

Tangy IV Wind Farm Section 36C Variation

Technical Appendix 3.7c: Outline Decommissioning Method Statement Tangy I & II



Outline Decommissioning Method Statement Tangy I & II Wind Farms

Document versions

Version	Author	Reviewer	Approver	Date
V1.0	Isla Davidson (SSE)	Hiba Ayaz (SSE)	Catriona Knott (SSE)	May 2024
Issue for discharge of Planning Condition 10				

Contents

Glossary

Planning Conditions

1.	Introduction.....	1
	1.1. Purpose of this Document	1
	1.2. Tangy I & II Wind Farm Site Location and Scheme Description	1
2.	Decommissioning.....	2
	2.1. Dismantling of Wind Turbine Generator	2
	2.2. Turbine Foundations.....	4
	2.3. Meteorological Mast.....	5
	2.4. Access Tracks	5
	2.5. Substation and Operational Control Building.....	6
	2.6. Underground Cabling.....	6
3.	Ground Restoration.....	6
	3.1. Habitat Restoration	6
	3.2. Aftercare	6
4.	Traffic Management Plan	7
5.	Waste and Material Recovery.....	7
	5.2. Potential Waste Streams	7
	5.3. Tracks, Hardstands and Foundations.....	7
	5.4. Wind Turbine Components.....	8
6.	Reference Documentation	9
	Appendix 1 EIA Report Commitments	10

Glossary

The following defines some of the terms used throughout this document:

The Developer – The wind farm developer (i.e., SSE Renewables).

The Contractor – The Contractor responsible for the decommissioning of Civil and Mechanical Infrastructure and the subsequent restoration of the site.

Aftercare – The definition of aftercare is considered largely synonymous with Restoration, although relates specifically to the requirement for further management effort as informed by post-restoration monitoring. For example, where seeding has been undertaken although subsequent monitoring has determined failure and requirement for additional effort to achieve restoration targets.

C&DEMP - Construction and Decommissioning Environmental Management Plan. This document will provide requirements for the avoidance, minimisation and control of adverse environmental impact associated with the construction of Tangy IV Wind Farm and the decommissioning of Tangy I and Tangy II Wind Farms.

Environmental Impact Assessment Report (EIAR) – The document submitted in support of the wind farm planning application which comprehensively describes the site, baseline environmental conditions, potential impacts of the development and prescribed mitigation. The principles outlined in this document form part of the conditions of the Planning Consent.

Decommissioning – Decommissioning is a process including the partial removal of the wind farm components and infrastructure. Decommissioning may extend to the entire wind farm after its natural operational phase or relate to discrete areas of one or more turbines as part of upgrade / replacement works. Decommissioning works will involve similar tasks / impacts as construction works and will be subject to additional detailed proposals to be submitted to the Planning Authority prior to the commencement of the decommissioning works.

Development Run-Off – Run-off from site infrastructure that may contain suspended solids, silt or other organic matter that requires treatment before discharge to the environment.

ECoW – The Environmental/Ecological Clerk of Works is an independent specialist appointed by the Developer. The ECoW monitors compliance of works with regard to environmental and ecological aspects in accordance with relevant planning conditions, applicable regulations, current best practice and prescribed works methods. The ECoW provides advice to the Developer.

HMP – Habitat Management Plan. An agreed plan of measures for the ongoing restoration and management of habitats on site over the duration of wind farm operation.

Reinstatement – Reinstatement works undertaken during decommissioning aiming to address any development of landscape and habitats as part of the decommissioning works. Reinstatement is undertaken as soon as practical following the decommissioning works in each area, such as the redressing of road and tracks where applicable, turbine bases (and other areas that may be disturbed as a result of the decommissioning process). Re-seeding (conventional or hydroseeding) may be part of reinstatement measures where redressing proves unsuccessful.

Restoration – Restoration works are generally defined as long-term measures aimed to restore the ecological status (comparable to pre-commencement / baseline) of the development, through species and / or habitat management.

Planning Conditions

Relevant to The Decommissioning Method Statement for Tangy I Wind Farm & Tangy II Wind Farm

This section provides a list of the planning conditions relevant to the decommissioning of the existing wind turbines at Tangy Wind Farm. These are set out within the Tangy IV Wind Farm Consent¹. In addition, relevant conditions are included within planning permission for the existing wind farms, Tangy I Wind Farm² and Tangy II Wind Farm³. The wording of relevant conditions within the existing wind farm consents are duplicated and noted once each below.

