

Tangy IV Wind Farm

Water Quality and Fish Monitoring Programme (WQFMP)

SSE Renewables Development (UK) Ltd

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1 Introduction

1.1 Introduction

This report is a Water Quality and Fish Monitoring Programme (WQFMP) for Tangy IV Wind Farm and is intended for use by SSE Renewables Development (UK) Ltd (or “SSE”) and its contractors during the construction of the wind farm. This monitoring programme is a combined Water Quality Monitoring Plan (WQMP) and Fish and Freshwater Invertebrate Monitoring Plan (FFIMP).

SSE intend to develop 16 turbines at Tangy IV Wind Farm. This is a redevelopment of the existing Tangy I and Tangy II Wind Farms where 22 turbines will be decommissioned. The works will also include construction of passing places along the current access route. The water quality monitoring and data collection will begin in 2023 and continue until one year after construction is completed. The Fish and Freshwater Invertebrate Monitoring will begin in September 2023 and continue until one year after construction is completed.

This monitoring plan sets out the programme to monitor the surrounding water environment by carrying out the following during the baseline and construction periods:

- Water quality sampling at six surface water locations;
- Water quality sampling of five private water supplies (PWS);
- Water quality sampling of two properties served by a PWS;
- Electric fish surveying at fourteen surface water sites; and
- Freshwater invertebrate surveying at six surface water sites.

1.1.1 Need for Water Quality, Fish and Freshwater Invertebrate Monitoring

The construction and decommissioning of the turbines at the Tangy Wind Farms risks introducing pollutants to the existing watercourses and the nearby PWS. Chemical spillages and sediment laden run off associated to the turbine construction works may enter the nearby water bodies during the construction phases. Therefore, monitoring of the nearby watercourses and PWS is essential to determine the existing water quality, aquatic ecology, and conditions of the site during the baseline and to monitor the effectiveness of mitigation measures during the construction. Regular monitoring will help to identify any pollution incidents if one should occur and infer if any habitat degradation has occurred.

1.2 Planning Consent

This FFIMP has been developed to satisfy the planning consent condition¹ which states:

20. Water Quality and Fish Monitoring Programme

(1) No development shall commence until a Water Quality and Fish Monitoring Programme (WQFMP) has been submitted and approved by the Planning Authority. The WQFMP must take account of the Scottish Government's Marine Scotland Science's response and must include:

(a) Water quality and fish monitoring programme (carried out at least 12 months prior to construction and decommissioning of the existing turbines taking place, during construction and for up to 12 months, after construction is complete, subject to survey results and in agreement with the Planning Authority and Marine Scotland); and

(b) Mitigation measures detailed in the Environmental Impact Assessment.

(2) Thereafter the WQFMP must be implemented in full and in accordance with the timescales set out in the plan. No changes to the WQFMP must take place unless they are with prior written approval of the Planning Authority.

