



Technical Appendix

# Drummarnock Wind Farm

Technical Appendix 8-1: Watercourse Crossing  
Assessment

Drummarnock Wind Farm Limited

July 2024



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## Glossary of Terms

Term	Definition
The Applicant	Drummarnock Wind Farm Limited
The Agent	Atmos Consulting Limited
Environmental and Planning Consultant	Atmos Consulting Limited
Environmental Impact Assessment	A means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development
Environmental Impact Assessment Regulations	Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
The Proposed Development	Drummarnock Wind Farm
The Proposed Development Site	The land enclosed by the red line shown on Figure 1-1

## List of Abbreviations

Abbreviation	Description
CAR	Water Environment (Controlled Activities) (Scotland) Regulations 2011
mAOD	Metres Above Ordnance Datum
SEPA	Scottish Environment Protection Agency
OS	Ordnance Survey
WC	Watercourse Crossing



# 1 Introduction

The report presents the findings of an assessment of the proposed water crossings associated with the Proposed Development.

## 1.1 Objective

The objective for the assessment was to review the Proposed Development layout and design and inspect the sites of the proposed crossings with the aim of avoiding or minimising the potential for the following types of environmental impact:

- Pollution and loss or physical damage to important plants, animals and habitats;
- Release of fine sediments during the construction phase;
- Erosion and/or sediment build up on watercourse altering geomorphology;
- Impact on the water quality of the watercourse;
- Impact on fish and other animals using the watercourses;
- Barrier to the movement of fish and other wildlife; and
- Changes to water flow and risk of flooding.

## 1.2 Proposed Development

The Proposed Development includes the provision for 6.59km of new access tracks, which includes two onsite access options (Option A and Option B). However, only one of these onsite access options will be constructed, and therefore of the 6.59km of proposed new tracks, a maximum of up to 5.8km would be constructed, dependent upon the access option utilised. To ensure a robust and conservative assessment, the EIA has assessed the full 6.59km to support the full appraisal of both access options.

The track layout has been designed to avoid watercourses and use existing access tracks where possible. Existing crossings that currently impede fish passage or restrict peak flows will be replaced by more environmentally friendly crossings.

This Technical Appendix includes an inventory of information on each watercourse crossing details. It should be read in conjunction with the following chapters of the EIA Report:

- Chapter 3: Development of Description;
- Chapter 6: Ecology; and
- Chapter 8: Hydrology, Geology and Hydrogeology.

## 1.3 Desk Study

A desk study was carried out which consisted of geological, hydrological and ecological information as reported in Chapter 8: Hydrology, Geology and Hydrogeology.

A review of the information regarding the Proposed Development was also conducted.

This included an infrastructure layout plan, Figure 1-2, showing layout including new and floating access track and watercourse crossings superimposed on an Ordnance Survey base.

Watercourses were identified as those marked on the OS 1:50,000 scale map which would require crossings, under the CAR Regulations. Crossings of minor watercourses were also identified at OS 1:25,000 scale mapping, where possible.

The watercourse crossings proposed consist of three crossings of tributaries to the Loch Coulter Burn (WC1, WC2 and WC3); and three crossings of tributaries to the Bannock Burn (WC4, WC5 and WC6).

## 1.4 Walkover Survey

A walkover survey of the Site was conducted subsequent to the initial desk study in April 2023.

Identified crossings WC1, WC2, WC3, WC4 and WC5 were visited to obtain specific information about each location. WC6 was not visited at this time as the track in this location was added to the Proposed Development layout at a later date.

Photographs and detailed field notes were taken including measurements of channel and valley dimensions, channel substrate, vegetation and other characteristics.

## 2 Hydrology

A Water Features Plan showing watercourses, surface water catchments and watercourse crossings is presented as Figure 8-1.