Condition	Cross-Reference
Tangy IV Wind Farm Consent: Condition 10 Decommissioning Method Statement – Tangy I and Tangy II	This document Appendix 1 EIA Report Commitments
No development shall commence until an outline Decommissioning Method Statement (DMS) for the dismantling of the existing 22 wind turbines and their associated infrastructure which form part of the Tangy I and Tangy II developments and any associated ground restoration works as described as a principal operation at Chapter 5.4 of the EIA Report, is submitted and approved in writing by, the Planning Authority.	
Tangy I Wind Farm Consent: Condition 2 Tangy II Wind Farm Consent: Condition 2	This document
This planning permission shall expire on 27 August 2027. Within 18 months of 27 August 2027, unless a further planning application is submitted and approved, all wind turbines, ancillary equipment and buildings shall be dismantled and removed from the site and the land reinstated in accordance with the applicant's statement of intentions and conditions listed below, to the satisfaction of the Council as Planning Authority.	

¹ Consent ECU00000673 under the Electricity Act 1989 (as amended) to Construct and Operate Tangy IV Wind Farm

² Planning Permission 21/02556/PP under the Town and Country Planning (Scotland) Act 1997 (as amended) and Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013. Variation of condition 2 of planning permission 02/01179/DET to allow continued operation for a further 6 years until 2027 at Tangy I Wind Farm.

³ Planning Permission 21/02555/PP under the Town and Country Planning (Scotland) Act 1997 (as amended) and Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013. Variation of condition 2 of planning permission 04/01291/DET to allow continued operation for a further 6 years until 2027 at Tangy II Wind Farm.

Condition	Cross-Reference
Tangy I Wind Farm Consent: Condition 10 Tangy II Wind Farm Consent: Condition 7	This document
Within 6 months of the planning consent lapsing, the wind turbines shall be removed and their bases covered in soil/peat and re-seeded with appropriate vegetation. Full details of the base restoration plan shall be submitted for the prior written approval of the Council as Planning Authority, in consultation with NatureScot prior to the commencement of works.	
Tangy I Wind Farm Consent: Condition 12 Tangy II Wind Farm Consent: Condition 15	Construction and Decommissioning Environmental Management Plan (C&DEMP)
No later than 12 months prior to the expected decommissioning of the Development, or 12 months after being directed to decommission the Development, a detailed decommissioning, restoration and aftercare plan shall be submitted for the written approval of the Planning Authority in consultation with NatureScot and SEPA. The detailed decommissioning, restoration and aftercare plan shall provide updated and detailed proposals, in accordance with the relevant guidance at that time, for the removal of the Development, the treatment of the ground surfaces, the management and timing of the works, and environment management provisions which shall include (but not be limited to):	
a) A site waste management plan (dealing with all aspects of waste produced during the decommissioning, restoration and aftercare phases);	C&DEMP
b) Details of the formation of the construction compound, welfare facilities, any areas of hardstanding, turning areas, internal access tracks, car parking, material stockpiles, oil storage, lighting columns, and any construction compound boundary fencing;	C&DEMP
c) A dust management plan;	C&DEMP
d) Details of measures to be taken to prevent loose or deleterious material being deposited on the local road network, including wheel cleaning and lorry sheeting facilities, and measures to clean the site entrances and the adjacent local road network;	C&DEMP
e) A pollution prevention and control method statement, including arrangements for the storage and management of oil and fuel on the site;	C&DEMP

Condition	Cross-Reference
f) Details of measures for soil storage and management;	C&DEMP
g) A surface water and groundwater management and treatment plan, including details of the separation of clean and dirty water drains, and location of settlement lagoons for silt laden water;	C&DEMP
h) Details of measures for sewage disposal and treatment;	C&DEMP
i) Temporary site illumination;	C&DEMP
j) The construction of any temporary access into the site and the creation and maintenance of associated visibility splays;	Transportation Management Plan
k) A traffic management plan (TMP) which provides for the arrangements in respect of traffic associated with the decommissioning of the Development;	
l) Details of watercourse crossings; and	C&DEMP
m) A species protection plan based on surveys for protected species (including birds) carried out no longer than eighteen months prior to the submission of the plan.	C&DEMP
The development shall thereafter be decommissioned, the site restored and aftercare undertaken in accordance with the approved plan, unless and until otherwise agreed in writing in advance with the Planning Authority, in consultation with NatureScot and SEPA.	C&DEMP
Tangy I Wind Farm Consent: Condition 13	C&DEMP Condition 26. ECoW Works
No later than 12 months after being directed to decommission the Development, the operator shall submit details of the terms of appointment by the operator of an independent Environmental Clerk of Works (ECoW) throughout the decommissioning, restoration and aftercare phases of the Development to the Planning Authority for approval in consultation with NatureScot and SEPA. The ECoW shall be appointed on the approved terms throughout the decommissioning, restoration and aftercare phases of the development.	
Tangy II Wind Farm Consent: Condition 14	

Condition

All wind farm decommissioning operations, within the application site are restricted solely to the period between one hour after dawn and one hour before dusk during the goose roosting season (30 September – 30 April) to avoid the risk of disturbance to the over-wintering population of Greenland white-fronted geese.