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

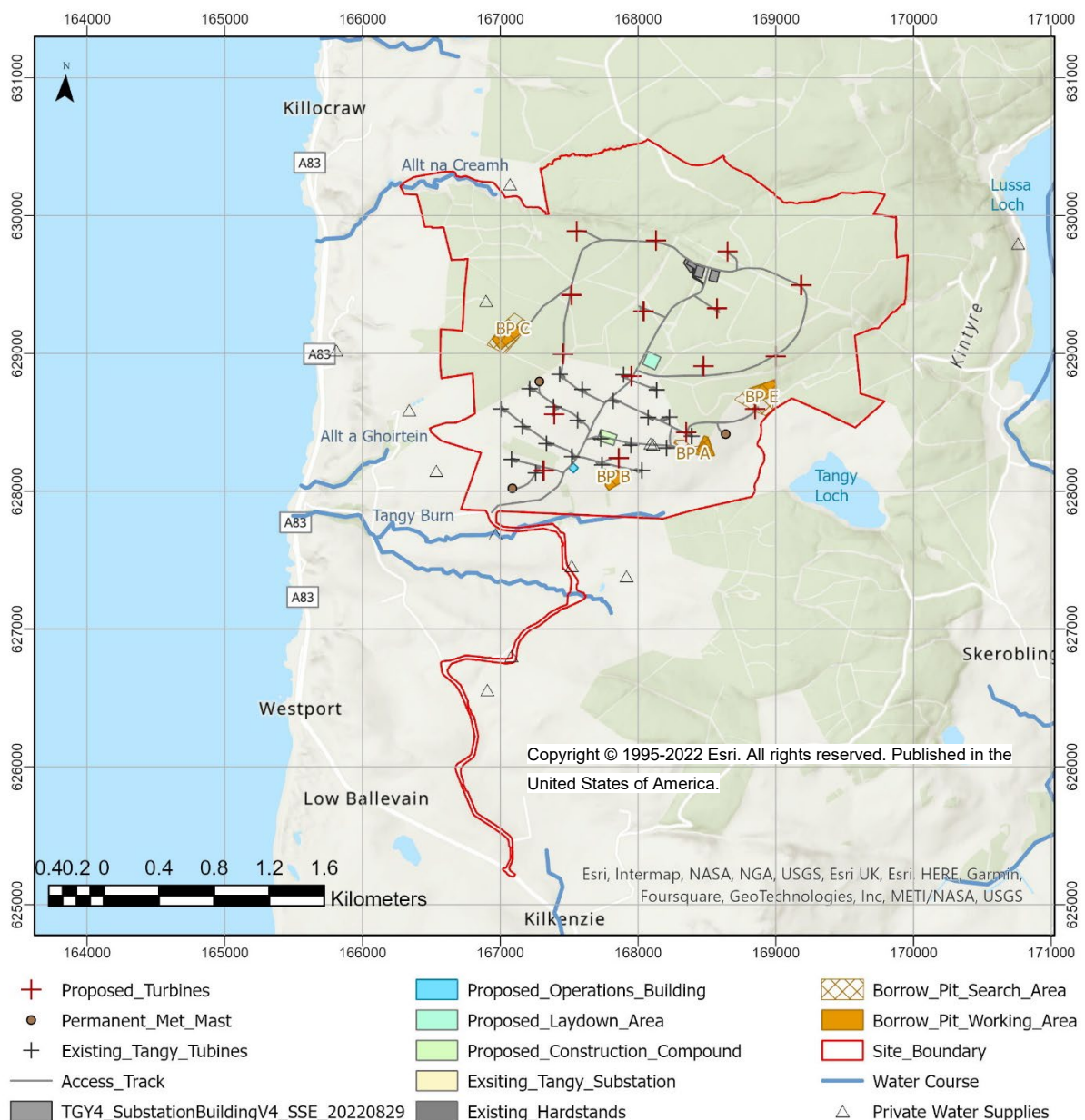
1.3 Project Background

Tangy IV Wind Farm is located 9km northwest of Campbeltown, Argyll and Bute, Scotland. The project consists of decommissioning 22 turbines and developing 16 new turbines to the north of the original site.

Access route improvements will begin in autumn 2024. Decommissioning of the existing turbines and the construction Tangy IV Wind Farm will follow. This work will also involve a geotechnical investigation and forestry works at and around the project site. The baseline period will begin August 2023 and continue for approximately 12 months.

Figure 1 displays the location of the site and the proposed turbine locations. The red outline indicates the site boundary.

Figure 1: Location Map of Site



2 Site Background

Desk based research has been undertaken to identify the water bodies and the ecologies within and adjacent to the Site and to understand the wider environment such as the soils and the geology. Data and information on the condition and attributes of the water bodies has also been evaluated.

2.1 Geology and Soils

According to the National Soil Inventory of Scotland² the site is mostly underlain by blanket peats to the east and peaty gleys to the west. Noncalcareous gleys with humic gleys underly the site to south underlying the main access route into site.

The British Geological Survey's Geoindex website³ indicates that the majority of the Site is underlain by till-diamicton of Devensian age. Quaternary peat deposits overlie the till-diamicton just east of borrow pit 2. These superficial deposits overlie Neoproterozoic metamorphic units which include Stonefield Schist Formation (Semi-Pelite), Loch Tay Limestone (Meta-limestone) and Glen Slián Schist Formation (Psammite and Semipelite) which are intruded by amphibolite and hornblende schist.

2.2 Surface Water

There are three Sites of Special Scientific Interest (SSSI) surrounding the proposed development site. These include Tangy Loch situated on the southeast border of the site boundary, Lussa Loch situated approximately 800m east from the site boundary and Bellochinty and Tangy Gorges approximately 700m southwest from the site boundary.

There are several streams situated running throughout the site, these include Allt na Creamh in the north end of the site and Tangy Burn in the southern end (Figure 1). Allt a Ghoirtein and Allt na Ceardaich are situated to the west of the site and Allt Harvie is situated to the east near to Lussa Loch. The majority of the streams drain from the higher topography in the east and northeast towards the sea in the west.

