
15	*19/08/16*	*Document title changed by removing RSWP 005 from start and putting at end; Safety & Environmental Requirements for Contractors on all activities (RSWP 005)*

CONTENTS

1 PURPOSE

The purpose of this document is to promote; Health, Safety, Environment, Safety Leadership and Sustainability of our Contractors, Consultants, RES employees and the general public by setting out the minimum expectations when working on RES managed contracts.

This document shall be supplied to all Contractors and Consultants tendering for any contracts relating to works or services on any RES site or office, it shall be read carefully and its receipt acknowledged in writing in connection with a specific Contract. No variation shall be permitted without the express permission of the appropriate RES Manager responsible for the works / services; eg. Project Manager, Construction Site Manager, Asset / Site Manager or Office / Facilities Manager, etc.

This document shall be read in conjunction with the relevant Health and Safety (& Environmental - where applicable) Plan for the location of the works.

2 SCOPE

It should be noted that this document and the References quoted below do not cover all possible site activities and it therefore remains the Contractor's / Consultant's responsibility to ensure that their works are carried out in a safe and environmentally responsible manner which complies with ALL relevant legislation current at that time. All work activities with significant risks are to be covered by an appropriate written risk assessment and work instruction / method statement that has been reviewed by the appropriate RES Manager prior to works commencing.

3 RESPONSIBILITIES & REQUIREMENTS

Contractors & Consultants shall comply with all relevant requirements appertaining to their contracted works. Throughout this document any references to Contractor(s) shall also

apply equally to Consultant(s) and whilst RES are not typically identified, this does not absolve RES employees from following the same site rules and requirements as our Contractors or Consultants. Where specific training requirements or qualifications are required, Contractors may provide evidence of alternative training subject to it being equivalent to / better than, the RES defined minimum requirements.

4 RES Responsibilities

4.1 Controlling Documentation

RES shall provide the Health, Safety & Environmental Plan (Pre-tender and construction phase), Project Quality Plan and Site Waste Management Plan. RES shall review all Safe Systems of Work for all significant risk activities; including Risk Assessments, Method Statements and Permits to Work - work will not be permitted without these being in place. HV Electrical cable and system isolations and documentation shall be controlled through RES Senior Authorised Person (SAP) or RES nominated SAP.

RES shall audit all aspects of the management of health, safety, quality and environment on site and may carry out appropriate surveys, inspections, tours and sampling at any time. RES may carry out their own accident investigation if deemed necessary to ensure that correct preventative measures are put in place.

4.2 On Site Responsibilities

Safety requirements & rules shall be displayed on site and readily available for all employees to see. RES shall provide the RES site induction or RES on-line induction (to be advised by RES) prior to visiting, starting works & at refresher intervals and provide support to those who have difficulty with the English language to ensure that all site attendees can demonstrate that they understand the site rules & instructions.

RES shall provide prompt information that could affect health & safety of workers, and/or other 3rd parties, members of the public, ensuring adequate steps to prevent harm to livestock on site, maintenance of site fencing, boundaries & keeping gates closed.

RES shall facilitate agreements on interface responsibilities between other parties - within procedures and appropriate documentation controls, including regular meetings / liaison with RES staff, employees and other contractors to identify and discuss hazards with work activities and how they could affect others.

Unaccompanied site visits will be at the discretion of the RES Site Manager. First Aid facilities and provision of first aid is the responsibility of the contractor unless agreed otherwise, RES facilities will be available for use in case of emergency.

4.3 Wildlife

RES Site Manager shall inform Contractors of any constraints or work time restrictions due to the protection of wild life, i.e. nesting sites, habitat issues. If unexpected wildlife is encountered during work activities, i.e. bird nest / badger sett etc, work is to be temporarily suspended and the Site Manager informed. No work shall take place until clearance has been given by RES to resume.

5 Contractor / Consultant Responsibilities & Requirements

5.1 Controlling Documentation

Contractors shall provide the Health & Safety management & site controls applicable to employees, visitors, third parties, Quality management & associated documentation for services, equipment, materials, products, Environmental management & associated documentation for services, equipment, materials, products. Contractors shall conform to the Project; Health, Safety (& Environmental) Plan, Quality Plan and Site Waste Management Plan. Contractors shall provide the Inspection & Test Plan appropriate for their works and any associated

documentation required to support conformance to contract specification.

Safe Systems of Work for all significant risk activities shall be provided, including; Risk Assessments, Method Statements and Permits to Work - work will not be permitted without these being in place.

5.2 On Site Responsibilities

Safety requirements & rules shall be displayed on site and be readily available for all employees to see, with delivery of toolbox talk records provided to RES. Contractors shall ensure that all site attendees complete a RES site induction or have undertaken a RES on-line induction (to be advised by RES) prior to visiting, starting works & at refresher intervals - including provision of support to those who have difficulty with the English language; everyone attending site must demonstrate that they understand the site rules & instructions. Contractors shall provide safety training & skills competency records (nationally recognised training bodies) - including matrix of training requirements and supporting certificates, CITB cards etc for all employees.

Contractors shall provide communication devices for contact and emergencies; to suit site requirements (mobile phone signals may not work), provision of prompt information that could affect health & safety of workers, and/or other 3rd parties, members of the public.

Implementing adequate steps to prevent harm to livestock on site, maintenance of site fencing, boundaries & keeping gates closed. A fencing & gates / gated scheme shall be developed and agreed with the landowner, including location, temporary or permanent. Agreeing interface responsibilities between other parties, defining within procedures and appropriate documentation controls.

Undertake regular meetings / liaison with RES staff, employees and other contractors to identify and discuss hazards with work activities and how they could affect others. Agreement to start works on site is through the consent of the RES Site Manager. When required, work instructions and risk assessments are to be provided to all employees undertaking the work who fully understand and agree with the requirements. Keep adequate records for site works including nature of work, duration, etc and making available to RES as required.

Visitors to be accompanied on site at all times by a fully inducted employee, (visitors shall receive a full induction if visiting site more than once and unaccompanied site visits shall be at the discretion of the Site Manager).

Contractors shall appoint a Competent Safety Representative (responsible for all safety issues for their company inc. electrical safety rules if applicable) and Site Supervisor(s) normally (black coloured hard hat required on construction sites) trained to nationally recognised standards, E.g. SSSTS, IOSH Managing Safely, Black / Gold CITB Card.

5.3 Site Accommodation

Temporary electrical systems are to be designed, inspected & tested by the Contractor, who shall provide the forms of Completion, Inspection & Testing required by the Wiring Regulations BS7671. Housekeeping relating to accommodation, storage and vehicles is to be of a high standard including regular cleaning. Areas for storage of plant, equipment, materials along with rules for use and access are to be in agreement with / designated on site by the RES Site Manager - Contractor shall provide all details of site requirements and what is being used on site (including any reinstatement of area after use).

All access tracks and entry routes are to be kept free of obstacles and well maintained - this includes controlling dust. Petrol or diesel engine plant is not to be used within buildings unless exhaust gases are piped to open air or an

alternative approved. LPG is only to be used in accordance with legislation.

5.4 Site Security

Contractors shall use designated means of access and egress on the site, daily site records of employees shall be collected to aid security in the event of a fire or other emergency. Where security is used on site it shall be the duty of the gate / guard person to ensure vehicles and people are logged and have undergone induction.

5.5 Safety Audit(s)

Contractors shall make available all information and records as required by an auditor in the undertaking of their activities. The Contractor shall co-operate at all times in the undertaking of such health, safety, quality or environmental related audits and follow up actions. The Contractor shall undertake their own audits and inspections as agreed by both parties. Any actions identified from the audits shall be planned, communicated and agreed to rectify the issue(s).

5.6 Alcohol, Drugs & Smoking

The supply and consumption of alcohol & drugs is prohibited on site. Any misbehaviour at work such as; being under the influence of alcohol or drugs, shall be classed as gross industrial misconduct. Accident investigation on site may require the need for alcohol or drug tests to be undertaken by the employer.

Any person prescribed medication by their GP must be fit for work. The Site Manager needs to be informed of such instances and arrangements made for storage of their medication on site. A record of their capability for work may also be required.

5.7 First Aid

First aid facilities and provision of first aid is the responsibility of the contractor unless agreed otherwise. All First Aid treatments must be reported and logged, no matter how small. Notification of first aid arrangements shall be displayed and employees and other 3rd parties shall be informed of the arrangements.

5.8 Accident Reporting & Investigation

All accidents shall be reported and recorded in their company and the RES site accident book / recording system. The RES Site Manager shall be informed of all accidents, incident and near misses. The RES accident procedure shall be followed. Any notifiable accidents, specified injuries or conditions, or dangerous occurrences which are reported by the contractor under RIDDOR regulations, shall be reported without delay to the RES Site Manager.

The Contractor must encourage near miss incident and hazard reporting, active recognition and reporting is a key function in Safety Leadership and a mandatory responsibility of everyone on site. The Contractor's Health and Safety Advisor is to carry out a full investigation of all accidents and issue a report to RES.

5.9 Lone Working

A risk assessment shall be produced to determine the risks of lone working and to mitigate any risks - lone working should be avoided where possible. Where persons are required to work alone, i.e. surveys, a lone working procedure shall be in place and communicated to all parties. The procedure shall be agreed with the Site / Project Manager.

5.10 Excavations, Barriers & Existing Underground Services

No mechanical excavation work shall take place within one metre of live High Voltage Cables, nor within 500mm of any known live utility services. Contractors shall provide early notice of their intended work near live services, confirming location of underground services and preparing safety document controls, barriers around all opening, trenches, excavations to prevent access into the areas.

Permission to remove / open mesh, coverings, gratings shall be obtained and removed items are to be replaced as soon as possible. Report any broken or

damaged gratings etc and put in place controls to prevent any risk of injury etc. Provide all shoring and support to excavations to prevent collapse as per HSG 150.

Excavated materials not suitable for backfill are to be disposed of in accordance with the Site Spoil Management Plan. Drilling, spikes or posts are to not to be driven into the ground without a permit to break ground as issued by the Site Manager.

There must be no alterations to any RES supplied barriers, screens or notices. Warning lights and reflective surfaces shall be placed on barriers around excavation works. Inspection reports are to be undertaken prior to entry of excavations, upon completion of shuttering and after additional works, alterations or dismantling as per HSE CIS 47. Weekly inspections are required and evidence submitted to RES. Excavation tags to be positioned at all access/egress points to all excavations and be updated at each inspection.

Segregation of plant and pedestrians shall be maintained; barriers are to be installed at access points and within excavation, along with appropriate signage. Stop blocks to be used with reversing of vehicles up to an excavation.

Pumps to be used to remove water from excavations shall be regularly inspected for stability; pumped water, whether ground or rain is not to be pumped into a watercourse or drain, water is to be managed in accordance with the site drainage plan (typically settlement lagoons).

5.11 Lifting Operations - Mobile cranes or similar type of equipment & lifting accessories

All lifting operations shall be managed in accordance with BS 7121; which shall include preparation of: risk assessment, method statement and lifting plan; and shall be agreed by all parties prior to works taking place. The lifting plan shall cover crane mobilisation, assembly and travel on site as well as any unloading and lifting activities. All crane movements on site are subject to 'Permit for Movement of Heavy Plant'.

All lifting equipment shall be fully certified and in date; copies of all certification and inspection reports shall be provided to RES prior to the works taking place. Safe Working Load (SWL) shall be clearly marked on all lifting equipment and ancillaries, along with test date. Structural steelwork shall not be used for lifting point or anchorage without agreement of RES (only permitted in exceptional circumstance and has been subject to structural review - Structural Engineer report required).

All temporary points for attachment to be load tested prior to use and record of test provided to RES, method of testing to be agreed. All testing shall be undertaken by an approved Test Engineer to British standards; approved on Lifting Equipment Engineers Association (LEEA) or similar organisation. Persons are not allowed to ride on a hoist unless it has been designed to carry passengers and fitted with interlock gates / safety devices. All persons operating hoists are to be fully trained and have recorded evidence of training to a national recognised standard.