Cross-Reference

**Construction and
Decommissioning
Environmental
Management Plan**

1. Introduction

1.1. Purpose of this Document

- 1.1.1. The purpose of this Outline Decommissioning Method Statement is to document the *Developers* approach as far as feasible ahead of Contractor engagement and to satisfy the Planning Conditions, as set out at the start of this document, prior to the commencement of development.
- 1.1.2. This document presents details of the Tangy I and Tangy II Wind Farm sites and the plan for dismantling of the existing 22 wind turbines and their associated infrastructure. This will include ground works necessary to restore habitats and gradients.
- 1.1.3. Where appropriate alterations to the methodology or commitments made within this document will be communicated to the Planning Authority for their agreement.
- 1.1.4. A developed/ detailed version of this Method Statement will form part of the Decommissioning Contractors Works Contract that will be implemented in preparation for onsite decommissioning works. This document will be implemented by the Contractor in conjunction with industry best practice, published guidance documents, and relevant *Developer* documents (including the Construction and Decommissioning Environmental Management Plan and Traffic Management Plan).
- 1.1.5. This document will not detail environmental management measures to be implemented during decommissioning works. The Construction and Decommissioning Environmental Management Plan (C&DEMP) sets out the requirements for the avoidance, minimisation and control of adverse environmental impact associated with the works.

1.2. Tangy I & II Wind Farm Site Location and Scheme Description

- 1.2.1. General project information and scheme description as provided within the S36 Consent.

Tangy I & II Wind Farms

The Development comprises a wind powered electricity generation station known as Tangy I & II wind farms, with a generation capacity of 18.7 MW, located approximately 9km northwest of Campbelltown, Scotland, in the Argyll and Bute Council planning area.

The existing Tangy I & II wind farms have been in operation since 2004 and consist of 22nr of 0.85MW turbines.

- 15 Vestas V52 850 kW wind turbine generators (49m hub height, 52m rotor diameter, 75m overall tip height) constructed under Tangy I in 2003;
- 7 Gamesa G52 580 kW wind turbine generators (49m hub height, 52m rotor diameter, 75m overall tip height) constructed under Tangy II in 2009;
- Hardstanding area at each turbine base with an approximate total area of 400m²;
- Onsite underground cabling;
- Meteorological mast and associated hardstand areas;
- Substation platform and control room building;
- Onsite access tracks with associated watercourse crossings;
- The Development contains a Voltage Control System (VCS) to enable the site to meet Grid Code Compliance.

2. Decommissioning

2.1. Dismantling of Wind Turbine Generator

- 2.1.1. Each Wind Turbine Generator (WTG) consists of the following main components: tower sections (2 of), nacelle, hub, rotor, blades (3 of), and transformer.
- 2.1.2. It is intended that the WTG decommissioning and dismantling works will be similar to the erection works, but in reverse. Electrical disconnection and termination will be followed by mechanical disconnection and dismantling of the components via crane, the extraction and safe disposal of oils and hydraulic fluids and transportation of all WTG components off site on heavy plant/vehicles similar to those used for delivery.
- 2.1.3. Requirements for waste materials from the WTG decommissioning works is provided in section 4 below.
- 2.1.4. The activities and processes outlined below cover the execution of dismantling of the turbines; more detailed information will be found in the Wind Turbine Dismantling manual of the turbine manufacturer. The dismantling activities and processes are based on a '*Method Statement Dismantling*' document provided by Business in Wind Projects BV, dated July 2022⁴.