The watercourses mentioned above do not have any open-sourced quality or flow data on the National River Flow Archive. Therefore, there is limited knowledge on their current conditions. However, information found within Chapter 10 and Chapter 12 of the Environmental Impact Assessment (EIA)⁴ and OS spatial data⁵ give some indication on the conditions of the watercourses. The paragraphs below give a brief description of the main watercourses found throughout the site:

- **Tangy Burn** is approximately 1m to 3m wide and drains from Tangy Loch at around NR 69103 28035 towards the west and enters the sea at NR 65495 27819. There are several tributaries which enter Tangy Burn such as at NR 66094 27663 and NR 68760 28001. Tangy Burn appears to have a relatively high flow and features a number of waterfalls. No water quality data is currently available.
- **Allt na Creamh** is also approximately 1m to 3m wide and enters the sea at around NR 65675 29819 and is sourced east at around NR 69692 30373. Appears to have similar conditions to Tangy Burn with a number of waterfalls and a relatively high flow. No water quality data is currently available.
- **Allt a Ghoirtein** is a smaller stream approximately 1m or less wide and enters the sea at NR 65560 28042 and is sourced around NR 67369 28874. No water quality data is currently available.
- **Allt na Ceardaich** is a shallow narrow stream flowing from NR 66568 29177 to NR 65663 29486. No water quality data is currently available.
- There are also a number of small streams and drain situated within and around the site boundary.

The watercourses mentioned above drain the proposed site area and therefore could be at risk of contamination during construction. Monitoring of these water courses and the surrounding water environment during the baseline, construction and post construction periods can help to ensure mitigation measures in place are sufficient.

² Scotland Soil (n.d.) https://map.environment.gov.scot/Soil_maps/?layer=1

³ GeoIndex (n.d.) <https://www.bgs.ac.uk/map-viewers/geoindex-onshore/>

⁴ SSE Renewables <https://www.sserenewables.com/onshore-wind/in-development/tangy-repower/>

⁵ MAGIC Maps <https://magic.defra.gov.uk/>

2.3 Hydrogeology

Stonefield Schist Formation, Loch Tay Limestone and Glen Sliam Schist Formation are classified as low productivity aquifers (class 2c) as shown in the SEPA superficial aquifer map and bedrock aquifer maps⁶. These aquifers have very little groundwater which is mostly localised near the surface within the weathered zones. Groundwater flow is virtually through fractures and discontinuities.

There is no available online groundwater level data, however, it is likely that groundwater is localised in the upper peat layers. There may also be perched aquifers within the granular material of the till-diamictic layers. Chapter 11 of the EIA support these predictions.

2.4 Private Water Supplies

There is a total for fourteen PWS that are situated nearby the site. Table 1 lists each of the PWS with their location, source and use and their locations are also visible on Figure 1.

Chapter 12 from the EIA⁷ show that the majority of these PWS were deemed to be not a risk as they are located 250m away from any construction activity. However, PWS2 was deemed to be at risk as it is located 244m away from a borrow pit working area (Figure 1) and PWS13 is close to access routes and construction activity. Construction of passing places along the current access route also poses a risk to PWS7, PWS8 and PWS11.

Table 1: Private Water Supplies located near the site

PWS Source ID	Source Type	Eastings	Northings	Distance from nearest excavation	Usage	Monitoring Justification
1	Groundwater	167071	630229	592 m to Turbine 8	Domestic & livestock – reliable source.	No Monitoring Required – Located more than 500m away from construction
2	Unknown – possibly spring or shallow groundwater	166897	629383	244 m from source collection point to borrow pit working area.	Domestic, livestock & commercial satisfactory for needs.	Monitoring Required - Located within 250m of borrow pit working area
3	Spring	165810	629023	1134 to Borrow Pit C working area	Domestic – never run dry (recent landslide directly adjacent).	No Monitoring Required – Located more than 1000m away from construction
4	Spring	166339	628590	792 to Borrow Pit C working area.	Domestic & livestock - can dry up.	No Monitoring Required – Located more than 500m away from construction
5	Spring	166536	628149	779 to Turbine 1	Domestic - can dry up in summer months (see Killarow Farm).	No Monitoring Required – Located more than 500m away from construction
6	Spring	166536	628149	779 to Turbine 1	Domestic & livestock – can dry up in summer months (then water pumped from burn).	No Monitoring Required – Located more than 500m away from construction

⁶ Scottish Government. <https://map.environment.gov.scot/sewebmap/>

⁷ SSE. <https://www.sserenewables.com/onshore-wind/in-development/tangy-repower/>