RES lifting operations checklist shall be used unless contractor has their own approved requirements. All crane lifts shall be planned by a competent Appointed Person (AP), an approved Crane Supervisor MUST be on site if the AP is not able to monitor the lifting. Lifting plans including method statement / risk assessment shall be reviewed by RES.

5.12 Scaffolding / Ladders

Only competent and fully trained persons shall be used to erect, dismantle and modify/alter and inspect scaffolding

(CISRS – tube & clip, PASMA – system). All scaffolding must display an in date SCAFFTAG or similar signage tag at point of access detailing scaffold status. All scaffolding shall be designed, erected, maintained, examined and recorded for the type of scaffold used – where necessary scaffold should be earthed.

All trained scaffold erectors shall wear securely attached safety harnesses connected to suitably tested fixed points as appropriate to risk assessment requirements. Scaffold boards shall be clamped into place wherever possible; any gaps in scaffold boards shall be covered with an appropriate secured material strong enough for the application and activity. Scaffolding shall be redesigned for all work activities, adjusted and inspected prior to use for each phase of work, scaffolding is not to be used until it has been cleared for the work activity.

Permission to use a scaffold erected by others must be obtained from the Site Manager and only after an inspection has been carried out. Incomplete and unsafe scaffolding must not be used and appropriate measures shall be put in place to prevent usage and when site is unattended access routes to scaffold to be removed to stop persons climbing scaffold.

All ladders used on site shall be in good condition and have a system of regular inspection; register to be kept on site. Metal ladders shall not be used in the vicinity of electrical equipment or scaffold.

Scaffold inspections shall be carried out by a competent person before use and then weekly (7 Days). Inspections will also need to be carried out following any modification or alteration to scaffolding; reports to be provided to RES weekly.

5.13 Work at Height

Any work at height or below ground level activity, shall require a method statement & risk assessment and be reviewed by RES prior to starting the work. A safe access & safe work place shall be provided via use of crawling boards, ladders, barriers, handrails, toe boards, edge protection as applicable. All materials shall be prevented from falling. Warning notices shall be displayed, along with exclusion zones at all levels, access routes etc.

The Work at Height hierarchy; Avoid, Prevent, Minimise should be implemented; 'collective' protection methods shall take priority to individual personal protection, with fall arrest equipment only being used if all other forms of protection cannot be achieved.

If Fall Arrest is to be used, persons must be fully trained in its use; it shall be inspected before / during use and have appropriate tested attachments; relevant records of equipment tests / dates to be provided. 100% attachment of the equipment is required during working at height, including double lanyards or other fall arrest equipment if collective measures are not implemented, method statement shall include Emergency Plans to rescue a suspended casualty. The Contractor shall inspect all equipment to ensure compatibility between each item being used.

MEWPS, mobile scaffold, podium steps shall be used where possible, ladders shall only be used for short duration low risk work, for no more than 30 minutes and only where stability can be achieved.

5.14 Risk & Environmental Controls

Contractors shall identify all potential environmental risks and report to the Site Manager, inform all employees of the site environmental rules and inform RES of environmental incident or potential incident as soon as practicable. Provision of information to RES for carbon counting / sustainability targets and records, typically: vehicles on site, mileage covered, fuel used (site

equipment), materials used, visitors and travel details, etc.

5.15 Environmental Plan

Contractors will be required to provide relevant documentation for inclusion into the RES Environmental Plan when applicable, all contractors are to comply with the RES Environmental Plan at all times.

5.16 Existing Features (Sites)

Any disturbance, remediation or disposal of contaminated land shall only be carried out under the direction of RES and in accordance with the Health, Safety (and Environmental) Plan, areas of contaminated land shall be fenced off and all persons made aware of its location and hazardous nature. Where any unexpected or potential hazardous obstacles are encountered, work shall cease until specialist advice has been obtained.

Underground services shall be identified in the site Health, Safety (and Environmental) Plan and controls put in place for the works to be undertaken, i.e. permit to work, risk assessment, etc. If poor conditions of underground services are found after exposure, this is to be reported to RES and the relevant authority.

Any old containers found on site should be checked and emptied by a licensed waste carrier before removal. Pollution is often caused through vandalism, theft or fly tipping - the site or working area shall be protected by fencing and locked access to discourage unauthorised access. Any instances of tipping on site shall be reported to the Site Manager.

5.17 Discharges to Water

All employees shall be made aware of the following:

- Rules about discharges to drains from spillage
- Refuelling / storage controls to be in place & location to be away from surface drains (minimum 10m distance)
- Use of bunded areas / bunds, double skinned bowsers for storing of fuels, liquids etc - to be checked weekly
- Management of any / all spills, spill kits, informing Site Manager etc (included in risk assessment)
- Discharge of any fuel, chemicals, silt, etc to a drain or water course is forbidden. Ensure that a suitable method for containing any surface water is provided when working near to a watercourse
- Surface water drains should only carry uncontaminated rain water and shall be protected from any other contaminants

Methods for prevention of pollution to water courses shall be regularly checked and maintained - failing of systems should be reported immediately to RES.

5.18 Hazardous Substances (COSHH)

Contractor shall provide a list of substances, liquids, gases, etc to be used on site or with their work activities, along with quantities to be stored in secure storage containers, clearly labelled with legible warning signs and content details. MSDS & COSHH Risk Assessment & register and controls in place, including emergency plans.

As defined by COSHH Risk Assessment, spill kits are to be located near any hazardous liquids or substances either at point of use or storage area. Emergency procedures and associated equipment shall be provided - 'Kelp' bio-remediation solution shall be provided for early treatment of any spills after initial clean up.

Generators shall be provided with an internal bund and external fuel tank with fuel cut off float switch, the refuelling area shall be kept empty of water (covered area or inceptor/full retention separator).

Bowsers are to be stored to minimise risk of collision, run-away and vandalism, with a flexible pipe, tap or valve provided with an appropriate lock for security when not in use. Flexibly delivery pipes for use with refuelling must be fitted with manually operated pumps or a valve that closes

automatically when not in use (delivery end).

Fuel type and capacity shall be displayed, along with no smoking signs and close valve when not in use signs, etc. A responsible person shall supervise deliveries, check tank quantities and emptying of tank and residues for safe disposal elsewhere.

Switch gear containing SF6 (Sulphur Hexafloride) shall be labelled on the equipment and substation door, along with contractor details and any leak shall be reported to the Site Manager and acted upon following the emergency contamination spill procedure.

5.19 Waste Management

Waste management shall follow the waste hierarchy of: Prevent, Reduce, Re-use, Re-cycle, Other recovery before disposal, all wastes shall be stored and segregated at designated disposal points away from watercourses and potential risk areas (cleared from work area as it is accumulated).

All personnel are to prevent litter from being blown around the site by disposing of rubbish responsibly. Skips must be covered to prevent refuse blowing away and rainwater accumulation. Skips to be replaced when full and disposal shall be in accordance with statutory requirements and RES Site Waste Management Plan, Contractors shall provide appropriate waste documentation.

5.20 Earthworks

Contractors shall work to the site drainage / SuDS design statement for the site. Appropriate drainage / SuDS management methods shall be agreed with the Site Manager where no Construction Method Statement is present.

Contractors shall make best endeavours to prevent water becoming contaminated at the place of work, activity area and to prevent build up of silt; shall use methods of work that eliminate or reduce workings in channels and do not contaminate surface water. Water containing silt shall not be discharged directly into rivers, streams or surface water drains. If silty water does occur and present a hazard, suitable treatment will be required - details of controls to be presented to the Site Manager.

Contractor shall prevent water from entering excavations, any cut-off ditches, well point de-watering or pumping shall be in accordance with the site drainage plan. Disturbance to flora and fauna whilst carrying out works shall be kept to the minimum and agreed with the Site Manager.

Topsoil and vegetation (not part of subsoil) shall be retained and stored in accordance with the Site Spoil Management Plan and reinstated on all areas of stripped ground as soon as possible to prevent erosion and leaching.

Where wet and marshy ground occurs, excavated materials may need to be stored on a geotextile. Turf shall be reinstated wherever possible to maintain the original species mix. Exposed ground and stockpiles / storage shall be kept to the minimum to prevent silt and dust build up, whilst long term storage shall be controlled and stockpiles seeded with recovered seed, covered and silt fences constructed from geotextile where required. In dry weather dust suppression controls will be required to eliminate at source, e.g. watering.

Environmental Agency guidance shall be used as guidance in control measure for works and maintenance in or near water.

5.21 Road Cleanliness

Site roads to be brushed or scraped as required to minimise mud and dust deposits, especially at site entrances and watercourse crossings; mechanical suction brush may be necessary. Wheel wash stations may be required to mitigate debris going onto public highways, private roads or accesses.

Used water shall be collected and passed through a silt trap before disposal.

5.22 Drip Trays

Where practicable, drip trays shall be used to contain absorbent granules, sheets or fibres and disposed of to site rules. Once used, drip trays shall be cleaned using appropriate materials and disposed of in accordance with COSHH regulations. Regular checks and cleaning of drip trays to be carried out.

5.23 Concrete

All concrete disposal shall be as set out in the Site Waste Management Plan (SWMP) when in place or responsibly and in accordance with legislation when no SWMP in place. Cement and wash out water is not to enter any watercourse or aquifer; wash out of cement vehicles shall only be permitted in a designated and suitable prepared wash out area(s), clearly signed and to the satisfaction of the RES Site Manager.

Tools, equipment or materials shall not be washed in watercourses, mortar mixing and storage shall be clear of any watercourses. Any concrete works near to a watercourse shall be approved by the appropriate agency and the RES Site Manager.

5.24 Wildlife

Wildlife shall be protected from entering and becoming trapped in any part of the works on site. For excavations this may mean provision of fences, crossing or escape routes. Due consideration shall be given to hazards presented to personnel from wildlife; adders, wild boar, buzzards, wasps etc.

5.25 Emergencies

Environmental emergencies such as spills shall be dealt with in accordance with the Environmental Emergency Response Plan - familiarisation with this plan is required before commencement of any works. Any spill kit provided shall be made accessible at all times to all site staff.

5.26 Environmental Assessment

Contractor shall provide an assessment of the likely environmental impacts of their activities (if applicable), along with controls to minimise impact and any corrective measures and actions.

6 APPENDICES

Appendix 1 - References

Appendix 2 - Issue / Receipt for Safety and Environmental Requirements for Contractors on all activities

5.1.1 Appendix 1 - RES References

The following documents may contain useful references.

6 App 1.1 RES Documents

i) RES Health, Safety, Quality & Environmental Management Systems, and associated documentation including all IMS, Safety Procedures, RAWP and documents and templates

7 App 1.2 Project Specific Documents

i) The Health, Safety & Environment Plan (Pre-tender and construction phase)

ii) Health & Safety Plan

iii) Quality Plan

iv) Environmental Plan

v) Inspection and Test Plan

vi) Site Waste Management Plan

7.1.1 Appendix 2 - Issue / Receipt for Issue / Receipt for Safety and Environmental Requirements for Contractors on all activities

SAFETY & ENVIRONMENTAL REQUIREMENTS FOR ALL CONTRACTORS

ISSUE DOCUMENT

Issued to

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Contract Number and Description

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Location
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.....

The person named below is the Company Project Manager responsible for overall management of the contract.

Project Manager
.....
.. Telephone .....

The person named below is the Company Site / Facilities Manager responsible for local management of the contract, who shall be permanently on Location.

Site Manager
.....
..... Mobile .....

Other Site Telephones
.....
.....

The Site Manager shall always be the first point of contact, if for any reason, he is not available you shall contact the Company Project Manager.

The Company Integrated Management System and Site Rules are available / displayed at:

.....
.....
.....