Preparation for dismantling:

- Check all certificates from the persons working on site.
- Check all certificates of the tools that will be used.
- Check all certificates of cranes and lifting gear.
- Yaw the nacelles in the right direction for dismantling the turbines.
- Attached taglines with tip bags to two blades with the following procedure: block the rotor with one blade pointing down. Pull the tip bag with attached tagline up from the top of the nacelle with a rope, guided from one person at the ground. When the tip bag is in position, tighten the tagline to the hub in a safe position discussed before starting the works. Once the first blade is done, rotate the rotor 120 degrees for the next blade pointing down and repeat the procedure. Once both tip bags are at the right position, rotate the rotor another 120 degrees with the two tip bags in upwards pointing blades.
- Disconnect the wind turbine from the power grid, on date to be defined.
- Check that the voltage is zero volt. 8. Isolate the electrical installation in the turbine.
- Install temporary diesel generator for needed power supply and check earthing of the generator.
- Disconnect all cables and untighten all small components.
- Loosen all bolts and fasten again. Procedure for the tower bolts: loosen all bolts and take them out one by one and replace from top to bottom in each flange. Fasten all bolts again to minimum 600kNm.
- Rig the main crane and tailing crane in accordance with lifting plan.

Hub and blades disassembly – start crane works:

- Check if the weather conditions are good for lifting.
- Check if radio connection between the competent technician in the turbine and competent technician at ground level and crane drivers is sufficient.
- Attach the hub slings to the blades.
- Attach the lifting equipment to the main crane hook.
- Loosen the bolts of the rotor after the correct weight is carried by the crane.
- Move the rotor from the nacelle main shaft by the crane.

⁴ Use of proposed methodology is use with permission from Business in Wind Projects BV.

- Lower the rotor to ground level up to tip of blade pointing down is about one meter from the ground.
- Attached the tip tailing bag to the tail crane.
- Move the rotor with two cranes from vertical to horizontal position near the position according Lifting Plan coordinated by the Lifting coordinator.
- Blades will be removed in a different sequence, removed and temporary stored in special blade frames.

Nacelle disassembly:

- Check if the weather conditions are good for lifting.
- Check if radio connection between the competent technician in the turbine and lifting coordinator at ground level and crane drivers is sufficient.
- The lifting equipment of the nacelle will be put in the hook of the main crane and connected to the nacelle.
- The crane will be centred above the nacelle and takes about 80% of the weight of the nacelle in his hook.
- Now loosen and remove the fasteners that are connecting the nacelle and the top tower.
- After making sure all the bolts are removed and all the cables between the top tower and nacelle are disconnected the crane can hoist the nacelle away from the tower and lower it down or on the ground, or directly to be loaded on a trailer.

Top tower disassembly:

- Check if the weather conditions are good for lifting.
- Permits to Work in place.
- Check if radio connection between the competent technician in the turbine and lifting coordinator at ground level and crane drivers is sufficient.
- The lifting brackets for the top tower will be put in the hook of the main crane and bolted to the top flange.
- The crane will be centred above the load and takes about 80% of the weight of the tower in his hook.
- All the bolts are loosened except for 2 bolts that have to be on the opposite side of each other. (this will prevent the tower coming off at once with too much speed when the tower parts are sticking to each other.).
- When the tower comes loose from the section below, the last 2 bolts will be removed, the crane can hoist the tower away and lower it down.
- The J Hook for tailing the tower section will be connected to the bottom flange of the tower and the tailing crane.
Both cranes will work together to get the tower in a horizontal position and lower it down on a trailer or on the ground.
- The lifting brackets will be taken off the tower and if needed changed or adjusted for the next tower section.
- For the dismantling the second tower repeat steps 1 t/m 8.

Bottom tower disassembly:

- Make sure all connections between the power module and the bottom tower are disconnected or unbolted.
- If there are parts on the power module that can be caught by the tower when it is lifted off, then these parts should be removed if possible.
- Check if the weather conditions are good for lifting.
- The lifting brackets for the tower will be put in the hook of the main crane and bolted to the top flange.
- The crane will be centred above the load and takes about 50% of the weight of the tower in his hook.

- All the nuts from the bottom flange will be loosened and taken off except for 2 nuts on the opposite of each other. These last 2 nuts will stay loosened 5cm above the flange. (this will prevent the tower coming off at once with too much speed when the tower is sticking to the concrete or threads.).
- When the tower comes loose from the flange the last 2 nuts will be removed. 2 People outside will guide the tower around the PPM while it gets lifted up.
- The tower door will be closed and locked and the J Hook for tailing the bottom section attached to the bottom flange and the tailing crane.
- Both cranes will work together to get the tower in a horizontal position and lower it down on a trailer.
- The lifting brackets will be taken off.

Secure loads on trucks:

- The major components will be placed on special transport frames.
- All major components will have specific fixtures to secure the loads on the trucks.
- Securing the loads on the trucks on higher level, a “cherry picker” will be used.
- All Wind turbine component loads on the truck will be checked for correct securing of the loads, CMR documents will be signed and the trucks will leave the site under escort where required by UK law having the right permits in place.