PWS Source ID	Source Type	Eastings	Northings	Distance from nearest excavation	Usage	Monitoring Justification
7	Spring	166966	627691	576 to Turbine 1	Commercial – not known	Monitoring Required - Located close to passing place construction
8	Spring	166906	626559	1642 to Turbine 1	Domestic & dairy cattle - never run dry.	Monitoring Required - Located close to passing place construction
9	Groundwater	167082	626805	1365 to Turbine 1	Domestic	No Monitoring Required – confirmed with landowner that Borehole not in use
10	Surface Water	167916	627384	634 to Borrow Pit B working area	Domestic & livestock – good yield, use <2m ³ /day, CAR/R/1014147 permit up to 11m ³ /day	No Monitoring Required – Located more than 500m away from construction
11	Spring	167518	627459	610 to Borrow Pit B working area	Domestic & livestock	Monitoring Required - Located close to passing place construction
12	Groundwater	168091	628348	255 to Turbine 2	SSE employees	No Monitoring Required – Located more than 250m away from construction and source is currently not potable
13	Spring	168110	628340	254 to Turbine	Domestic, commercial & livestock –never run dry.	Monitoring required – close proximity to access tracks and decommissioning turbines.
14	Spring			1603 to Turbine 11	Domestic & livestock – never run dry.	No Monitoring Required – Located more than 1500m away from construction

2.5 Aquatic Ecology

Previous background information and environmental findings to date within the Tangy IV Wind Farm Environmental Impact Assessment Report (EIAR) works has been used to inform site selection and methodology. Previous fish and macroinvertebrate survey work carried out in 2013⁸ over 14 sites within four watercourses inside the development area *Tangy Burn, Allt a' Ghoirtein, Allt na Ceardaich and Allt nan Creamh) showed that brown trout (*Salmo trutta*) were present in low densities in the Tangy Burn and Allt nan Creamh. No fish were present in the Allt a' Ghoirtein and Allt na Ceardaich. No other fish species were caught.

⁸https://www.sserenewables.com/media/1kwbxhtp/r170_1106_ta10-4_fish-habitat-survey-report_1.pdf

Habitat surveys identified impassable obstacles to upstream migration of salmonid fish in the lower reaches of all four streams. These obstacles also appear impassable for lamprey species. Suitable climbing substrate for European eels, *Anguilla anguilla*, was present around the waterfalls on Tangy Burn and this watercourse may be accessible to eels.

Six macroinvertebrate samples were also taken over the four watercourses in 2013. Based on the taxa present in laboratory processing and further data analysis, very good water quality is indicated by the macroinvertebrate communities across these sites with only two sites affected by sedimentation.

Repetition of the aquatic ecology surveys at the same sites over the baseline, construction, and post construction periods will allow any changes in biotic communities to be assessed.

3 Monitoring and Reporting

3.1 Pre-Construction Monitoring Programme

3.1.1 Water Quality Monitoring

The monitoring programme will aim to establish a robust assessment of the water quality conditions of the existing watercourses on site. Water quality monitoring will consist of three core tasks:

Task 1: Monthly sampling at each of the locations for the baseline, construction and post-construction period. The samples will be analysed for the testing suite presented in Table 2 at a certified laboratory. The suite of analysis will be reviewed after three rounds and where analysis has shown parameters to be very low or below the Limit of Detection, it may be removed from future analysis with the agreement of stakeholders.

Task 2: Visual and olfactory observations will be recorded at each monitoring location on each of the 12 monthly visits. This is important as during the construction works observations of water quality can be undertaken at any time and by anyone and therefore provides the most rapid means by which changes that may be caused by pollution can be detected.

Task 3: Interpretation and Reporting. The results of the monitoring (to include raw data and an interpretation of the findings) will be presented in monthly reports (from the first day of sampling).

Table 2: Proposed water quality chemical analysis suite

Test	Units	Limit of Detection	Laboratory/Field
pH		+/- 0.1	Field and Lab
Electrical Conductivity	µS/cm	10	Field and Lab
Redox Potential			Field
Dissolved Oxygen	%	1	Field and Lab
Temperature	°C	0	Field
Turbidity	NTU	1	Lab
Suspended Solids	mg/l	2	Lab
Colour	Hazen	1	Field and Lab
Total Organic Carbon (TOC)	mg/l	0.1	Lab
TPH: EPH (C10 – C40)	µg/l	10	Lab
TPH: CWG inc BTEX & MTBE	µg/l	1 - 10	Lab
Manganese (dissolved)	µg/l	0.05	Lab
Iron (dissolved)	mg/l	0.004	Lab
Nitrate (as N)	mg/l	0.01	Lab
Orthophosphate (as P)	µg/l	20	Lab
Sulphate as SO4	mg/l	0.045	Lab

Test	Units	Limit of Detection	Laboratory/Field
Aluminium (dissolved)	µg/l	1	Lab
Alkalinity (as CaCO ₃)	mgCaCO ₃ /l	3	Lab
Chloride	mg/l	0.15	Lab
Ammoniacal Nitrogen as N	µg/l	15	Lab
Calcium (dissolved)	mg/l	0.012	Lab

3.1.1.1 Monitoring Locations

Table 3 displays the surface water monitoring points, PWS for monitoring and the two properties served by PWS2. Figure 2 displays the locations of the monitoring points.

