Appendix 8.1: Watercourse Crossings

KAYA CONSULTING

EDF Energy Renewables Ltd

Dunside Wind Farm

Appendix 8.1: Watercourse Crossing Report

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1 Introduction

This appendix contains the data on proposed engineering activities in the water environment and forms part of the EIA Report for the proposed Dunside Wind Farm (Proposed Development). The document should be read in conjunction with **Chapter 8: Hydrology, Hydrogeology and Geology (including Peat)** of the Dunside Wind Farm EIA Report (EIA-R). The locations of the proposed watercourse crossings and 50 m buffers from watercourse are illustrated in **Figure 8.2** of the EIA Report.

The Site covers an area of approximately 2006 hectares (ha) and is located solely within the administrative boundary of Scottish Borders Council, 6 km north of Westruther and 7 km west of Longformacus. The Site is within the Lammermuir Hills.

There are a number of tracks onsite including the existing access track for the construction and maintenance of the Fallago Rig Wind Farm, with access taken from the B6456 to the east of Westruther. The Proposed Development will share the existing access track created for Fallago Rig.

Extensive hydrology site walkovers were conducted in March, September and December in 2022, and April and May in 2023 as part of the peat and hydrology surveys of the site. Watercourses in the vicinity of the Proposed Development were recorded during the hydrology walkover and used to feed into early iterations of design layout constraints.

New watercourse crossings were avoided as much as possible in the design and existing tracks were utilised. **Table 1** presents data on the existing and proposed watercourse crossings that will be utilised for the Proposed Development.

The Scottish Environment Protection Agency (SEPA) recommend a buffer of 50 m around each waterbody/watercourse in their scoping guidance. This was achieved for most of the Proposed Development, with the exception of parts of the existing access track, watercourse crossings and two locations (the proposed battery storage and borrow pit 3). The 50 m buffer from watercourses is shown in **Figure 8.2** of the EIA Report. Areas where the 50 m buffer could not be achieved are described and assessed in **Table 2**.

2 Watercourse Crossings and Buffers

2.1 Watercourse Crossings

The watercourse crossings of the proposed and existing access tracks have been identified from a combination of Ordnance Survey mapping, Bing aerial imagery and hydrology field surveys.
Data for each crossing is provided in **Table 1** below. The Proposed Development will use 19 existing crossings and proposes 4 new crossings. The Proposed Development will share the access track created for Fallago Rig, utilising existing crossings. There are some upgrades and repairs proposed to the access track, but no proposed upgrades or widening proposed at the existing crossings. There are 14 existing crossings on the access track, including bridges across the Dye Water, Watch Water and Blackadder Water.
There are several existing wind farm tracks within the Fallago Rig Wind Farm which will be utilised during construction of the Proposed Development. No upgrades of these tracks are proposed other than general repair and maintenance to support construction traffic. There are 5 existing watercourse crossings on the Fallago Rig wind farm tracks. Redressing, and/or minor repair to the track surfaces of the existing crossings will likely be required to provide a suitable running surface for component delivery and routine Site maintenance. Culvert/bridge dimensions and watercourse descriptions at the existing crossings are provided in **Table 1**, as is a representative photograph.
There are four new watercourse crossings required for the Proposed Development. There is an unnamed drain immediately east of the Fallago Rig turbines (crossing ID1) that will require to be crossed by new wind farm tracks. There is an old existing track that runs alongside the electricity pylons that pass through Fallago Rig wind farm where the proposed wind farm track crosses two small watercourses (crossing ID2a and ID2b). These crossings will require to be upgraded as part of the Proposed Development. A proposed light vehicle track crosses Kersons Cleugh (crossing ID3), which will require a new light vehicle track crossing. At this crossing it is necessary to facilitate the wind farm cabling to cross the watercourse at the same location (within the track).
Catchment areas upstream of each new watercourse crossing were calculated in GIS software based on LiDAR Phase 3 DTM topographic data, supplemented by field observations. The catchment areas upstream of the track crossings ID1, ID2a, ID2b and ID3 are approximately 0.06 km^2, 0.78 km^2, 0.85 $km^2$and 1.25 km^2, respectively, with the largest catchment being upstream of the Kersons Cleugh crossing (crossing ID3). Hydrological analysis for each individual catchment at each new crossing location was undertaken to determine the design flows for 2-, 10-, 30-, 50- 100- and 200-year return periods. This was fed into the Outline Drainage Strategy (EIA Report **Appendix 8.5**) to provide initial sizing and design of the crossings.
The proposed new crossings will be bottomless arched culverts.
The locations of the proposed watercourse crossings are illustrated in **Figure 8.2** in the EIA-R.