De-rig cranes and clean the location:

- After the turbine is dismantled both cranes can derig and move to the next turbine (cranes need to take off ballast).
- All crane component loads on the trucks will be checked for correct securing of the loads, CMR documents will be signed and the trucks will leave the site.
- All debris and garbage left from the dismantling will be cleaned and taken away from the location.

2.2. Turbine Foundations

- 2.2.1. Following removal of the WTG components, the strategy will be to break out the reinforced concrete plinth/foundation to at least 1m depth below ground level using mechanical breakers. The remaining foundations may remain in situ. The approach taken may vary as advised by the risk assessment described in section 3.1 below. The demolition/removal activities and processes are based on a ‘*Method Statement Demolition foundation*’ document provided by Business in Wind Projects BV, dated July 2022.

Preparation for demolition of the foundation:

- Check all certificates from the persons working on site.
- Check all certificates of the tools that will be used.
- Check all certificates of excavators, cranes and lifting gear.
- Check if the cables are disconnected in the compact station, take or ask a picture as evidence.
- Check that vehicles and welfare units are at least 30 meters from the working zone.

Start removing the concrete from the inside of the insert ring:

- While removing the concrete on the inside, there must be a distance between the hammer and insert wall of approximately 20 centimetres, to prevent damage.
- When the rebar makes hammering too difficult, the concrete debris has to be removed from the inside even as the rebar.
- The removed concrete debris and the rebar need to be stored separate outside the foundation.
- Repeat step 2 and 3 till the inside of the insert is deep enough removed, and the lower flange of the insert is visible.

- On four places, 12, 3, 6 and 9 hour, the concrete has to be removed completely to the inside insert wall, this because after removing the concrete on the outside, the remaining concrete debris will come off, without a chance of damaging the insert wall.

Start removing the concrete on the outside of the insert ring:

- Excavate around the foundation with a width of about 2m and as deep as the foundation is, this will give the concrete debris the opportunity to fall apart while hammering.
- While removing the concrete on the outside, there must be a distance between the hammer and insert wall of approximately 20 centimetres, to prevent damage.
- As the rebar is making hammering difficult, cut away the rebar, and store separate.
- When the concrete is removed at least 15 centimetres below the bottom flange of the insert, the remaining 20 centimetre around the insert wall has to be removed carefully.
- When the concrete on the outside is removed, the insert must be moved by using the excavator, put the bucket carefully below the bottom flange, and see if the insert will come loose.
- The concrete from the inside will come off because of this movement, without damaging the insert wall.

Lifting and loading the insert ring:

- Use proper and fitting lifting gear to lift the insert from the excavation and to load it on a trailer.
- Make sure the lifting zone is free and marked.

Removal of concrete debris and reinforcement steel:

- After removal of the insert ring, the remaining concrete will be reduced in size and loaded onto trucks or dumpers to bring to a recycling facility or preferably crushed at site for re-use (see next chapter).
- All reinforcement steel loaded onto truck to deliver to steel recycling facility.
- Once the excavation is free of concrete debris and reinforcement steel, it can be backfilled or the excavation will have a slope, to secure a safe natural environment.

Crushing concrete debris for (local) re-use:

- Preferred procedure is to have a central storage location at site for concrete debris. Once most or all foundations are demolished, a mobile crusher will crush all material to be re-used at site for the new crane hard stands and roads.

2.3. Meteorological Mast

- 2.3.1. The meteorological monitoring equipment shall be dismantled using a mobile crane as required and removed from site.
- 2.3.2. The meteorological monitoring equipment and associated foundations shall be broken out and restored in a similar manner to that of the turbine foundations (Section 2.2). The proposal to leave a proportion of the foundation in-situ will be considered against prevailing environmental legislation at the time of the next review, i.e., 12 months prior to decommissioning.

2.4. Access Tracks

- 2.4.1. Site access tracks constructed during the development of the Tangy I and Tangy II wind farms will be retained where they continue to be required for access to the repowered wind farm, or by the landowner. Where not required for continued use they will be removed and the ground restored.
- 2.4.2. Access tracks to be reinstated would likely be treated in the following way:
 - The existing track material will be reused as far as practicable in the construction of the tracks for the repowered wind farm development;

- Backfill required will utilise material generated local to the access tracks and hardstanding areas, covered with topsoil and reseeded as required;
- Backfilling of access tracks would be carefully planned in advance to avoid having to unnecessarily move plant and equipment on freshly reinstated land.