The monitoring locations below have been selected by reviewing a number of factors including location access and contamination risk from construction. The information concerning the PWS in the Environmental Impact Assessment was used to assess which PWS would be at risk of contamination. As stated in Section 2.4 PWS7, PWS8 and PWS11 could be at risk of contamination due to their close proximity to passing place construction. PWS2 and PWS13 is also potentially at risk due to the nearby borrow pit C location, access tracks, turbines and other construction activity.

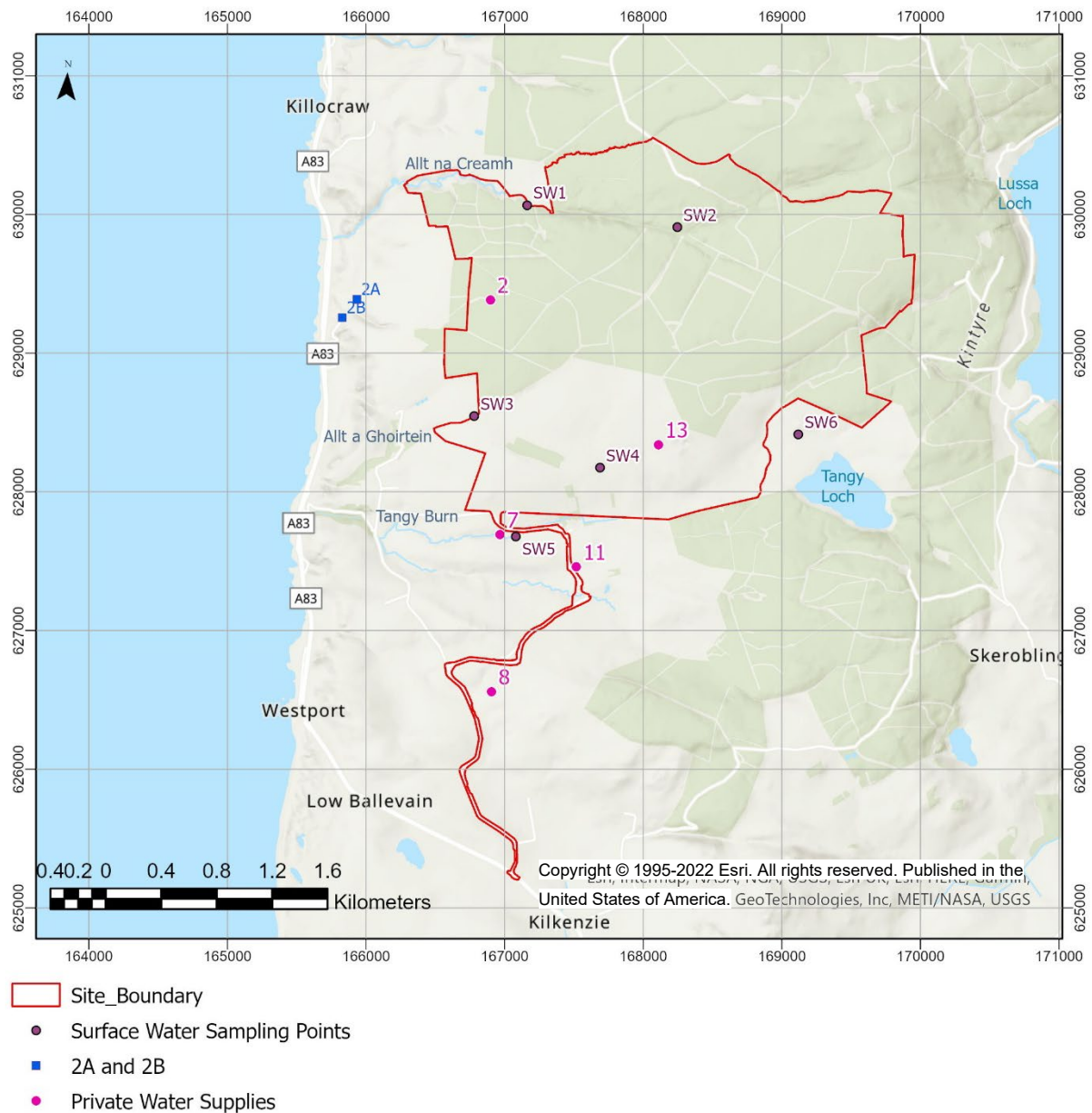
The surface water locations were selected to cover several watercourses throughout the site and to their proximity to the macroinvertebrate surveying sites. This will allow for water sampling to coincide with macroinvertebrate surveying.