SAFETY & ENVIRONMENTAL REQUIREMENTS FOR ALL CONTRACTORS

RECEIPT DOCUMENT

RENEWABLE ENERGY SYSTEMS COPY

(To be detached and retained by the Site Manager when this document is issued to a Contractor on site)

I acknowledge receipt of the safe works procedure - Safety & Environmental Requirements for All Contractors.

Contract Number and Description
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Location
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Signed .....

Contracting Company
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.....

Date .....

Contracting Company Head Office Telephone
.....
.....

Local/site Telephone Number
.....
....

ANNEX 3: SUSTAINABLE URBAN DRAINAGE SYSTEM DESIGN PHILOSOPHY

EIA-R Reference	Document Description
Appendix 9.3	FRA and Outline Drainage Strategy
Appendix 9.4	PWS Risk Assessment
Appendix 9.5	Carbon Balance Assessment

ANNEX 4: PROCEDURE IN THE EVENT OF A CONTAMINANT SPILL

Emergency Procedure in the Event of a Contaminant Spillage

Report No: 01276R00001

History

Issue	Date	Nature And Location Of Change
1	13th Nov 2020	First isse

CONTENTS

1.0 OBJECTIVES

This procedure details the emergency procedure to be followed and actions to be taken in the event of a hazardous waste spillage such as oil, fuel and chemicals, occurring on a RES managed premises or site / project in order that the environmental impacts that may be associated with a hazardous waste spillage may be mitigated.

2.0 SCOPE

This procedure covers all UK geographic locations; sites, project or offices for which RES are responsible for or manage.

3.0 PROCEDURE

3.1 Project, Site or Office Locations

		Responsibility
i)	The Contractor shall provide MSDS and COSHH assessments for all substances controlled under COSHH that are to be used or stored on the site. Records of the supplied MSDS & CoSHH Assessments shall be maintained. Note: Substances with hazardous properties such as cement, concrete and curing agents are all controlled by the COSHH.	**C**
ii)	Appropriately sized spill kits shall be provided for the controlled substances that will be used or stored on the site; the contractor shall train personnel in the use of these spill kits and maintain training records.	**C** **RRM**
iii)	The Contractor shall provide oil spill training and awareness to their staff RES have subscribed to an emergency environmental call-off support service from Veolia to be used the event of a major spill, details included in Project Directory or can be provided by the HSQEM.	**C,** **HSQEM**
iv)	In the event of a liquid spill occurring the Contractor shall cease work in the vicinity immediately. If spillage is flammable, extinguish all ignition sources. Identify source of pollution and rectify the problem. The Contractor's trained personnel shall immediately deploy the spill kit in accordance with the manufacturer's instructions. Contractor's personnel shall don appropriate PPE and clean up the spill. All used spill kit materials should be disposed of in the proper manner.	**C**

v)	In the event of a concrete spillage into water channel or surface water, as the waste is highly alkaline it is regarded as Hazardous Waste. Every effort should be made to contain the movement of the liquid cement in the watercourse or drainage channel. Similarly in the event of a Peat / Spoil Movement / Slip into a water course; remove any peat or clay material which has entered the watercourse and transport to a location where it will no longer be a source of pollution. Notify the following agencies; Environmental Agency (region specific; EA, SEPA or NIEA etc), local Fisheries.	**RRM, C**
vi)	Place geotextile silt fences/stone barrages at downstream points in the river as required. Constant monitoring should be maintained not only of the water quality (clarity) downstream of the check dams, but also of the excavated peat or clay material. Consideration should also be given to the subsequent movement of the spoil / peat and any preventative / containment measures required.	**RRM**
vii)	The Contractor shall inform the RRM of the incident as soon as possible and certainly no more than 1 hour after the spill.	**C**
viii)	The Contractor is responsible for replacing the used spill kits as soon as possible and no later than 24 hours after use.	**C**
ix)	The Contractor is responsible for ensuring that used spill kits and any other oil / fuel soaked / contaminated material e.g. rags, used during the incident are disposed of in accordance with the Environmental Waste Management Regulations in operation. These materials shall be bagged up and disposed of at a licensed hazardous waste disposal site e.g. taken away by a licensed oil / fuel disposal / broker company.	**C**
x)	The Contractor shall submit copies of the receipt or waste oil certificate to the RRM within 48 hours.	**C**

4.0 REFERENCE DOCUMENTS

i) IMS 20 – Emergency Incident Preparedness and Response HSQE00-001043

5.0 DEFINITIONS

	Abbreviation or term	**Explanation of abbreviation or term**
i)	C	Contractor: Any company or person employed by RES to carry out any work on a site / project or office location
ii)	COSHH	Control of Substance Hazardous to Health Regulations 2011
iii)	H&S Plan	Health and Safety File maintained by the Site Manager
iv)	HSQE	Health, Safety, Quality & Environment
v)	HSQEM	HSQE Manager (Head of HSQE)
vi)	MSDS	Material Safety Data Sheet supplied by manufacturer
viii)	RRM	Responsible RES Manager (Construction Site – Construction Site Manager, Generation Site – Site / Asset Manager, Office Locations – Office Manager)

ANNEX 5: PEAT MANAGEMENT PLAN

EIA-R Reference	Document Description
Appendix 4.3	Outline Peat Management Plan

Cairn Duhie Wind Farm
Draft Site Waste Management Plan

REVISION HISTORY

Issue	Date	Author	Nature And Location Of Change
01	16th Sept 19	Calum Campbell	First Issue

CONTENTS

1 CONSTRUCTION SITE WASTE MANAGEMENT PLAN

1.1 Introduction – What is a Site Waste Management Plan

RES has a waste management policy that requires all activities undertaken by the company and their contractors to follow best practise guidelines and to minimise effects on the environment. As the management of waste is crucial in achieving this aim, SWMPs are applicable to all sites in UK & Ireland, in accordance with this policy and the ISO14001 standard for minimising effects on the environment.

A SWMP provides guidance on waste management and disposal throughout the construction period, it identifies the following:

- Who is responsible for the SWMP;
- What types of waste will be generated;
- How the waste will be managed – reduced, reused or recycled;
- Which waste contractors will be used; and
- How the quantity of waste generated from the project will be measured. here

1.2 Why do RES have a Site Waste Management Plan?

Everyone on site is responsible for the waste that is generated, be it wooden pallets to drink bottles and paper. Whether you are a site worker, engineer, project manager or site manager, you must think hard about the role you can play in reducing, reusing and recycling wastes on site.

1.2.1 Waste Management Priorities:

- Minimise raw materials used;
- Reduce wastes;
- Reuse materials;
- Recycle wastes – 30% of all steel now produced in the UK is recycled waste steel;
- Recover energy from wastes;
- Send minimum amount of waste to landfill.

The SWMP ensures overall responsibility is assigned and individuals know their roles and the requirements with regard to waste management and legislation.

1.3 Legislation

Make sure you know the rules and follow them. It is important to know that the Environmental Protection Act (1990) and Duty of Care state that wastes must be transported by a registered carrier and disposed of, or deposited at a licensed facility.

1.3.1 Rules of Waste Management

1. You must be able to describe what wastes you are holding and transporting on a Waste Transfer Note. See below for required content.

2. Waste should be correctly handled and stored, segregated where necessary, with the container clearly labelled.

3. Waste should only be transferred by / to a registered carrier. Any carrier of waste must be registered with the relevant environment agency. The only exception to this is for charities and voluntary organisations.

1.3.2 Duty of Care – Code of Practise

Four basic principles:

- Identify and describe the controlled waste accurately by using the European Waste Codes and complete the documentation.
- Keep the waste safely, do not allow it to escape.
- Transfer to authorised carrier, check the original license and check with the relevant authority that they are still licensed.
- Checking-up responsibility on destination of waste.

1.3.3 Your Responsibilities

All those who produce or handle wastes from demolition, earthworks and construction activities have legal responsibilities called a 'Duty of Care' to ensure it's; safe keeping, transport and subsequent recovery or disposal. Failure to comply can result in an unlimited fine.

Duty of Care requires you to take care of your waste while it's in your control, check that the person to whom you give your waste is authorised to receive it, make out a waste transfer note when the waste is handed over and to take all reasonable steps to prevent unauthorised handling or disposal by others.

1.3.4 Definition of Responsibilities

Producer

Producer means anyone whose activities produce waste. They are responsible for ensuring the description of the waste is accurate and contains all the information necessary for safe handling, disposal and treatment. The Producers bear the main responsibility for packing waste for transit.

The Producer's responsibility does not stop at the gate as the skip leaves, follow-up is required, chasing for weighbridge receipts, auditing carriers, keep records of this.

Carrier

Is anyone who carries a controlled waste; they must be licensed, it is an offence to carry controlled waste without registration.

Broker

Any organisation or individual who arranges the disposal or recovery of waste for another person is likely to be a Broker and must register with the relevant environmental agency, unless they have an exemption. Often, Brokers will not physically possess the waste they are dealing with.

Waste Disposers/Licensed Site

Should be a licensed site, documentation should be seen by the Carrier and the Producer, copies kept.

1.3.5 Waste Transfer Notes

A Waste Transfer Note (WTN) is a document which must accompany any transfer of waste between different holders. The purpose of a WTN is to allow other people who handle your waste to know what they are dealing with, so that they can manage it safely and properly.

The sub-contractor must create a WTN for each and every load of waste that leaves a wind farm site.

The WTN must include:

- What the waste is, how much there is and its 6-digit European Waste Code – it is the responsibility of the producer to identify the waste;
- What sort of containers it is in;
- The time, date and place the waste was transferred;
- The names and addresses of both persons involved in the transfer, the WTN must be signed by both before it leaves the site;
- Details of which category of authorised person each one is e.g. producer;
- Registered waste carrier, waste licence holder;
- If either of the persons is a registered waste carrier, the certificate number of the registration;
- If either of the persons has a waste management licence, the licence number of the facility;
- Where appropriate, the name and address of any broker involved in the transfer of waste; and
- Signatures of both parties, and transfer notes kept for two years.

When the waste is collected, the transfer carrier and the waste producer will sign the WTN and you will be given a copy. The carrier will keep a copy and when transport of the waste is completed, they will fill in details of the landfill site. At this point, a copy is also given to the landfill site

Note: Wastes from construction, demolition and excavation operations is a 'controlled waste' and hence subject to waste-related legislation.

1.3.6 Hazardous Waste

The transfer documentation for hazardous/special waste (In Scotland) is called a 'consignment note'. If your waste has hazardous properties, you will need to treat it as hazardous/special waste. In this case, a consignment note should be completed to comply with your duty of care. The consignment note must contain similar information to a WTN. A separate WTN is not required.

Waste that is defined by the European Waste Catalogue (EWC) as hazardous can only go to a waste treatment facility that is licensed to receive hazardous waste, this should be identified during the SWMP set up described in Section 1.4.

1.3.7 Hazardous Waste Site Registration

For sites in Scotland, 'Pre-notification' of the first movement of waste must be provided to the regulator at least 3 working days before the 'expected removal date' the sub-contractor (Producer) should contact the carrier for them to arrange this.

The waste must be moved within one month of the given expected removal date.

1.3.8 Who's Who in Waste Transfer?

You must check that anyone that you pass your waste onto is authorised to take it. If you don't check that they are authorised to take your waste and it is illegally disposed of, you could be held responsible.

What you must check is that anyone removing waste from site is either:

- Exempt from registration as a carrier of controlled waste, or
- Is from a waste disposal authority in Scotland.

Additionally, the site receiving the waste has a waste management licence, applicable to the waste management site and the carrier is registered as a carrier of controlled waste.

You should ask for proof that an individual or business is authorised to handle or transport your waste.

The sub-contractor's responsibility for the waste does not end when the waste carrier removes it from the wind farm site. The responsibility extends until the waste has either been finally and properly disposed of or fully recovered.

Cairn Duhie Wind Farm

Appendix 4.3: Outline Peat Management Plan

REVISION HISTORY

Issue	Date	Author	Nature And Location Of Change
01	20th Aug '20	Calum Campbell	First Issue
02	9th Nov '20	Calum Campbell	Annex 3 removed
03	16th Dec '20	Calum Campbell	Annex format updated following comments from LUC.