2.5. Substation and Operational Control Building

- 2.5.1. It is proposed that existing buildings, no longer required for the Tangy IV Wind Farm development will be removed in their entirety. The foundations will be broken out to 1m below ground level, and the land will be reinstated (considering existing ground profiles) and revegetated as appropriate.

2.6. Underground Cabling

- 2.6.1. It is proposed that underground cabling at the site will be left in-situ to minimise disturbance to regenerated plant communities.
- 2.6.2. Where cabling connects to above surface features, e.g., turbines, substation components, etc, cables shall be cut to approximately 1m below surface level in accordance with the feature being removed, e.g., turbine foundation plinth.

3. Ground Restoration

3.1. Habitat Restoration

- 3.1.1. The areas of restoration (i.e. following removal of redundant access tracks and site buildings) will be included within the envelope of the operational wind farm site. Restoration will be prescribed based on the existing and adjacent habitats and hydrology.
- 3.1.2. Appropriate prescriptions for restoration will be determined to fit with the habitat and gradient surrounding the decommissioned infrastructure. Works will be monitored by the Independent ECoW appointed to the project, further information on responsibility for environmental management activities can be found within the C&DEMP
- 3.1.3. Where peatland habitats surround proposed decommissioned infrastructure, opportunities exist to remove these hydrological barriers within the peatland environment. This will have the aim of recreating a cohesive hydrological unit and improving the condition of the surrounding peatland habitats.
- 3.1.4. Where identified hydrological units are not present, restoration will include removal of decommissioned infrastructure and grading in keeping with the surrounding landscape.
- 3.1.5. It is anticipated that back fill and soils for restoration will be sourced from the site as far as practicable, in accordance with the Reinstatement Plan within the C&DEMP and measures set out within the HMP. The main phase of decommissioning and construction of Tangy IV Wind Farm will coincide, it is therefore envisaged that materials may be used as they arise. The aim of this approach is to maintain the local provenance, avoid nutrient or pH imbalances, and prevent the introduction of invasive species. It will therefore be necessary to undertake an assessment of soil and soil-forming resources to inform the restoration design.
- 3.1.6. If natural revegetation is not possible then every effort will be made to source seed mixes consisting of native (Scottish) species of local provenance, in consultation with NatureScot.

3.2. Aftercare

- 3.2.1. Aftercare monitoring, associated with construction and decommissioning works, will be undertaken in accordance with the Reinstatement Plan within the C&DEMP and as prescribed within the HMP.

- 3.2.2. The Independent ECoW will undertake a survey of all reinstated areas at the end of the first growing season following completion. In addition, monitoring of restored hydrological units will be monitored as prescribed within the HMP.

4. Traffic Management Plan

- 4.1.1. A Traffic Management Plan will be produced for decommissioning that will set out abnormal load movements and consultation with the roads authorities. This will include swept path analysis.

5. Waste and Material Recovery

- 5.1.1. Materials arising from decommissioning will be reused or diverted from disposal as far as reasonably practicable. Decommissioned wind turbine generator components will be re-used/ Re-manufactured (by the Developer or sold-on) or recycled off-site. It is recognised that turbine blades, due to their composite structure, are currently challenging to recover. It is anticipated that blades will be re-used as far as possible, however currently (at development phase of the wind farm) options to divert blades from landfill is limited.
- 5.1.2. The Developer will also work with supply chain partners to investigate opportunity to resell turbines as a whole enabling life extension in alternative locations
- 5.1.3. The main decommissioning works and the construction of Tangy IV Wind Farm coincide, therefore materials (including soil, stones and foundation materials) that will be excavated to enable restoration of decommissioned areas will be reused as far as practicable on site in the construction of new infrastructure.
- 5.1.4. Landfill disposal of turbine components, or other materials generated during decommissioning, will be a last resort and undertaken in accordance with current waste regulations.

5.2. Potential Waste Streams

- 5.2.1. The Developer, in collaboration with the supply chain, are considering all possible waste streams pertinent to the works proposed, these may include the following (non-exhaustive):
- Composites
 - Turbine components (electrical and mechanical)
 - Tower sections
 - Turbine rotor
 - Turbine hub
 - Oils and hydraulic fluids
 - Turbine foundations, access tracks, hardstands, LiDAR and meteorological mast
 - Concrete
 - Stone
 - Steel rebar
 - Substation and operational control building
 - Concrete
 - Ancillary features (e.g., drainage, cabling)
 - Underground cabling (where not left in situ)

5.3. Tracks, Hardstands and Foundations

- 5.3.1. All materials won during the decommissioning of the turbine foundations, typically being steel rebar and concrete, are considered “inert” (in accordance with current waste classification), and an appropriate use for these materials (i.e. re-use or processing/ recycling off-site) shall be identified prior to decommissioning and agreed with the Planning Authority and SEPA.