Table 3: Monitoring Locations

Location ID	Water Course or Source	Coordinates (Easting, Northing)	Reason for Monitoring	Monitoring Frequency
SW1	Allt na Creamh	167163, 630066	To provide background quality for the potential effect of the wind farm and associated infrastructure on the water environment	Monthly
SW2	Allt na Creamh	168243, 629906		
SW3	Allt a Ghoirtein	166781, 628544		
SW4	Stream joining Tangy Burn	167687, 628169		
SW5	Tangy Burn	167082, 627679		
SW6	Alt Trasda	169121, 628416		
PWS2	Spring	166897, 629383	Proximity to borrow pit C puts at risk of contamination during construction	Monthly
PWS13	Spring	168110, 628340	PWS13 is potentially at risk due to the nearby access tracks, turbines and other construction activity.	
PWS7	Spring next to Tangy Burn	166966, 627691	Proximity to passing place construction puts	

Location ID	Water Course or Source	Coordinates (Easting, Northing)	Reason for Monitoring	Monitoring Frequency
PWS8	Spring	166906, 626559	at risk of contamination during construction	
PWS11	Spring	167518, 627459		
PWS2A	T-PWS2	Lagalgarve Farm	Additional sampling to ensure source is not being contaminated by borrow pit C	Twice during baseline and monthly thereafter
PWS2B		Tangytavil		

Figure 2: Private Water Supply and Surface Water Monitoring Points



3.1.1.2 Water Quality Sampling Procedure

All water samples should be collected by suitably trained Water Scientists, and samples stored and transported in accordance with British Standards (BS) Institution ISO 5667, particularly the following parts:

- BS EN ISO 5667-3:2018 Water quality. Sampling. Preservation and handling of water samples;
- BS EN ISO 5667-6:2016 Water quality. Sampling. Guidance on sampling of rivers and watercourses; and
- BS EN ISO 5667-14:2016 Water quality. Sampling. Guidance on quality assurance and quality control of environmental water sampling and handling.

Samples from the stream should be collected from suitable and safe bank locations. Sample water would be decanted on the bank into sterilised sample bottles (containing any required preservative) provided by the appointed laboratory. Any samples requiring filtration (e.g. dissolved metals) should be filtered on Site using 0.45 µm filters provided by the appointed laboratory.

Access arrangements must be clarified before sampling from private water supplies. Sampling at PWS is subject to their access and set up. It is planned to sample the PWS at their source but in some cases, this may not be possible i.e. groundwater boreholes with no sample tap or borehole access. Each of the recommended monitoring PWS would need to be investigated to ensure source sampling can be achieved and is possible to do on a monthly basis.

3.1.1.3 Analysis and Reporting

Monthly reporting of the samples collected will be carried out after each round of monitoring in a factual report. This will include comparison with standard Environmental Quality Standards (EQS) for freshwater watercourses (e.g. WFD standards and other relevant UK EQS for river water quality), reporting of basic statistics of the data across the monitoring period (e.g. average, max, min, percentiles where relevant, and standard deviation etc.), and discussion of how water quality varies across the site. A summary table will be provided that can be used as a 'quick reference' guide to those responsible for monitoring construction works on Site during the works.

3.1.2 Aquatic Ecology

3.1.2.1 Fish

Electric fishing surveying under appropriate licence following Marine Scotland guidance⁹, SEPA and Scottish Fishery Co-ordination Centre (SFCC) methods (SFCC 2007) will be carried out over fourteen sites on four watercourses using standard operating procedures¹⁰. Preconstruction surveys will be carried out in September 2023 using a Smith Root LR-24 electric fishing backpack to collect qualitative (spot check), semi-quantitative (single run) and fully quantitative (3 run depletion) data depending on site conditions and accessibility. Fish will be identified to species level, fork length measured to the nearest mm and returned to the watercourse.

3.1.2.2 Macroinvertebrates

Preconstruction macroinvertebrate sampling will be carried out in Autumn (September) 2023 and Spring (March-May) 2024. Kick sampling methods¹¹ will be employed to determine species present. Samples will be preserved with 70% Industrial Methylated Spirits, sealed in plastic containers, and identified to species level in a laboratory.

3.1.2.3 Monitoring Locations

Table 4 and Figure 3 display the fish and freshwater macroinvertebrate water monitoring points. These monitoring locations have been selected to mirror the previous work carried out to inform the EIA to allow direct spatial and temporal analysis for the baseline, construction, and post construction periods.