CONTENTS

ANNEXES

ANNEX 1. DRAWINGS

1 INTRODUCTION

1.1 Background

Renewable Energy Systems Limited (RES) is proposing the development of Cairn Duhie Wind Farm situated approximately 15km south east of Nairn. The project consists of 16 turbines and associated crane hardstandings, approximately 8.3km of access track, a control building and substation compound, a battery storage compound, crane hardstandings, electrical cables, temporary infrastructure to facilitate the construction works, 1 borrow pit, and a site entrance.

The Northern portion of the site is currently used for grazing and any work/deliveries will have to be coordinated with the land user. Historically site land use included shooting, however the suggestion from the landowners is that no shooting has taken place in recent years. The site covers a plan area of approximately 666 hectares. The Site Location is included in ***Annex 1***.

1.2 Approach to Minimising Peat

The Infrastructure Layout, included in ***Annex 1***, was carefully developed to minimise the likely peat excavation required. An additional peat probing survey was not possible due to the Covid-19 restrictions therefore the infrastructure layout was developed using interpolated data. SLR Consulting have reviewed the suitability of using the existing peat data to assess the infrastructure layout which is discussed in more detail in section 3.1.

Prior to and during the construction of the Cairn Duhie Wind Farm development, reasonable measures will be taken to further avoid or minimise excavations and minimise disturbance to peat. Measures will include:

- Micrositing of site infrastructure where permitted;
- Minimising site infrastructure through negotiations with turbine suppliers and civil contractors;
- Using floating tracks where deemed practicable to avoid excavating areas of deeper peat;
- Maximising batter and cutting angles where appropriate;
- Restricting access to working areas during construction to specified routes;
- Using appropriate plant to avoid unnecessary disturbance to the ground surface; and
- Stripping and storing peat by its type in an appropriate manner. Temporary peat storage principles are detailed further in section 3.5.

Notwithstanding the above, there is still a residual requirement to excavate peat to facilitate the construction of the site infrastructure due to the presence of peat across the site. This outline document details the estimated peat volumes and proposals for management of excavated peat.

1.3 Relevant Guidance

The following documents were used as guidance to inform the infrastructure layout and the content of this outline Peat Management Plan (PMP).

- Development on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste; SR & SEPA; Version 1 January 2012.
- Floating Roads on Peat; SNH & FCS; August 2010.

- SEPA Regulatory Position Statement - Developments on Peat; SEPA; February 2010.
- Good Practice During Wind Farm Construction; A joint publication by SR, SNH, SEPA, FCS, HES, MSS & AEECoW; 4th Edition 2019.
- Guidance Developments on Peatland - Site Surveys; SNH, SEPA, Scottish Government and The James Hutton Institute; 2nd Edition 2017.

2 AIMS AND OBJECTIVES

2.1 The Need for a Peat Management Plan

As noted in the peat management guidance produced by Scottish Renewables and SEPA, at the EIA stage the developer must show:

- How, through field surveys, data collection and iterative design, the proposed infrastructure layout has been structured and designed to minimise, so far as is reasonably practicable, the quantity of peat which will be excavated;
- That volumes of peat anticipated to be excavated by the proposed development have been considered; and
- How excavated peat will be managed.

The Cairn Duhie Wind Farm Environmental Statement (ES), chapters 4 (Description of Development) and 9 (Geology, Hydrology and Hydrogeology) contain details of the design process and data on which the outline PMP is based.

2.2 Objectives of this Peat Management Plan

The aims of the outline PMP are achieved through completion of the following objectives as noted in the Relevant Guidance (as listed in section 1.3)

- Objective 1: Description of the peat conditions on the site.
- Objective 2: Calculation of peat volumes to be excavated and reused.
- Objective 3: Classification of excavated material.
- Objective 4: Description of excavated peat use in borrow pit restoration.
- Objective 5: Description of excavated peat use in other restoration.
- Objective 6: Description of excavated peat temporary storage.
- Objective 7: Consideration of the potential volume of peat which may not be suitable for reuse and development of a Waste Management Plan for the development.

3 DETAILS TO INFORM THE PEAT MANAGEMENT PLAN

3.1 Description of the Site Peat Conditions (Objective 1)

The site is dominated by a mixture of degraded bog and heath habitats with localised wooded areas and a few scattered mature trees. Evidence of earlier management is present in the forms of systematic drainage channels. Cairn Duhie itself is a gently sloping hill which peaks at 312 mAOD and is centrally located on the site. The turbines are located in the central area around Cairn Duhie itself and in the northern half of the site.

The development site was initially assessed for peat vegetation through desktop review of geological and soil maps as well as aerial photography. This was followed up by site assessments by the development's ecologists, hydrologists and engineers.

Peat conditions across the development site have been determined through an initial phase of intensive peat probing survey in 2012, initially covering the site using a 100m grid probing regime while A second phase of probing was carried out in 2013.

A total of 1,461 peat depth probes were carried out during the MacArthur Green field work surveys in 2012 and 2013. It was noted that only 6% (75) of the peat probes undertaken recorded peat depths greater than 2.0m (maximum thickness of peat recorded was 5.1m). The highest percentage of probes recorded peaty soil <0.5m thick (43.6%). 84% (1,250) of the total probes recorded peat less than 1.5m thick.

Additional peat probing was carried out by RES in January 2019 at two locations:

- Ferness Field - located north of the main wind farm site; and,
- Substation Compound – located in the north of the main site at approximate grid reference E297764, N844305.

Peat Interpolation

Due to current Covid-19 restrictions additional probing was not undertaken at each new turbine location, however on this site it is the opinion of SLR and RES that the data quality was sufficient, and the interpretation could be projected to the amended sites.

Using the field data, we have interpolated to areas of infrastructure where there is limited information. For each turbine the interpolated depth has been calculated from the nearest peat probe, while also including the data from surrounding points. The final design layout has been developed using the existing data, on a reduced number of turbines, and avoids all deep peat where possible. 13 No. turbines are located on peaty soils or, and 3 No. on peat less than 1.3m.

3.2 Calculation of Peat Volumes (Objective 2)

Table 1 shows the construction activities that will generate excavated peat and the expected volumes of peat produced from each activity. The peat volume estimates are derived from data gathered during the peat survey programme described in Section 3.1 and dimensions of the proposed infrastructure components used in the design.

Table 1 - Estimated Peat Excavation per Development Component

Development Component	Total Volume of Excavated Peat (m^3)	Total Volume of Acrotelmic Peat (m^3)	Total Volume of Catotelmic Peat (m^3)
Wind Turbine Foundations	4,958	2,085	2,874
Crane Hardstandings	15,346	6,061	9,285
Access Tracks	21,315	9,036	12,280
Control Building and Substation Compound	6,678	3,349	3,328

Met Mast Foundation & Hardstanding	3,222	975	2,247
Borrow Pits	22,756	4,410	18,346
Total	**74,275**	**25,916**	**48,359**

The following assumptions have been used in the generation of this peat excavation calculation:

1. Existing ground surfaces are assumed to be flat/planar.
2. Assumed depth of acrotelmic peat excavated is 300mm.
3. Excavation slopes have been adopted as 1:2 for shallow (<1m) peat and 1:3 for deep (>1m) peat.
4. The substratum below the peat is assumed to be a suitable subformation for tracks, wind turbine foundations and crane hardstanding.
5. Typical wind turbine gravity foundation dimensions were adopted as follows - base diameter 20m, upstand diameter 5.5m, base depth 3.5m, base volume 560m^3, stone backfill volume 770m^3
6. 40m x 35m crane hardstandings excavated to suitable soil strata as noted below bottom of peat.
7. 0.25m wide structural shoulders have been added to the cut tracks and 0.5m wide structural shoulders have been added to the floating tracks. Track running width is assumed to be 4m.
8. To minimise track excavation, floating tracks are proposed on areas of peat greater than 1m.

Geotechnical desk studies for Cairn Duhie Wind Farm indicate that the soil and bedrock underlying the peat is suitable for gravity type wind turbine foundations. Piled wind turbine foundations have therefore not been considered at this site.

Table 2 shows the estimated requirements for reinstatement of peat for the development site including the requirement for acrotelmic and catotelmic peat. The summary of peat volumes are presented in Table 3.

Table 2 – Estimated Peat Reinstatement Requirements per Development Component

Development Component	Total Volume of Peat Requirement (m^3)	Total Volume of Acrotelmic Peat Requirement (m^3)	Total Volume of Catotelmic Peat Requirement (m^3)
Wind Turbine Foundations	7,499	1,752	5,747
Crane Hardstandings	7,587	4,588	2,999
Access Tracks	22,416	12,027	10,389
Control Building and Substation Compound	1,556	1,028	528
Met Mast Foundation & Hardstanding	981	574	407

Borrow Pits	34,310	5,998	28,312
Total	**74,350**	**25,967**	**48,382**

Notes and assumptions regarding the re-use of excavated peat:

1. Peat will be placed with sufficient depth and at a suitably gentle slope to minimise the risk of drying out and encourage growth. Catotelmic peat placed along track edges and around hardstandings will be dressed with acrotelmic peat, and will not be used as a thin veneer on steeper non-peat slopes. Low verges and landscaping will be formed to permit surface water to drain off the track.
2. Peat verges on floating tracks and cross slope cut tracks are proposed to be 2-3m wide, gently sloping back to existing ground level, ensuring structural integrity and sympathetic landscaping. These will be no higher than the finished track surface level to ensure water runoff from the tracks is maintained. Figure 1 shows an indicative peat verge on floating track.
3. Peat verges shall also be along the down slope edge of cross slope orientated crane hardstandings.
4. No allowance has been made for transitions between floating and cut tracks. This is a conservative assumption as peat will be reused underneath the transition sections of cut track.
5. Approximately 49% of the proposed borrow pit search areas have been assumed to be utilised.
6. The area comprising temporary infrastructure (construction compound, assist crane hardstandings, blade laydown) are assumed to be fully reinstated post-construction with the final cuts of peat from the construction work equating to the same volume as the peat excavated.

Figure 1 – Indicative Floating Track Peat Verge

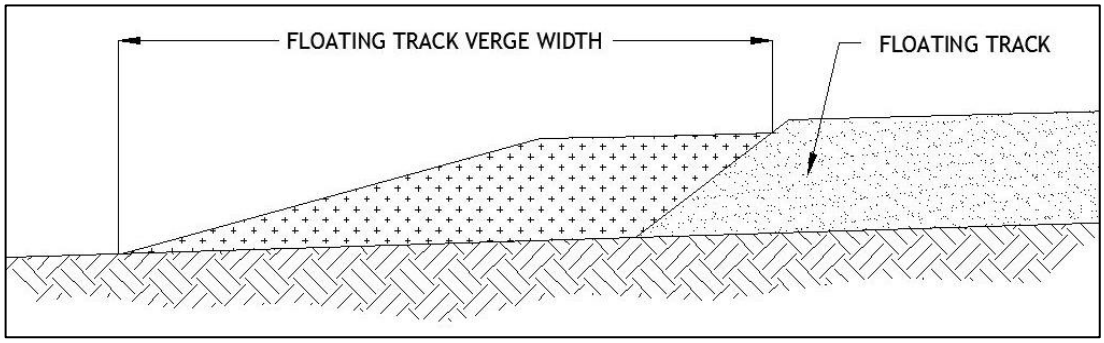


Table 3 – Summary of Demand and Supply

Peat Type	Volume of Excavated Peat (m^3)	Volume of Peat Requirement (m^3)	Volume of Peat Surplus (+) or Deficit (-) (m^3)
Acrotelmic	25,916	25,967	-51
Catotelmic	48,359	48,382	-23
Total	**74,275**	**74,350**	-74

The results of the peat balance calculation show the required peat volume (as shown in Table 3) is slightly more the excavated peat volume. To ensure that the development is not unnecessarily constrained by turbine choice (and hence crane choice), the proposed infrastructure covers a broad envelope of turbine supplier requirements. These calculations are considered conservative as the proposed infrastructure is larger than what is typically required. It is likely that peat excavation will be minimised further during development and construction phases through the measures detailed in section 1.2. To optimise the peat balance the width of the peat verges on floating tracks and depth of borrow pit restoration have been varied.