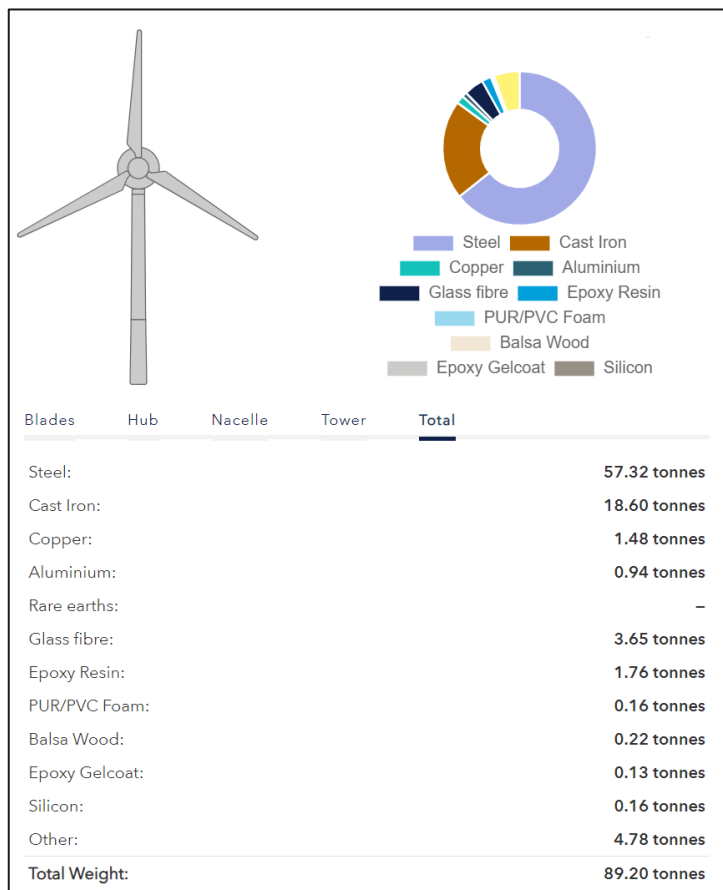
5.4. Wind Turbine Components

- 5.4.1. The *Developer* continues to identify supply chain partners to support circularity in renewables. This includes partnerships aiming at better understanding of the carbon impact the Developer operations have, adopting refurbishment strategy for a wider group of components as well as supporting the development of new refurbished components.
- 5.4.2. In advance of decommissioning activities at Tangy Wind Farm, the Developer has been investing in the following tools and partnerships.

ReWind Tool by DNV

- 5.4.3. The Developer is one of the early adopters of the ReWind tool developed by DNV that calculates the weights of all materials included within a turbine (see Figure 1). This tool combined with The Developer's Sustainability team will enable the calculation of emissions throughout the decommissioning process and provide a basis for decision making based on reduced carbon footprint.

Figure 1 Material Composition of V52-850 Turbine



- 5.4.4. The Developer will be evaluating components prior to decommissioning with the intention of keeping components within Developer organisation to use as spare parts for other turbines of the same type.
- 5.4.5. The Developer will be investigating the opportunity apply circularity principles in terms of waste management on site including recycling of components and wherever possible partner with organisations to refurbish and resale components on the spare part market.

SusWIND

- 5.4.6. The Developer is partnered in a UK national initiative to make composite wind turbine blades more sustainable. The SusWIND project, led by the National Composites Centre, aims to accelerate the processes, technology and materials needed to increase the sustainability of existing blades and make new blades more recyclable.

6. Reference Documentation

Developer/ SSE Renewables Project Documentation

- Construction and Decommissioning Environmental Management Plan
- Traffic Management Plan

Other

- Method Statement Demolition Foundation, Business in Wind Projects BV, July 2022 (used with permission)

Project Consent and Environmental Impact Assessment Report

Consent

- ECU00000673 Application under the Electricity Act 1989 to Construct and Operate Tangy IV Wind Farm
Website: <https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00000673>
- Environmental Impact Assessment Report
Website: <https://www.sserenewables.com/onshore-wind/in-development/tangy-repower/>

SEPA

- Life Extension and Decommissioning of Onshore Wind Farms, SEPA Guidance, November 2016
- Duty of Care for waste, SEPA

NatureScot (NS):

- Decommissioning and Restoration Plans for Wind Farms, Guidance, February 2016
- Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms, SNH Commissioned Report No 591, 2013

Appendix 1 EIA Report Commitments

These commitments, set out within the Tangy IV Wind Farm EIAR, are listed within Chapter 5.4 of the EIAR and a requirement of Consent Condition 10 “Decommissioning Method Statement – Tangy I and Tangy II”.