According to SEPA Water Environment Hub<sup>1</sup>, the watercourse crossings of the Proposed Development are located in two surface water bodies:

- WC1, WC2 and WC3 on the Buckie Burn and its tributaries which are part of the River Carron (Carron Valley Reservoir to Avon Burn Confluence) waterbody (ID: 4202) is in the River Carron (Falkirk catchment) of the Scotland river basin district; and
- WC4, WC5 and WC6 on tributaries of the Bannock Burn (Source to Sauchie Burn confluence) waterbody (ID: 6831) in the Stirling Coastal catchment of the Scotland river basin district.

There is already widespread drainage alteration of the watercourses of both catchments, but particularly in the ditches in the Buckie Burn.

The Bannock Burn waterbody is classified on SEPA Environmental Hub as 'Good', but on SEPA Classification Hub<sup>2</sup> as 'Poor' overall status. This is due to 'Poor' ecological status. Water quality is as 'Good' as is overall hydrology and hydro-morphology. There is an objective of 'Good' status by 2027.

The Auchenbowie Burn waterbody is classified with a 'Moderate' overall status. Ecology and hydro-morphology status are 'Poor'. This waterbody also has an objective of 'Good' status by 2027.

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<sup>1</sup> <https://www.sepa.org.uk/data-visualisation/water-environment-hub/>

<sup>2</sup> <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>

### 3 Legislative Considerations

It is beyond the scope of this Technical Appendix to detail design features of watercourse crossings, however the following is noted.

New engineering activities (such as bridges and culverts) in Scotland's rivers, lochs and wetlands require an authorisation under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (also known as the Controlled Activities Regulations or CAR).

Watercourse crossings as engineering works in inland waters and wetlands come under Section 6 of CAR. CAR applications are beyond the scope of this Technical Appendix and would be processed pre-construction upon granting of planning consent.

There are three different levels of authorisation under CAR, based on the risk an activity poses to the water environment:

- General Binding Rules (GBRs) have been specified for certain low risk activities in CAR. Provided an activity can comply with these rules no application to SEPA is required;
- Registrations are required for medium risk activities. Operators must apply to SEPA to register an activity; and
- Licences are required for high risk activities. Operators must apply to SEPA for a licence.

These levels cover activities with increasing potential impact upon the environment.

Details of what level of authorisation an activity requires can be found in the CAR Practical Guide.

Most of the watercourse crossings will fall under the GBR (Engineering Activities) identified in the relevant guidance The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide, Version 8.4, October 2019 (SEPA, 2019).

Some crossings (such as bridges with no construction on bed and <20m of total bank affected and open-based culverts) may require Registrations. Simple Licences may be required for all other bridges, fords and causeways, such as those with construction on bed and greater than 20m of total bank affected. Larger culverts may also fall within this category.

The SEPA Regulatory Methods for Engineering Activities (SEPA, 2019) lists conservation, environmental standards for morphology and good practice as tests for any licence application. During the determination, SEPA shall consider the specific location, type, size and existing water quality of the local water features.

A Construction Site Licence is anticipated to be required, in accordance with CAR. This application process would also be undertaken pre-construction, providing supplementary information to that available at the EIA Report stage.

A large and complex construction project licence authorisation from SEPA will be required as it is a development project that undertakes one or more "controlled

activity" including the discharge of water run-off from a construction site to the water environment), and it:

- Covers an area greater than 4 hectares;
- Contains a road (or track) greater than 5 kilometres in length; and
- Includes road (or track) with a length greater than 5km and/or area >1ha that has a slope more than 25 degrees.

The SEPA complex construction licence must be applied for and be granted before the activity can take place and will form as a suspensive planning condition to any consent granted.



## 4 Ecological and Hydrological Design Considerations

There will be a requirement for realignment of the line of any existing tracks and excavation cut and earthworks fill.

This will essentially mean that all watercourse crossings are new, even when there is an existing culverted crossing. This would have been required in any case as there is evidence of structural weakness and scouring in the existing watercourse crossing culverts and the existing farm track would not be suitable for purpose of wind farm.

The watercourse crossings will be designed to allow the conveyance of a 0.5% AP (200 year) flow event plus an allowance for climate change and freeboard.

Mitigation will put in place to control and attenuate runoff during all phases of the development and crossings will be regularly checked and maintained during operation.