It is anticipated the excavated volumes will be reduced during construction and a peat balance can still be achieved by varying peat verge widths and borrow pit restoration depths.

3.3 Classification of Excavated Peat (Objective 3)

Samples of peat were observed in the field as part of the peat depth probing programme, and descriptions noted with respect to its characteristics, including fibre content, decomposition and moisture content are summarised below:

- The peat depth in some areas is underlain by a thin layer of soft clay/sediments;
- The depth of the acrotelm is generally very shallow, and non-existent in places;
- The peat across the whole site area is highly fibrous in nature and generally contains very high levels of both coarse and fine fibres;
- 23 of the 28 samples were considered to be relatively dry (B1 or B2 on the Hobbs scale);
- All samples scored low on the Von Post scale of humification (H1 to H3 except for a few individual sub-samples) including low to weak levels of decomposition;
- The samples exhibited a strongly acidic pH, ranging from 3.85 to 5.0; and
- Dry matter, wet bulk density, dry bulk density and total carbon content varied marginally around the respective means.

All material is expected to be suitable for reuse without the need for engineering measures.

The layout of the wind farm infrastructure has been developed to avoid deep peat deposits as far as possible, however if any catotelmic peat is encountered then it would be placed in appropriate locations such as the base of the borrow pit and dressed with acrotelmic peat.

Further information on the classification of peat within the development is provided in the Peat Landslide & Hazard Risk Assessment (PLHRA) report compiled by SLR, dated July 2020, which concludes that the risk of a peat side in areas of infrastructure is largely negligible or low. Where areas of medium risk have been identified, appropriate mitigation measures have been advised to reduce risk.

3.4 Peat Use in Borrow Pit Restoration (Objective 4)

A search area for 1 borrow pit have been proposed for Cairn Duhie Wind Farm. The proposed borrow pit search area has a combined area of approximately 3.6ha, which is estimated to reinstate approximately 32,100m^3 of peat, utilising 49% of the proposed borrow pit search areas

The proposed borrow pit search area within the development site is presented on the Borrow Pit General Arrangement, included in ***Annex 1***.

The final design of the borrow pit will be confirmed prior to construction and may be subject to further detailed ground investigation.

The following principles will be adopted in the final method statements for the restoration of borrow pits:

- Any peat and soil material excavated from the borrow pit will be replaced within the same borrow pit where possible;
- Peat arising from excavations will only be placed in areas of the borrow pit which have a been designed to structurally retain and where practicable hydrologically connect it;
- A maximum of 2m depth of peat will be used for borrow pit restoration with catotelmic peat being placed underneath acrotelmic peat;
- Temporary storage locations, to be agreed with the Ecological Clerk of Works, will be appropriately located and designed to minimise the impact to sensitive habitats and species, prevent risks from material instability and run-off into watercourses;
- Restoration activities will be overseen by the Ecological Clerk of Works to ensure methods are properly adhered to;
- The final restoration profile of the borrow pit using excavated peat will depend on local ground conditions and slope angles of the area surrounding the borrow pit and will be designed to ensure hydrological conductivity with surrounding environment;
- If required, reseeding, with seed appropriate to the local habitat, will be carried out to aid revegetation.

If these principles are followed, further material treatment or specific engineering of borrow pits will not be required to ensure suitability for use.

3.5 Peat Use in Other Restoration and Temporary Storage (Objectives 5 & 6)

It will be necessary for the final construction PMP to prescribe methods and timing involved in excavating, handling and storing peat for use in reinstatement. A method statement to govern the process will be produced and will be based on the following principles:

- The surface layer of peat and vegetation (acrotelmic peat) will be stripped separately from the catotelmic peat. This will involve an excavation depth generally between 0.3m and 0.5m.
- Acrotelmic material will be stored temporarily, separate from the catotelmic material.
- Less humified catotelmic peat (consolidated peat) which maintains its structure upon excavation should be kept separate from and highly humified amorphous peat.
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be used. To minimise handling and transportation of peat, acrotelmic and catotelmic peat will be replaced, as far as is reasonably practicable, in the location from which it was removed.
- Additional peat required to address local deficits for track verges should be taken from the closest possible source of peat excavation.
- Temporary storage of peat will be minimised. Temporary stockpiles may be sprayed with water if necessary during particularly dry periods of weather to prevent the peat drying out.
- Suitable temporary storage areas should be sited in areas with shallow peat depths, shallow gradient, low slide risk, avoiding 50m watercourse buffer zones, avoiding ecological and cultural heritage constraints as illustrated in the Combined Constraints drawing particularly avoiding.

- Temporary peat storage areas should not be located within the highly dependent ground water dependent terrestrial ecosystems (GWDTEs).
- Reinstatement will, in all instances, be undertaken at the earliest opportunity to minimise storage of turves and other materials.
- Temporary hardstandings e.g. the construction compound will be reinstated at the earliest opportunity following their final use.
- Timing the construction work as much as possible to avoid periods when peat materials are likely to be wettest.
- Temporary storage and replacement of peat excavated from borrow pits should where possible occur adjacent to and within the source pit.

3.6 Peat Unsuitable for Reuse (Objective 7)

Based on the observations made during peat probing surveys and the calculations made in this report, it is considered unlikely that there will be a surplus of excavated peat and therefore there will be no requirement for a waste management for the Cairn Duhie Wind Farm development.

In the event that a residual excess of peat was generated, the off-site use of peat will be considered in which case peat may be treated and managed as a waste, in accordance with the terms of the Waste Management Licensing (Scotland) Regulations 2011. Where possible any off-site reuse of peat would be in nearby licensed restoration sites and disposal in a landfill would be avoided.

4 CONCLUSIONS

This document is a working outline, which will be refined and updated throughout the development of the wind farm in accordance with industry practice. The following preliminary conclusions are drawn regarding the management of peat within the proposed development site:

- The overall balance on site suggests that all excavated peat can be used on site, with some spare capacity to use extra peat if required.
- The current estimates of excavated peat are considered conservative, allowing for large wind farm infrastructure (and hence a broader choice of wind turbine) resulting in what is expected to be overestimated excavation volumes.
- Sufficient procedures are in place to ensure that peat can be sensitively handled and stored on-site, therefore allowing for effective reuse.

ANNEX 1. DRAWINGS

EIA-R Reference	Drawing Name	Drawing Number
Figure 1.1	Site Location	02914-RES-LAY-DR-TE-007
Figure 4.1	Infrastructure Layout	02914-RES-PRO-DR-PT-001
Figure 4.12	Borrow Pit General Arrangement	02914-RES-ERW-DR-CO-002

CAIRN DUHIE WIND FARM EIA REPORT: APPENDIX 4.4: FORESTRY

Contents

Figures

Appendices

1.1 Introduction and Background

1.1.1 RES is the project developer for Cairn Duhie Wind Farm (the proposed development), a proposed 16 turbine development located near Ferness, south of Nairn in the Highland Council local authority area. A site location plan is included as Figure 1.1.

1.1.2 An initial forest assessment was undertaken to accompany the application for the consented development in 2013. This report has been updated and is included as Appendix 1 of the EIA Report for the revised scheme. It details the location of all trees within the study area and identifies where they are affected by the construction works associated with the access roads infrastructure and turbines.

1.1.3 This report details the existing forestry and woodland baseline and provides mitigation to address the impact on the loss of woodland resource as a result of the proposed development.

1.1.4 The study area shown in Figure 1.2 is best described as open moorland, typical of this area of upland Scotland with scattered native tree species. All trees are considered to have regenerated naturally on the site and been subject to varying levels of deer and livestock grazing in the past. There is evidence of continued browsing damage to these trees and this has clearly restricted the expansion of the area of native woodland in the past.

1.1.5 This assessment has been carried out by Norman O'Neill MICFor Chartered Forester at RTS.

1.2 Scope of Assessment

1.2.1 This assessment covered a study area of approximately 663 Ha of open hill land with areas of scattered trees (predominately Scots Pine with a small proportion of Birch). All infrastructure locations to inform the survey have been provided to RTS by RES in GIS format.

1.2.2 Those areas of existing woodland along with proposed tree clearance and new planting woodland within the site are shown in Figure 1.2.

1.3 Report Objectives

The objective of this Forestry report is to:

- Identify those sections of the wind farm infrastructure, including access tracks, which impact on existing areas of native woodland and individual trees.
- Describe, quantify and map the woodlands and individual trees affected by the Proposed Development.
- Comment on any trees or woodland areas within Scottish Natural Heritage (SNH) register of Ancient and semi-natural woodlands (ASNW), the Forestry Commissions Native Woodlands Survey of Scotland (NWSS) and the Cairngorms National Park woodland inventory.
- Identify mitigation to address any areas of woodland loss resulting from the proposed development.

1.4 Assessment Methodology

1.4.1 The report presents the Study Area utilising data collected from the following:

- Site surveys;
- National data sources from FCS and SNH;
- Aerial photographs; and
- Infrastructure locations in GIS format provided by client.

1.5 Baseline Forestry Conditions and Impact of the Proposed Development

1.5.1 The previous woodland survey from 2013 has been reassessed as detailed within Appendix 1 and found to still accurately reflect the current scale and location of woodland throughout the study area in November 2020. Individual trees have continued to grow in the interim 7-year period at the anticipated slow growth rates as would be expected in this location. The rate of trees in this location is low due to a combination of altitude, soil types exposure and presence of grazing animals.

1.5.2 Construction of the proposed development requires the felling of 0.27 Ha of trees which are identified in Figure 1.2. These are located near Turbines 1,2,7 and 11 and also at the western end of the access road as it leaves the A 939.

1.5.3 Throughout the remaining study area there are scattered native tree species either singly or in small groups. As detailed above the growth rate of these trees is slow and it is anticipated that they will not adversely impact upon the operation of the wind farm.

1.6 Mitigation

1.6.1 The site assessment of the study area identified a loss of woodland resource, through the construction phase of the project to a total of 0.27 ha across the site. These are located as follows;

- Turbine 1;
- Turbine 2;
- Turbine 11;
- Turbine 12; and
- There are an estimated 25 trees within the footprint of the access road and bellmouth onto the A939 to be removed during construction.

1.6.2 Within the study area an area of proposed new woodland planting has been identified adjacent to the substation. This new woodland planting will be of similar native species to that being removed (Scots Pine and Birch). This woodland area of 1.4 Ha within which approximately 2,100 trees will be planted. This will mitigate in full for the loss of woodland resource during construction of the proposed development. A further area of new woodland planting at the entrance to the site is also planned. This will require approximately 1.0 Ha of further trees to be planted on both sides of the access bellmouth.

1.6.3 This area of new tree planting will be undertaken within the first planting season after the construction of the proposed development. All trees will be planted as transplant sized 40-60 cm bare rooted stock. Trees will be protected against grazing by a combination of individual tree guards and fencing. After planting the trees will undergo a period of maintenance works including weeding, application of fertiliser and replacement of any failed trees to ensure the area is fully established.

1.7 Summary and Conclusion

1.7.1 During the design process existing forestry and woodland has been assessed and the final design of the turbine layout, substation and access roads has avoided the need for removal of woodland as far as possible. The new woodland planting at both the substation and access bellmouth will deliver 2.4 Ha of new native tree species across both sites reflecting the current natural mix found locally to the site and as such will fully mitigate the loss of the estimated 0.27 Ha of trees during the construction process.