Commitments	Cross Reference
5.4.9 Decommissioning and reinstatement of Tangy I and II will comprise: • Removal of the 22 existing wind turbines and towers to ground level • Reinstatement of turbine bases/ foundations • Removal of approximately 2.2km of access tracks and reinstatement of former routes	2 Decommissioning
5.4.10 The decommissioning of the existing turbines will need to be managed in order to ensure that no significant impact on the environment occurs. The following sections provide information on how the applicant intends to manage potential and actual environmental risks. Environmental management for the decommissioning of Tangy I and II, and the construction of Tangy IV is described in detail in Appendix 5.1 (CEMP) and in the topic assessment chapters of this EIA report.	See ‘Construction & Decommissioning Environmental Management Plan’
5.4.11 The proposed methodology for reinstatement is described in Appendix 5.1 (CEMP), however is summarized here for each of the key components. It is possible that the existing substation would be retained and used as part of Tangy IV, so decommissioning of the substation and associated buildings is not described.	2.5 Substation and Operational Control Building
Turbines and Foundations	
5.4.12 The existing 22 turbines will be decommissioned, dismantled and removed from the site in their largest component parts and transported, by public road, either to Campbeltown harbour where they will be loaded onto a suitable sea vessel, or by public road to another destination. These components may be sold on, re-used or recycled.	2.1 Dismantling of Wind Turbine Generator
5.4.13 The existing reinforced concrete foundation of each tower cannot be re-used as part of the new turbine foundations and will largely be left in-situ with the top 1m of the foundation being broken down to just below ground level. Where the existing turbine foundations fall within the infrastructure for Tangy IV, the foundations will be capped using stone and where the foundation falls outside the new infrastructure, a topsoil cap will be used to reinstate the area to ground level and left to re-vegetate naturally from the indigenous vegetation.	Paragraph 2.2.1
Access Tracks and Cabling	
5.4.14 As described in more detail in the CEMP (see Appendix 5.1), redundant tracks will be broken out and stone excavated for reuse on site as part of the construction works for Tangy IV. Tracks will be reinstated with suitable sub-soil/topsoil. Seeding may be required if suitable vegetation turfs are not available. See mix will be approved by the ECoW prior to reinstatement works commencing.	2.4 Access Tracks
5.4.15 It is not proposed to re-use the existing electrical cables that are in place as part of the Tangy I and II infrastructure, however to minimize ground and habitat disturbance it is not proposed to remove them, and they will be left in situ.	2.6 Underground Cabling
Materials	

5.4.16 Reinstatement will be undertaken by use of either: • Soil material generated on site during the repowering construction works; or • Imported soil and topsoil (it is not currently anticipated that this would be required due to the likely availability of soil material on site).	3.1 Habitat
Transport	
5.4.17 Any areas of the public road that require protection during any abnormal load movements, as part of the removal of the decommissioned turbines, will be identified and protection measures will be agreed with the roads authority. It should be noted that the new turbines to be installed for Tangy IV are larger than those that would be removed from Tangy I and II, and therefore the swept path analysis that has been conducted for the transport of the new turbines will take into account the removal of the existing turbines and no specific assessment needs to be conducted. The results of the swept path analysis are discussed in Chapter 15: (Access, Traffic and Transport).	4 Traffic Management Plan
Waste Management	
5.4.18 The applicant will prepare a draft Site Waste Management Plan (SWMP) to be agreed prior to the commencement of the decommissioning works. The plan will detail waste types and disposal routes/ final destinations in accordance with current regulations and guidance.	See 'Construction & Decommissioning Environmental Management Plan'
5.4.19 The decommissioning of turbine components with regard to disposal and/or end-use will be undertaken in line with best practice and the waste hierarchy. In order to minimize the impact on the surrounding habitats and species, and to reduce the volume of potential waste materials generated part of the decommissioning works, the applicant proposes to remove those components and materials which will be replaced as part of the repowering works.	5 Waste and Material Recovery
5.4.20 Where possible, turbine components will be re-used (sold-on) or recycled off-site and concrete broken out from existing turbine foundations and hardstanding areas will be re-used on site (e.g. in the construction of Tangy IV). Where this is not possible, material will be assessed for potential off-site or recycling.	5 Waste and Material Recovery