SEPA Position Statement WAT-PS-06-02 (June 2015): Culverting of Watercourses - Position Statement and Supporting Guidance to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2011 states that:

- SEPA will seek improvements to existing culverts in line with this position statement when replacement or significant maintenance works are proposed);
- For crossings >2m in width, the use of span bridges and bottomless arch structures should be pursued, where practicable. This is not the case here; and
- The replacement of existing culverted crossing with bottomless arches or box crossing will be beneficial to improve migratory fish passage and otter passage, and the replacement of fords with bottomless arch, box or single span crossings will reduce the disturbance and sediment release effects of the fords.

The final design of watercourse crossings will be designed in accordance with this guidance and will include appropriate design features where mammal or migratory fish presence is confirmed or suspected.

These may include incorporation of ledges or additional dry passages to allow passage at high water levels, in-channel baffles or low water channels to aid fish passage, and other design features appropriate for the crossing location. Overall the number of watercourse crossing have been limited where possible, and where required have been designed to improve on existing crossings to improve habitats and fish migration.

## 5 Details of Individual Watercourse Crossings

Details of the proposed watercourse crossings are given below along with photographs of the upstream crossing, the crossing itself and downstream.

The findings are discussed in sections 8.5.5 and 8.7.3 of Chapter 8: Hydrology, Geology and Hydrogeology of the EIA Report.

The location of the watercourse crossings are shown on Figure 8-1 Water Feature Plan.

<b>ID</b>	WC1
<b>NGR</b>	NS 75914 87135
<b>Elevation</b>	c 202m AOD
<b>Infrastructure</b>	Existing crossing over Buckie Burn tributary, with 3 x 0.4m diameter. Plastic culverts. The bottom two culverts are 50 % submerged. One culvert has a 0.5m drop fall which has formed a pool. There is a 0.4m overburden padded with rocks. The existing track is 5m across.
<b>Current Setting</b>	Located in a 15m wide valley with incised channel 1m width x 0.5m deep. There are zig zag meanders upstream with till and possibly alluvium in banks and some minor braiding. Water is 0.3m deep. There is a downstream incised channel, whose dimensions are 1.5m x 0.5m deep.. The upstream channel is extensively scoured indicating significant flow. There is a roadside ditch entering upstream from East and West. Downstream is fenced off for forestry. The watercourse crossing is joined downstream by a tributary from Muirpark Farm. This crossing has by a strong margin, the largest flow of all watercourse crossings.

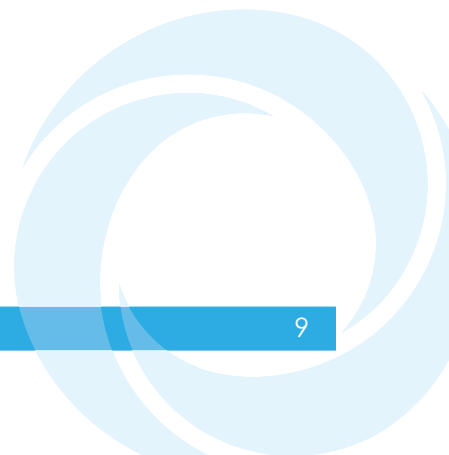


<b>ID</b>	WC2
<b>NGR</b>	NS 75191 87303
<b>Elevation</b>	c225 mAOD
<b>Infrastructure</b>	The crossing is of a minor unnamed watercourse tributary of the Buckie Burn, via an existing culvert on a farm track. The track is 4.5 m across with <0.2m of overburden. The culvert is 0.8m diameter, made of corrugated iron with a small lip downstream. There is no lip upstream and culvert is not sunken.
<b>Description</b>	<p>The upstream valley is 5m x 1.2m deep. The watercourse channel is 0.8m x 0.05m deep. The downstream valley is slightly steeper, at 4m x 1.5m deep with watercourse channel 0.8m x 0.1m deep. There are slight meanders upstream with gentle bend downstream.</p> <p>The substrate is grit and cobbles. Banks are composed of fine-grained silt. Vegetation present in stream. The stream is flowing North at perhaps 0.2L/s with evidence of stronger flow. Habitat is MG10.</p>