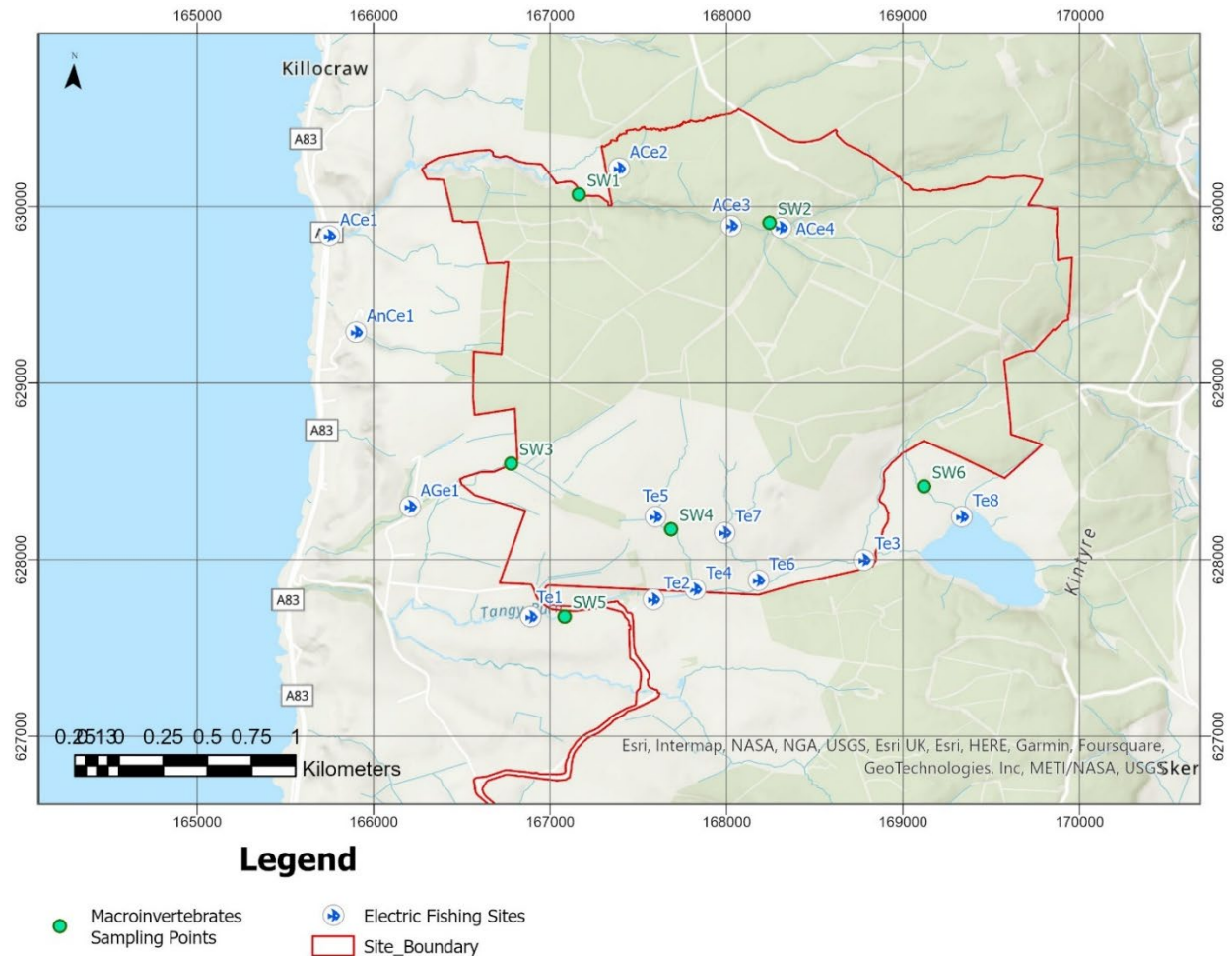
⁹ <https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/>

¹⁰ <https://www.gov.scot/publications/electrofishing-programme-for-scotland-standard-operating-procedures/>

¹¹ <https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/>

Table 4: Aquatic ecology monitoring locations

Location ID	Water Course or Source	Co-ordinates (Eastings, Northings)	Reason for Monitoring	Monitoring Frequency
Te1	Tangy Burn	166892, 627676	Fish	Annually (Early Autumn)
Te2	Tangy Burn	167586, 627775		
Te3	Tangy Burn	168780, 627998		
Te4	Tangy Burn	167823, 627832		
Te5	Tangy Burn	167598, 628243		
Te6	Tangy Burn	168181, 627883		
Te7	Tangy Burn	167990, 628153		
Te8	Tangy Burn	169335, 628243		
ACe1	Allt nan Creamh	165750, 629833	Macroinvertebrates	Spring and Autumn
ACe2	Allt nan Creamh	167392, 630216		
ACe3	Allt nan Creamh	168028, 629891		
ACe4	Allt nan Creamh	168310, 629880		
AnCe1	Allt na Ceardaich	165902, 629287		
AGe1	Allt a' Ghoirtein	166207, 628300		
SW1	Allt nan Creamh	167163, 630066		
SW2	Allt nan Creamh	168243, 629906		
SW3	Allt a' Ghoirtein	166781, 628544		
SW4	Tangy Burn	167687, 628169		
SW5	Tangy Burn	167082, 627679		
SW6	Tangy Burn	169121, 628416		

Figure 3: Electric Fishing and Macroinvertebrates Sites

3.1.2.4 Analysis and Reporting

Fish density calculations will be made to compare trout densities with previous assessments. Age structure, distribution, and fish size for each age class will also be determined and compared annually with previous years' monitoring data.