Figures

Figure 1.1: Location Map

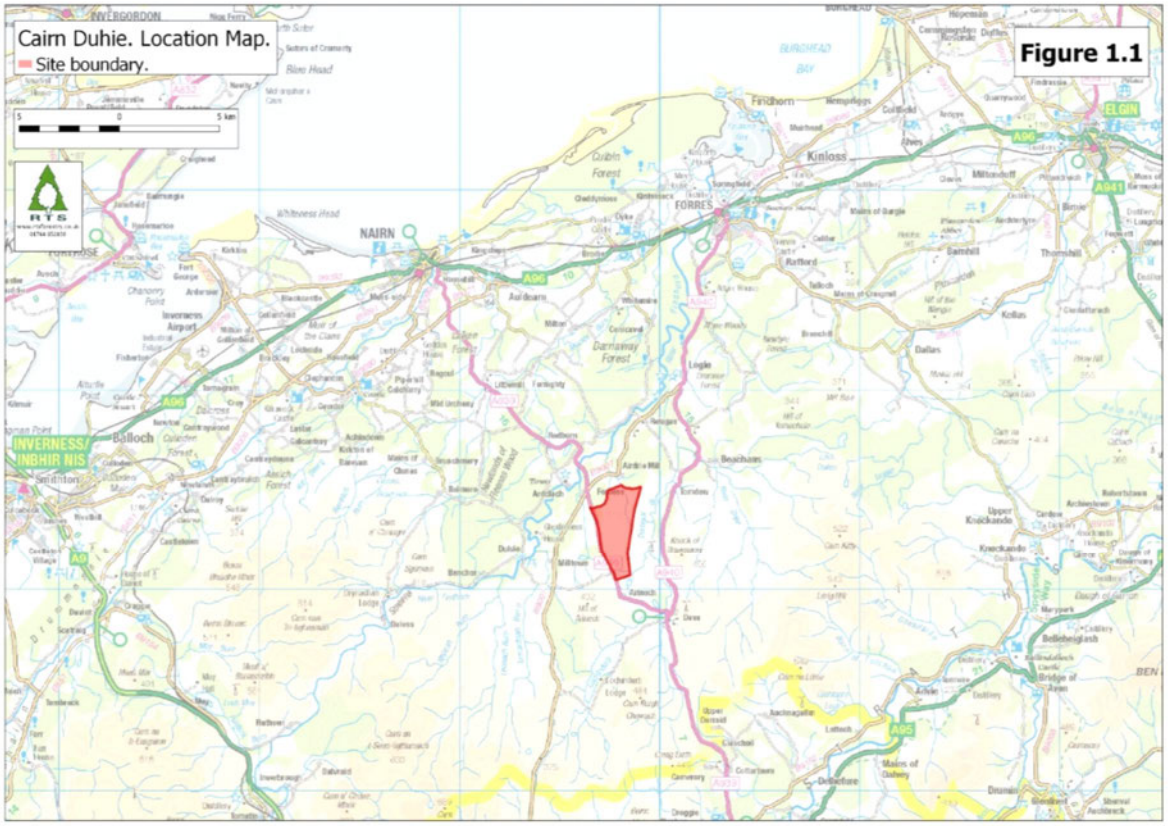
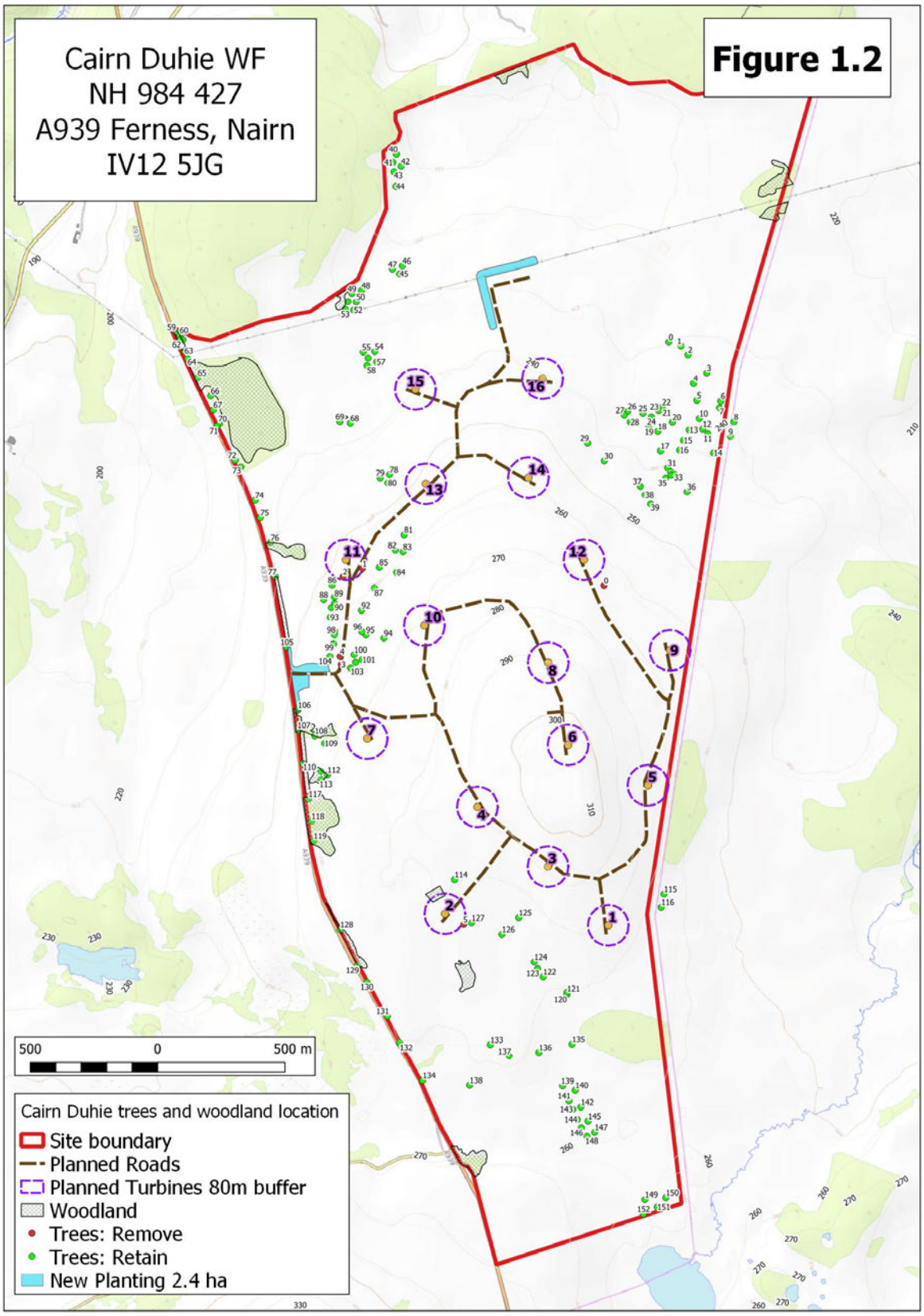


Figure 1.2 Trees and Woodland Location



Appendices

Appendix 1

The following report was originally produced in 2013 to assess the woodland cover at that time within the proposed Cairn Duhie Windfarm study area. It was reviewed in November 2020

Summary

In 2020 RTS Ltd were asked to review the 2013 report and to update it where required. The positioning and number of trees was assessed and found to still accurately reflect the situation within the study area.

The increase in tree height between 2013 and 2020 was small (< 1.0m) and in keeping with the projected growth rates for the slow growing conditions expected for this type of upland moorland.

RTS also reviewed the change in impact on the trees being lost as a result of this development taking into account the change in Turbine layout and infrastructure relative to the 2013 proposed design.

The updated assessment identified a net area of 0.27 Ha of existing trees requires to be felled to accommodate wind farm infrastructure. The assessment also identified the proposed planting of a combined area of approximately 2.4 Ha new trees within the area adjacent to the substation and at the access road bellmouth as detailed within Figure 1.2.

This review was undertaken in November 2020 by Norman O'Neill , BSc For, CEnv ,Mic For ;Senior Forestry Consultant within RTS Forestry

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RES UK and Ireland Ltd Cairn

Duhie Wind Farm

Forestry and Woodland Report

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RES UK and Ireland Ltd Cairn
Duhie Wind Farm
Forestry and Woodland Report

1 The Brief

To carry out on-site survey of specified forest and woodland blocks in the vicinity of the proposed Cairn Duhie wind farm development, and provide an assessment of how forestry is likely to develop in the future within each forest block.

There are four main elements in the survey and fact finding:

A. Within the wind farm site boundary

Using the base mapping by MacArthur Green provide the following characteristics for each mapped area of woodland and scattered woodland, the area modified by the turbine buffer map drawing no 0291 4D2203-02:

- Species
- Year of planting/current tree age
- Current height
- Annual growth rate
- Potential maximum height over next 30 years
- Height of ground ASL, derived from OS data, where the trees are and ultimate potential maximum height of the trees ASL over the next 30 years
- Approximate area of trees (for point mapped scattered trees)
- Approximate woodland density
- Estimated value

B. Auchindare Estate (planted area contiguous with the eastern site boundary)

Map the area currently planted and provide the following characteristics:

- Species
- Year of planting/current tree age
- Current height
- Annual growth rate
- Potential maximum height over next 30 years
- Height of ground ASL, derived from OS data, where the trees are and ultimate potential maximum height of the trees ASL over the next 30 years
- Approximate woodland density
- Estimated value

C. Glenferness Estate (to the north and west of the site boundary)

Use the information provided by Scottish Woodlands (Glenferness Woodland Assessment,

D. Forestry Commission Scotland (between the site boundary and Ferness Village)

Obtain felling plan information from Forestry Commission Scotland for the forestry between the site boundary and Ferness Village for a 30 year period.

2 Methodology

A. Within the wind farm site boundary

A detailed on-site survey, using electronic GIS data collection and height measurement was undertaken of the forest and woodland blocks within the turbine buffer zone of the wind farm site.

B. Auchindare Estate (planted area contiguous with the eastern site boundary)

For the Auchindare Estate native planting scheme, details of the scheme were obtained from Forestry Commission Scotland records held at the Grampian Conservancy office at Huntly. Tree heights were taken from outside the planted area.

C. Glenferness Estate (to the north and west of the site boundary)

Woodland data and anticipated tree growths of adjoining Glenferness Estate woodland to the north and west of the wind farm site were obtained from the Scottish Woodlands Woodland Assessment drawing.

D. Forestry Commission Scotland (between the site boundary and Ferness Village)

Felling plan information for Forestry Commission Scotland forestry between the site boundary and Ferness Village was obtained from the Forestry Commission Scotland District Office at Smithton.

3 Results

E. Within the wind farm site boundary

The results of the detailed on-site survey, using electronic GPS data collection and height measurement of the forest and woodland blocks within the turbine buffer zone of the wind farm site is tabulated in Table 1.