2.2 Watercourse Buffers

SEPA recommend a buffer of 50m around each watercourse in their scoping guidance. This was achieved for all the watercourses on the site, with the exception of watercourse crossings, parts of the existing access track, and two locations (the proposed battery storage and borrow pit 3). These are shown in **Figure 8.2**, labelled A, B and C.

The locations where a buffer could not be achieved are detailed in **Table 2**, along with photographs and details of potential effects and additional mitigation required.

Table 1: Watercourse Crossing Details

ID	Name	Easting	Northing	Field Notes / Comments	Width (m)	Bed Sediment	Bank Erosion (yes/no)	Natural Channel (yes/no)	Crossing Type	Existing Culvert/ Bridge Dimensions	Catchment (km^2)	Minor Watercourse (yes/no)[1]	CAR Authorisation Required (yes/no)	Photograph
1	Unnamed Drain	358566	658009	Drain near edge of existing turbine.	0.9	Silt	No	Yes	Proposed wind farm track	N/A	0.06	Yes	No	
2a	Middle Black Burn	359394	660057	Small watercourse with old metal culvert at track crossing	0.6	Gravel	No	Yes	Proposed wind farm track	600 mm	0.78	No	Yes	

[1] A minor watercourse is defined by SEPA as one that is not shown on 1:50,000 scale Ordnance Survey maps. SEPA do not normally require an authorisation for engineering activities on minor watercourses with the exception of culverting for land-gain, dredging and permanent diversions/realignments.

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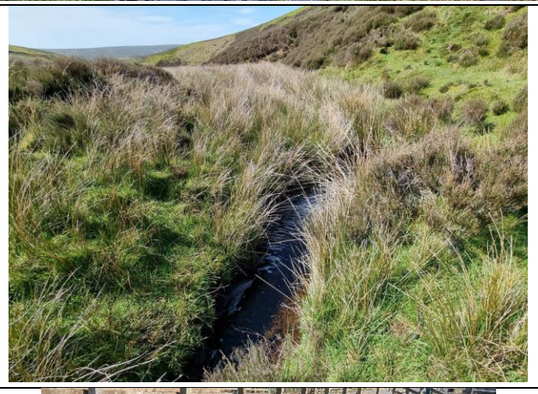
2b	Black Burn	359424	660066	Three existing metal culverts are in poor condition and partially blocked. Water was dark with peat runoff.	1.0	Gravel	No	Yes	Proposed wind farm track	2 * 600 mm 1 * 350 mm	0.85	No	Yes	
3	Kersons Cleugh	360850	660026	Water was clear with no sign of peat runoff.	0.7	Gravel	Yes	Yes	Proposed crossing for light vehicle track	N/A	1.25	No	Yes	
4	Blackadder Water	364420	651589	Clear water, no sign of peat	1.2	Gravel/Cobble	Yes	Yes	Existing bridge on access track	Bridge ~9.5 m Wide ~2.5 m High	n/a	No	No (no upgrade proposed)	

ID	Name	Easting	Northing	Field Notes / Comments	Width (m)	Bed Sediment	Bank Erosion (yes/no)	Natural Channel (yes/no)	Crossing Type	Existing Culvert/ Bridge Dimensions	Catchment (km^2)	Minor Watercourse (yes/no)[1]	CAR Authorisation Required (yes/no)	Photograph
5	Watch Water	364685	655964	Clear water, small tributaries upstream	1.7	Gravel/Cobble	Yes	Yes	Existing bridge on access track	Bridge ~9.5 m Wide ~2 m High	n/a	No	No (no upgrade proposed)	
6	Small ditch tributary to Watch Water	364691	656028	Small man-made ditch tributary	0.8	Silt	No	No	Existing culvert on access track	300 mm	n/a	Yes	No (no upgrade proposed)	
7	Small tributary to Watch Water, unnamed	364666	656141	Small tributary culverted beneath existing track	0.9	Gravel	No	Yes	Existing culvert on access track	450 mm	n/a	Yes	No (no upgrade proposed)	