<b>ID</b>	WC3
<b>NGR</b>	NS 75138 87347
<b>Elevation</b>	c 228 mAOD
<b>Infrastructure</b>	This is an existing culvert crossing of a minor watercourse tributary of the Buckie Burn. The track is 4m wide with around 0.15m of overburden. There are signs of two culverts. There is a corrugated iron culvert downstream. This culvert is deformed with a 0.3m drop fall which has formed a pool. The upstream culvert is plastic, 0.6 m diameter and slightly sunken.
<b>Description</b>	<p>The crossing is located in an 8m wide valley x 1.5m deep. The actual channel is 0.8m x 0.3m wide with water up to 0.2m deep. There is evidence of water rising to fill the channel. There is minor braiding with some vegetation in channel.</p> <p>The banks upstream are alluvium with rust colour and fill. The downstream banks contain alluvium.</p> <p>Downstream opens up into artificially impounded farm pond with PWS within 5metres, The pond is not a registered PWS but it is confirmed that it is for agricultural use.</p>



<b>ID</b>	WC4
<b>NGR</b>	NS 74562 87430
<b>Elevation</b>	mAOD
<b>Infrastructure</b>	This will be a new crossing of an unnamed minor watercourse which drains to the Bannock Burn to the north,
<b>Description</b>	The watercourse is effectively just an artificially straight section likely cut for drainage. The watercourse runs across a green track with no evidence of culverts. It is on or close to the catchment divide between Barvie and Bannock Burns. The Drainage Impact Assessment will identify whether it can be filled in and avoid a watercourse crossing here or whether some minor culverting will be needed. It is in a shallow valley 4m across and 0.5m deep. There is a 0.8m channel with depth of 0.05 m. Channel is full of waterlogged vegetation. There is a very low flow eastwards. No evidence of flooding. Habitat is MG10 with 0.4m deep peaty soil on south and west – with silt substrate.



<b>ID</b>	WC5
<b>NGR</b>	NS 74180 87306
<b>Elevation</b>	c 267 m AOD
<b>Infrastructure</b>	This will be a new crossing of an unnamed watercourse, a tributary of the Bannock Burn.
<b>Description</b>	The crossing is in a wide flat bottomed valley 80-100m across. The entire valley is a linear SSW/NNW saddle wetland. The current crossing location is just north of the Bannock Burn / Buckie catchment divide and consists of multiple streams leading to the Bannock Burn. The actual watercourse channel is up to 2m across with water depth of 0.5 m. It is fed by run off from surrounding small hills to W and E and groundwater baseflow and rainfall. It contains an elongated pool with abundant sphagnum vegetation along its length. The valley channel is mostly straight but does meander slightly. The valley bottom is peaty and waterlogged. In terms of plant communities, the crossing comes off MG10a from the east and goes into M19 blanket bog for 100m west then over a H9 hillock northwest. The crossing itself is located at the boundary of M20a to the north and M6d to the south. There is also surrounding M6 flush. The substrate is deep fully saturated peat. There is no discernable flow.



<b>ID</b>	WC6
<b>NGR</b>	NS 75746 87898
<b>Elevation</b>	c 192 mAOD
<b>Infrastructure</b>	New crossing
<b>Description</b>	<p>This new crossing was a relatively late addition to the infrastructure layout. Consequently it has not been visited for this survey. The crossing is essentially of the headwaters of a minor tributary 175m upgradient of the Bannock Burn.</p> <p>The watercourses are fed by spring and seepage arising immediately upgradient on the flanks of the unnamed 229m AOD hill to the west. This is further confirmed by the GWDTE M23 rush pasture of the valley crossed.</p>

## 6 References

SEPA, 2019, The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), A Practical Guide, Version 8.4

SEPA Position Statement WAT-PS-06-02 (June 2015): Culverting of Watercourses - Position Statement and Supporting Guidance to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2011