Table key

- Column 1 Easting
- Column 2 Northing
- Column 3 ID Scattered Trees
- Column 4 ID Woodland Block
- Column 5 Species
- Column 6 Comments
- Column 7 Year of Planting
- Column 8 Current tree top height (Meters) 2013 (by Survey)
- Column 9 Potential maximum tree top height (meters) by 2043 (by hypothesis)
- Column 10 Ground ASL (from OS data)
- Column 11 Tree top ASL (meters) 2013
- Column 12 Tree top ASL (meters) 2043
- Column 13 Blocks Only Area
- Column 14 Tree Density (trees/ha)

1.7.1.1.1.1 Table 1. Tabulated data for scattered trees and woodland blocks within the wind farm site boundary

1	2	3	4	5	6	7	8	9	10	11	12	13	14
												Blocks only	
Easting	. Northing	ID Scattered trees	ID Woodland blocks	Species	Comrents	Yr of planting	Tree Height 2013 (m)	Potential max. htby 2043 (m)	Ground ht, ASL (m)	Treemax ht. ASL2013 (m)	Tree max ht. ASL 2043 (m)	Area (ha)	Tree density (trees/ha)
296541.9	844126.9	1		Scots pine		Unknown	12	13	222	234	235		
296557.8	844114.8	2		Scots pine		Unk	10	11	222	232	233		
296557.8	844096	3		Birch		Unk	13	14	222	235	236		
296570.7	844096.4	4		Birch		Unk	13	14	222	235	236		
296576.3	844052.7	5		Birch		Unk	8	10	222	230	232		
296588.3	844023.1	6		Scots pine		Unk	10	12	222	232	234		
296627.9	843946.8	7		Scots pine		Unk	9	11	224	233	235		
296679.2	843876.3	8		Scots pine		Unk	10	12	226	236	238		
296689.3	843821.1	9		Scots pine		Unk	14	15	227	241	242		
296705.3	843755.9	10		Scots pine		Unk	8	10	227	235	237		
296713.1	843766.6	11		Scots pine	11 to 12 sparse cover	Unk	8	10	227	235	237		
296775.6	843623.5	12		Birch		Unk	8	10	230	238	240		
296797.9	843596.8	13		Birch		Unk	7	9	231	238	240		
296853.5	843466.1	14		Birch	13 to 14 sparse cover	Unk	10	12	233	243	245		
296873.9	843398.3	15		Birch	14 to 15 no trees	Unk	7	9	235	242	244		
296914.4	843300.4	16		Birch		Unk	9	11	237	246	248		
296933.5	843165.8	17		Birch		Unk	8	10	239	247	249		
296978.2	842889.6	18		Birch	17to18sparsecovertreesatapprox.20 metre centres	Unk	9	11	245	254	256		
297021.5	842642.5	19		Birch	18 to 19 only 3 no small row an	Unk	10	11	251	261	262		
297026.6	842562.7	20		Birch	19 to 20 band forms part of woodland block B2	Unk	10	11	255	265	266		
297041.2	842432.7	21		Birch	20 to 21 sparse tree cover	Unk	10	12	258	268	270		
297063.2	842293.4	22		Scots pine	21 to 22 sparse cover	Unk	11	12	262	273	274		
297074.7	842205.7	23		Scots pine		Unk	14	15	265	279	280		
297083.4	842128.9	24		Birch		Unk	9	11	265	274	276		
297187.5	841780.1	25		Birch	24 to 25 sparse scrub birch only	Unk	6	8	270	276	278		
297254.8	841640	26		Scots pine	25 to 26 band of pred birch	Unk	9	11	270	279	281		
297292	841574.2	27		Birch		Unk	8	10	270	278	280		
297373.2	841440.7	28		Scots pine		Unk	7	9	270	277	279		
297421.1	841335.5	29		Scots pine		Unk	7	9	270	277	279		
297511.3	841185.6	30		Scots pine		Unk	10	11	268	278	279		

	2	3	4	5	6	7	8	9	10	11	12	13	14
												Blocks only	
Easting	. Northing	ID Scattered trees	ID Woodland blocks	Species	Comrents	Yr of planting	Tree Height 2013 (m)	Potential max. ht by 2043 (m)	Ground ht, ASL (m)	Tree max ht. ASL 2013 (m)	Tree max ht. ASL 2043 (m)	Area (ha)	Tree density (trees/ha)
297104.3	842106.6		B101	Scots pine		Unk	12						
297131.1	842091.4		B102	Scots pine		Unk	10						
297151.6	842090.3		B103	Birch		Unk	10						
297158.7	842127.5		B104	Birch		Unk	14						
297153.3	842204.1		B105	Birch		Unk	11	15	262-275	276-289	278-290	2.61	100
297189.1	842189		B106	Scots pine		Unk	11						
297184.8	842242.7		B107	Birch		Unk	9						
297171.4	842293.4		B108	Birch		Unk	10						
297112.8	842305.5		B109	Scots pine		Unk	10						
297112.7	842370.5	31		Birch		Unk	8	10	265	273			
297137	842388.3	32		Birch		Unk	8	10	265	273			
297111.9	842401.1	33		Birch		Unk	12	13	265	277			
297178	842544.2		B201	Birch		Unk	8						
297157.8	842581.4		B202	Birch		Unk	10						
297079.2	842584.2		B203	Birch		Unk	8	12	250-267	261-277	262-279	0.67	100
297036.4	842601		B204	Birch		Unk	11						
297228.2	842807.7	**34**		Birch	Small scattered self seeded groups of birch and scrub willow	Unk	9	**11**	262	271	273		
297274	842840.2	35		Birch		Unk	8	10	263	271	273		
297242.1	842860	36		Birch		Unk	5	7	262	267	269		
297186.8	842852.4	37		Birch		Unk	6	8	259	265	267		
297358.8	842924.7	38		Birch		Unk	5	7	265	270	272		
297147.2	842852.6	39		Birch		Unk	6	8	256	262	264		
297288.7	842938	40		Birch		Unk	4	6	262	266	268		
297161.6	842902.2	41		Birch		Unk	6	8	257	263	265		
297165	842937.9	42		Scots pine		Unk	3	5	257	260	262		
297165.6	842951.5	43		Birch		Unk	6	8	257	263	265		
297272.6	842950.3	**44**		Birch		Unk	4	6	262	266	268		
297148.3	843006.6	45		Scots pine		Unk	4	6	255	259	261		
297271.1	843033.4	46		Birch		Unk	3	5	260	263	265		
297152.4	843044.4	47		Scots pine		Unk	5	7	254	259	261		
297164.9	843085.8	48		Birch		Unk	8	10	253	261	263		

	2	3	4	5	6	7	8	9	10	11	12	13	14
												Blocks only	
Easting	. Northing	ID Scattered trees	ID Woodland blocks	Species	Cornnents	Yr of planting	Tree Height 2013 (m)	Potential rrax. ht by 2043 (m)	Ground ht, ASL (m)	Tree rrax ht. ASL 2013 (m)	Tree rrax ht. ASL 2043 (m)	Area (ha)	Tree density (trees/ha)
297165.5	843060.3	49		Birch		Unk	6	8	254	260	262		
297123	843075.3	50		Birch		Unk	7	9	255	262	264		
297321.7	843121.4	51		Scots pine		Unk	5	7	257	262	264		
297341.1	843203.1	52		Birch		Unk	5	7	255	260	262		
297198.6	843165.4	53		Scots pine		Unk	6	8	250	256	258		
297155.5	843133.9	54		Birch		Unk	8	10	250	258	260		
297058.2	843242.3		B301	Birch		Unk	7						
297013.7	843252.9		B302	Birch		Unk	10						
297001	843262.4		B303	Birch		Unk	6						
296971.3	843269.9		B304	Birch		Unk	8	12	237-272	247-282		0.86	100
296956.4	843276.2		B305	Birch		Unk	7						
296931.6	843282.5		B306	Birch		Unk	5				249-284		
296668.4	843993.1		B401	Scots pine	Scots pine plantation		6						
296755.5	843992.6		B402	Scots pine			9						
296839.8	844020.8		B403	Scots pine			6						
296862.4	843988.1		B404	Scots pine			5						
296903.9	843905.7		B405	Scots pine			6						
296955.9	843821.2		B406	Scots pine			6						
296973	843722		B407	Scots pine		1991	6	19	225-237	234-246	244-265	10.26	1,500
296939.4	843691.1		B408	Scots pine			6						
296844	843622.1		B409	Scots pine			6						
296833.9	843633.8		B410	Scots pine			7						
296783.9	843693.9		B411	Scots pine			7						
296763.7	843757.4		B412	Scots pine			6						
297184.8	844183.9		B501	Birch	DN art birch under pow erline	Unk	4						
297180	844225.6		B502	Birch		Unk	8	10	226-228	234-236	244-238	0.27	100
297209.9	844257.9		B503	Birch		Unk	8						
297259	844250.9		B601	Birch		Unk	7	9	226	233	235	0.11	100
297287.4	844264.9		B602	Birch		Unk	7						
297321.7	844296.3		B701	Birch		Unk	8						
297294	844302.5		B702	Birch		Unk	4	14	225	233	239	0.17	100
297286.4	844309.5		B703	Larch		Unk	10						

	2	3	4	5	6	7	8	9	10	11	12	13	14
												Blocks only	
Easting	Northing	ID Scattered trees	ID Woodland blocks	Species	Comrents	Yr of planting	Tree Height 2013 (m)	Potential max. htby 2043 (m)	Ground ht, ASL (m)	Treemaxht. ASL2013 (m)	Tree max ht. ASL 2043 (m)	Area (ha)	Tree density (trees/ha)
297400	844369.4		B801	Larch		Unk	13	14	222	235	236	0.1	70
297412.7	844364.7		B802	Larch	Groupof7larchtreesonknoll	Unk	10						
297314.2	844007.9		B901	Scotspine		Unk	7	12	230-232	240-242	242-244	0.17	206
297330.6	844044.3		B902	Scotspine	Groupof35Scotspine	Unk	10						
298327.4	843772.7	55		Birch		Unk	9	11	230	239	241		
298302.9	843800.3	56		Birch		Unk	10	12	230	240	242		
298316.7	843815.5	57		Birch		Unk	10	12	230	240	242		
298437.9	843818.8	58		Scots pine		Unk	8	10	232	240	242		
298451.6	843831.7	59		Scots pine		Unk	8	10	232	240	242		
298452.6	843823.3	60		Scots pine		Unk	8	10	232	240	242		
298409.5	843792.9	61		Scots pine		Unk	9	11	232	241	243		
298400	843753.9	62		Birch		Unk	8	10	232	240	242		
298492.2	843772.9	63		Scots pine		Unk	10	12	233	243	245		
298434.8	843736.7	64		Scots pine		Unk	10	12	233	243	245		
298535.8	843701.2	65		Scots pine		Unk	13	14	235	248	249		
298681.9	843855.5	66		Scots pine		Unk	12	13	232	244	245		
298597.6	843787	67		Scots pine		Unk	10	12	234	244	246		
298610.8	843745.7	68		Scots pine		Unk	8	10	235	243	245		
298720.7	843715.6	69		Scots pine		Unk	7	9	235	242	244		
298733.6	843774	70		Scots pine		Unk	8	10	235	243	245		
298672.5	843987.8		B1001	Scots pine	Group of 10 Scots pine	Unk	10	12	230	240	252	0.25	40
298671	843986.1		B1002	Scots pine		Unk	10						
298673.6	843566.7		B1101	Scots pine	Group of 100 Scots pine	Unk	5	9	230	237	239	1.77	56
298473.3	843512		B1102	Scots pine		Unk	7						
298688.1	843461.7		B1103	Scots pine		Unk	7						
298465.6	843552.9	71		Scots pine		Unk	9	11	238	247	249		
298498.3	843570.2	72		Scots pine		Unk	9	11	235	244	246		
298520.9	843663	73		Birch	Group birch	Unk	8	10	235	243	245		
298488	843564	74		Scots pine		Unk	9	11	238	247	249		
298473.3	843593.4	75		Scots pine		Unk	9	11	238	247	249		
298366.1	843520.5	76		Scots pine		Unk	9	11	238	247	249		