ID	Name	Easting	Northing	Field Notes / Comments	Width (m)	Bed Sediment	Bank Erosion (yes/no)	Natural Channel (yes/no)	Crossing Type	Existing Culvert/ Bridge Dimensions	Catchment (km^2)	Minor Watercourse (yes/no)[1]	CAR Authorisation Required (yes/no)	Photograph
8	Unnamed small crossing	364433	657796	Minor watercourse crossing, much smaller upstream than downstream	0.7	Silt, some gravel	Some minor erosion at culvert outlet	Yes	Existing culvert on access track	450 mm	n/a	Yes	No (no upgrade proposed)	
9	Easter Stop Cleugh	364340	657868	Wider at downstream culvert outlet than upstream	0.2	Gravel	No	Yes	Existing culvert on access track	600 mm	n/a	No	No (no upgrade proposed)	
10	Wester Stop Cleugh	364294	657905	Watercourse is slightly wider downstream of the crossing location	0.4	Gravel	No	Yes	Existing culvert on access track	600 mm	n/a	No	No (no upgrade proposed)	

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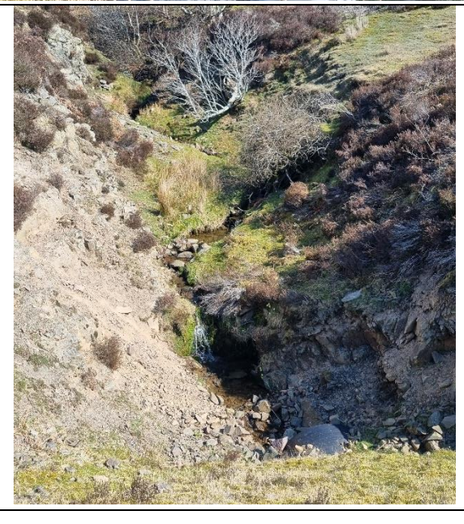
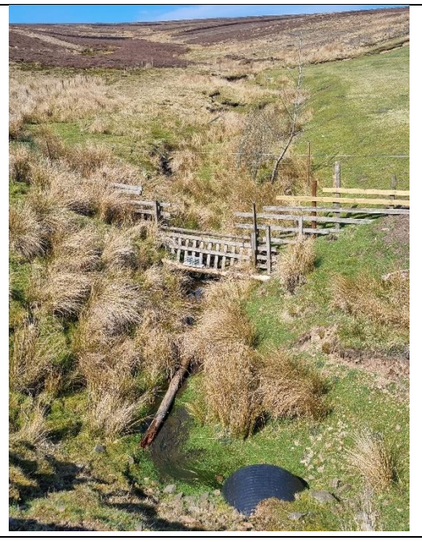
11	Dye Water	363453	658060	Large bridge crossing Dye Water, not much erosion here but in other places along the Dye Water	3.1	Cobble	Yes	Yes	Existing bridge on access track	Bridge, ~14 m Wide ~3 m High	n/a	No	No (no upgrade proposed)	
12	Byrecleugh Burn	362876	658001	900mm culvert acts as primary with extra 600mm culvert set higher	1.1	Gravel/ Cobble	Yes	Yes	Existing culvert on access track	900 mm and extra 600 mm	n/a	No	No (no upgrade proposed)	
13	Brock's Cleugh	361602	658618	Very steep but small tributary, some erosion from earthworks at side of track	0.6	Cobble	Yes	Yes	Existing culvert on access track	900 mm	n/a	No	No (no upgrade proposed)	

ID	Name	Easting	Northing	Field Notes / Comments	Width (m)	Bed Sediment	Bank Erosion (yes/no)	Natural Channel (yes/no)	Crossing Type	Existing Culvert/ Bridge Dimensions	Catchment (km^2)	Minor Watercourse (yes/no)[1]	CAR Authorisation Required (yes/no)	Photograph
14	Unnamed ditch	361296	658835	Small drain under track	0.4	Silt	No	No	Existing culvert on access track	400 mm	n/a	Yes	No (no upgrade proposed)	
15	Chapman's Grain	361140	658845	Clear water	1.6	Gravel/ Cobble	No	Yes	Existing bridge on access track	Bridge ~8 m Wide ~2.5 m High	n/a	No	No (no upgrade proposed)	
16	Unnamed Watercourse	360934	658805	Small gully watercourse	0.7		Yes- Further upstream	Yes	Existing culvert on access track	900 mm	n/a	Yes	No (no upgrade proposed)	