Aquatic macroinvertebrates will be used as biological indicators of water quality. Previous indices used which will be replicated are listed below:

- the Biological Monitoring Working Party (BMWP), the sum of the group scores for the sample, or the Whalley, Hawkes, Paisley and Trigg (WHPT) metrics which replace the BMWP for WFD river basin status classification
- taxon richness (NTAXA), the number of different macroinvertebrate taxa collected
- the Average Score per Taxon (ASPT), the average score for the taxa assigned a score in the sample
- Proportion of Sediment-sensitive Invertebrates (PSI), to provide an indication of the extent to which watercourses are influenced by fine sediment

The above biotic index scores, taxon richness and invertebrate abundance can be determined from the baseline data set and used to make comparisons with similar scores calculated during construction and post-construction monitoring to detect any water quality changes.

An annual summary report of surveys undertaken over the year is to be produced that includes monitoring and analysis together with an interpretation, i.e. comparison with baseline, throughout the construction period.

3.2 Construction Monitoring Programme

3.2.1 Water Quality Monitoring

At this stage it is not anticipated that there will be any changes to the monitoring programme during construction works that is different to the pre-construction. Apart from the addition of monthly monitoring on the two properties served by PWS 2 Lagalgarve Farm (2A) and Tangyavil (2B). However, during construction works the Contractor will be required to regularly monitor their works, review procedures and consult with the Local Planning Authority and SEPA on progress to minimise potential risks from works on water quality. Monthly factual reporting will still be carried out during this period.

3.2.2 Aquatic Ecology

Fish surveys will be repeated annually over the duration of construction in late summer/early autumn. Macroinvertebrate sampling will be carried out every spring and autumn over the construction period.

3.3 Post Construction Monitoring Programme

3.3.1 Water Quality and Aquatic Ecology Monitoring

The greatest risks to the water quality and aquatic ecology of local waterbodies will be during the construction period. It is acknowledged that post construction there may be a period of adjustment as the site is restored following intrusive construction activities, but the need for monitoring should be risk assessed and kept under constant review during this period.

It is not anticipated that there will be any changes to the monitoring programme during post construction works that is different to the construction works. Monthly factual reporting will still be carried out during this period for water quality and annual reporting for aquatic ecology.

3.4 Summary

Below is a summary of the baseline monitoring programme and the anticipated works each month.

Table 5: Summary of Baseline Monitoring

Month	Water Quality Monitoring	Aquatic Ecology
August 2023	5 PWS and 6 Surface Water Samples	-
September 2023	5 PWS and 6 Surface Water Samples	14 fish sites monitored plus 6 macroinvertebrate samples taken
October 2023	5 PWS, 6 Surface Water Samples and the two properties served by T-PWS2	-
November 2023	5 PWS and 6 Surface Water Samples	-
December 2023	5 PWS and 6 Surface Water Samples	-
January 2024	5 PWS and 6 Surface Water Samples	-
February 2024	5 PWS and 6 Surface Water Samples	-
March 2024	5 PWS and 6 Surface Water Samples	-
April 2024	5 PWS, 6 Surface Water Samples and the two properties served by T-PWS2	-
May 2024	5 PWS and 6 Surface Water Samples	6 macroinvertebrate samples taken
June 2024	5 PWS and 6 Surface Water Samples	-
July 2024	5 PWS and 6 Surface Water Samples	-

3.5 Limitations

The Water Quality and Fish Monitoring Programme presented herein aims to provide a balance between laboratory, accessibility and labour costs and the need to gather sufficient data to be able to understand the Site. As with all monitoring, there are limitations to the approach. These are as follows:

- The water quality samples collected provide snapshots of conditions at the time that samples were taken, and so will not in all cases be representative of longer-term conditions.
- Access and ability to sample the selected PWS may be difficult where access to source is not available. Access to the PWS is also dependant on landowners and source set up.
- Monitoring points may be limited by weather conditions. For instance, monitoring points which are located at springs may dry up during drier summer months or access to monitoring points may be impossible during adverse weather conditions.
- Site constraints will determine the electric fishing methodology and whether fully quantitative, semi quantitative, or qualitative data is collected. Fish densities will be calculated whatever method is employed but should be noted when comparing to different methods and sites.