	2	3	4	5	6	7	8	9	10	11	12	13	14
												Blocks only	
Easting	Northing	ID Scattered trees	ID Woodland blocks	Species	Cornnents	Yr of planting	Tree Height 2013 (m)	Potential rrax. ht by 2043 (m)	Ground ht, ASL (m)	Tree rrax ht. ASL 2013 (m)	Tree rrax ht. ASL 2043 (m)	Area (ha)	Tree density (trees/ha)
298448.1	841868.1	77		Scots pine	This rrature Scots pine tree rrarks the end of southern boundary of the new native planting on adj. property	Unk	5	7	270	275	277		
298458.7	841919.7	78		Scots pine		Unk	6	8	267	273	275		
298078.3	841533.7	79		Scots pine		Unk	4	6	267	271	273		
298077.3	841524.8	80		Birch		Unk	4	6	267	271	273		
297984.5	841594.9	81		Birch		Unk	4	6	270	274	276		
297962.5	841627.3	82		Birch		Unk	4	6	270	274	276		
297949.4	841653.2	83		Birch		Unk	5	7	270	275	277		
297938.6	841672.6		B1301	Birch	Group of 10 birch	Unk	4	6	270	274	276	0.1	100
297888	841828.2	84		Scots pine		Unk	4	6	276	280	282		
297726.3	841828.5		B1401	Birch		Unk	3	10	272-277	280-285	282-287	3.12	100
297660.2	841732.8		B1402	Birch		Unk	5						
297735.8	841759.8		B1403	Birch		Unk	3						
297723.7	841615.6		B1404	Scots pine		Unk	8						
297725.2	841573.3		B1405	Birch		Unk	6						
297672.9	841539.3		B1406	Scots pine		Unk	5						
297653.4	841739.2		B1501	Birch	Group of 5 birch	Unk	4						
297630.7	841731.1		B1502	Birch	Group of 4 birch	Unk	4	6					
297636.5	841976.6	85		Scots pine		Unk	3	5	278	281	283		
297585.3	841929.4		B1601	Scots pine		Unk	3	5	277	280	282	0.25	80
297534.9	841908.3		B1602	Scots pine	Western boundary of block 50 x 50 low dens y self seeded	Unk	3						
297244.9	843781.3		B1701	Birch	Group of 30 birch	Unk	3	6	236-237	240-241	242-243	0.22	136
297211.6	843787.4		B1702	Birch	North end of strip	Unk	4						
297272.8	843696.3		B1801	Birch	Group of birch w h sorre w illow	Unk	4	7	238-239	243-244	245-246	0.15	133
297281.4	843684		B1802	Birch	Group of 12 birch	Unk	5						
297363	843611.6		B1901	Scots pine	Group of 8 Scots pine plus draw f willow	Unk	5	7	241-244	246-249	248-251	0.27	30
297379.2	843556.3		B1902	Birch		Unk	5						
297410.4	843331.8		B2001	Scots pine	Group of 10 Scots pine and birch	Unk	5	7	250	255	257	0.1	100
297404.4	843270	86		Birch		Unk	4	6	255	259	261		
297409.2	843183	87		Scots pine		Unk	3	5	258	261	263		
297274.8	843197.9	88		Scots pine		Unk	6	8	252	258	260		

Estimation of height growth to 2043

For the purposes of estimating future yield the concept of Yield Class is used in commercial forestry. Yield Class is based on the relationship between top height of a stand of trees and the age of the stand linked together with a series of general assumptions of silvicultural treatment of that stand. This leads to a series of published general yield class curves for a range of species grown throughout the UK. For the Cairn Duhie site an assumption has been made for the self-seeded birch and Scots pine that a Yield Class of 4 (expressed in cubic metres per hectare per year) would be at the upper range of any growth.

However, for all the self-sown scattered trees and trees in the woodland blocks a combination of the maturity of the trees and the degree of exposure of the site will limit further growth, especially in the height of the trees. Transforming YC into height gain for both species, YC 4 for the older mature trees would mean in the region of 2m height gain in 30 years, the exposure is likely to limit this to between zero and a 1 m gain over the 30 year period. For younger smaller trees height gain has been estimated to be closer to YC4, and a height gain of 2m over a 30 year period has been used in the estimation of future height.

Survey summary

The site survey was started at the north west corner of the wind farm site adjoining the A939 where the first survey measurements were taken of a number of the trees throughout the length of this boundary. Trees ID numbers 1 to 30 were recorded and the survey plan (Appendix 2) notes the locations with the dotted line giving an indication of the density of the trees along the boundary. The tree species were an even mixture of self-seeded Birch *(Betula pendula)* and Scots pine *(Pinus sylvestris).* The height range of the birch was from 8m to 13m with an average tree height of 9m. The Scots pine had a range of 7m to 14m with an average height of 9.3m. The trees were predominately mature or over mature and unlikely to achieve much further height growth. Across both species the height range is estimated at 8m to 15m (232 to 280ASL) by 2043. The boundary trees and the woodland blocks directly abutting the boundary have a considerable amenity value in the landscape.

The second stage of the survey concentrated on the scattered trees and woodland blocks throughout the site. One difficulty that arose in parts of the site was the identification of a block against "scattered" trees. This ended up as a subjective process given the scale of the site, the results indicated a further 55 "scattered trees" and some 20 woodland blocks.

The species throughout the site mirrored that in the west boundary trees and comprised almost 100% birch and Scots pine (in a 50:50 mix) with a small percentage of European larch *(Larix decidua)* and willow *(Salix mixed species).*

The scattered trees located in the survey ranged from 3m to 14m in height with an average height of 7.5m. Table 1 tabulates the current and potential maximum height of the trees ASL over the next 30 years to 2043.

Some 20 woodland blocks were identified at ground levels all below the 280m contour line (some 32 metres below the summit). Six blocks were predominately birch, 6 Scots pine (including Block 4, the only planted block of commercial forestry within the site), there were a further 7 mixed blocks and a single block of larch. Excluding block 4 (the Scots pine plantation with a density estimated at 1,500 trees per hectare (trees/ha), density of tree cover in the blocks ranged from 25 to 206 trees/ha with an average density of 83 trees/ha.

Individual tree heights in the 20 woodland blocks ranged from 3m to 14m and the average tree heights in the blocks ranged from 3m to 12m. Blocks 12 to 20 contained the smaller trees with average tree heights of 3m to 5m in more exposed positions on the site.

F. Auchindare Estate (planted area contiguous with the eastern site boundary)

Details of the Auchindare Estate native planting scheme were obtained from Forestry Commission Scotland records held at the Grampian Conservancy office at Huntly. Tree heights were estimated from outside the planted area.

This native planting scheme was established in 1997, with an original planned area of some 52 hectares running parallel with the eastern boundary of the wind farm site. There appears to have been complete failure of the southern area of planting as the site survey shows less length of planting on the boundary than was shown on the establishment plans. The current extent of the planting is marked on the site survey drawing.

Planting was proposed to consist of 80% Scots pine (Caledonian), 5% native broadleaved species and some 15% of open ground. In some areas there has been a 100% loss of planting whilst in others there is growth in the pine to around 1.5m, indicating YC4. Original planting density was carried out at 1100 trees/ha, but failure has reduced this considerably over the 15 years since establishment.

Given the estimated YC4, the Scots pine could be expected to reach a top height in the range of 8.5 to 11m by 2043. With a ground ASL derived from OS data in the range 240 to 275m, the current tree top height is in the range of 242 to 277m ASL and by 2043 this is predicted to be in the range 249 to 286m ASL.

G. Glenferness Estate (to the north and west of the site boundary)

Woodland data and anticipated tree growths of adjoining Glenferness Estate woodland to the north and west of the wind farm site were obtained from the Scottish Woodlands Woodland Assessment drawing

There are three main blocks of Glenferness Estate forestry to the north of the wind farm site with planting dates ranging from 1925 for the most easterly block of Scots pine to1968 for the central block of pine and 2006 for the most recently planted Sitka spruce. The three blocks are lying between 21Om and 235m ASL. Scottish Woodlands data indicates the maximum top height of the oldest trees to be some 25m (260m ASL) indicating YCl 0. Given the age of the crop and the fact that it is reaching maturity it is predicted that the top height will not exceed 28m (263m ASL) by 2043.

All woodland to the west of the site and below the A939 road and in the ownership of Glenferness Estate consists of native pine and native broadleaves lying within 235m and 265m ASL. "Best regeneration is expected to reach 15m within 25 years and mature stands are currently at approximately 10 - 15m high with no further height growth expected due to exposure. Maximum tree top heights are not expected to be above 280m ASL" (Comments by Scottish Woodlands). Site survey results of tree measurements on the western boundary of the wind farm site, above the nearest of the Estate woodlands, would support the figures put forward by Scottish Woodlands. Boundary trees - ID nos 20 to 25 - have a current top tree height of 265 to 279m ASL and predicted top heights of 266 to 280m ASL by 2043.

H. Forestry Commission Scotland (between the site boundary and Ferness Village

Information on long term proposals for Forestry Commission forestry between the site boundary and Ferness Village was obtained from the Forestry Commission Scotland District Office at Smithton. It is understood that this information is required for the preparation of landscape impact drawings of the wind farm.

4 Discussion

There are a number of caveats to the production of information on forestry crops obtained by survey. The biological diversity of the crops as a result of soils, growing conditions, the chance of potential damage from wind and the impacts of management regimes imposed (or not imposed as the case may be), for example the absence of thinning in the crops due to the potential for opening the crop to potential for wind damage, and the variable nature of that growth can all impact on future predications of yield and growth increment. Notwithstanding these caveats the data used in predicting growth is based on a large number of Forestry Commission sample plots in Scotland, England and Wales over a considerable period of time and therefore are the best estimates available.

For all the self-sown scattered trees and trees in the woodland blocks a combination of the maturity of the trees and the degree of exposure of the site will certainly limit further growth, especially in the height of the trees. Scottish Woodlands in their comments on the native woodland to the west of A939 have predicted no further height growth in the crops in this area. For the woodland and scattered trees within the wind farm site this report is more cautious and we have predicted height growth of one metre over thirty years for the older more mature trees and 2 metres in the younger perhaps more vigorous trees. The exceptions include Block 4 of plantation grown Scots pine which is forecast (on current growth) to achieve YC10, and a height of 19m by 2043, and the new native planting in Auchindare Estate where YC4 is predicted which would result in a top height of 8.5 to 11 m by 2043.

The tree species within the actual wind farm site boundary were an even mixture of self-seeded Birch (Betula pendula) and Scots pine (Pinus sylvestris), with a small percentage of European larch (Larix decidua) and willow (Salix mixed species). The trees were predominately mature or over mature and unlikely to achieve much further height growth. The boundary trees and the woodland blocks directly abutting the boundary have a considerable amenity value in the landscape.

Some 20 woodland blocks were identified at ground levels all below the 280m contour line. The blocks were one third pure birch one third pure Scots pine and one third mixed species.

The major exception was Block 4, the only planted block of commercial Scots pine within the site. Excluding block 4, density of tree cover in the blocks ranged from 25 to 206 trees/ha with an average density of 83trees/ha.

Individual tree heights in the 20 woodland blocks ranged from 3m to 14m. Blocks 12 to 20 contained the smaller trees with individual tree heights of 3m to 8m in more exposed positions on the site.

The Auchindare Estate native planting scheme was established in 1997, there appears to have been complete failure of the southern area of planting as the site survey shows less length of planting on the boundary than was shown on the establishment plans. Planting was proposed to consist of 80% Scots pine (Caledonian), 5% native broadleaved species and some 15% of open ground. Original planting density was carried out at 1100 trees/ha, but failure has reduced this considerably over the 15 years since establishment. The Scots pine is predicted to reach a top height in the range of 8.5 to 11m by 2043.

There are three main blocks of Glenferness Estate forestry to the north of the wind farm site with planting dates ranging from 1925 to 2006 for the most recently planted Sitka spruce. Scottish Woodlands data indicates the maximum top height of the oldest trees to be some 25m not exceeding 28m by 2043.

All woodland to the west of the site and below the A939 road and in the ownership of Glenferness Estate consists of native pine and native broadleaves regeneration is expected to reach 15m within 25 years and mature stands are currently at approximately 10 - 15m high with no further height growth expected due to exposure.

Information on long term proposals for Forestry Commission forestry between the site boundary and Ferness Village was obtained from the Forestry Commission Scotland District Office at Smithton. It is understood that this information, outwith the turbine buffer zones, is required for the preparation of landscape impact of the wind farm.

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Reviewed and updated

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Appendix 2. Photo Report

Photo A. North west corner of the site boundary

Photo B. Typical stretch of road boundary

Photo C. Block l from the south

Photo D. Typical birch woodland block

Photo E. Block 5 typical dwarf birch from natural regeneration from west

Photo F. Block 9 typical Scots pine block from south

Photo G. Typical scattered Scots pine towards eastern boundary

Photo H. Trees 56 and 57 typical 9/1Om mature birch