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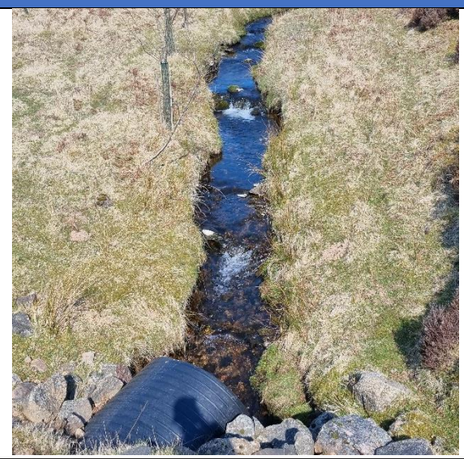
17	Burn betwixt the Laws	359944	658804	Much wider at downstream culvert outlet than upstream	0.9	Gravel/ Cobble	No	Yes	Existing culvert on access track	900 mm	n/a	No	No (no upgrade proposed)	
18	Wester Bank Burn or Shiel Burn	358682	659157	There is another track crossing just upstream with twin 1000 mm culverts (photo in **Table 2**, Location A)	1.9	Cobble	Yes	Yes	Existing crossing of wind farm track	2000 mm	n/a	No	No (no upgrade proposed)	
19	Unnamed Watercourse	358231	659133	Twin 600 mm culverts just upstream of existing track	0.8	Gravel/ Cobble	Yes	Yes	Existing crossing of wind farm track	900 mm	n/a	No	No (no upgrade proposed)	

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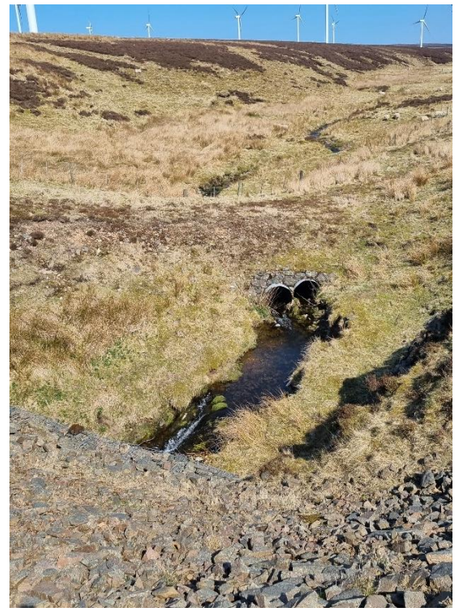
20	Dye Water	357854	659091		2.6	Boulder/ Cobble	Yes	Yes	Existing crossing of wind farm track	Twin 1450 mm	n/a	No	No (no upgrade proposed)	
21	Unnamed Ditch	357981	658653	Poor clarity water from peat, man-made drainage ditch	0.5	Peat and Cobble	No	No	Existing crossing of wind farm track	300 mm	n/a	Yes	No (no upgrade proposed)	
22	Unnamed Ditch	358214	658466	Artificial drainage ditch	0.6	Peat and cobble	No	No	Existing crossing of wind farm track	300 mm	n/a	Yes	No (no upgrade proposed)	

Table 2: Watercourses where a 50 m buffer to infrastructure was not achieved.

ID	Name	Width of watercourse (top of bank)	Watercourse Description	Infrastructure and Ancillary Works Description	Temporary or Permanent	Width of buffer strip achieved	Water feature upgradient or downgradient of Proposed Development	Potential Effect/ Comment	Additional Mitigation	Photograph
A	Sheil Burn	1.8	Narrow, incised watercourse several metres below battery storage area. There is an existing track crossing (crossing ID18) close to the Proposed Development.	Battery Storage Location	Permanent	32 m	Downgradient	Flow path analysis indicates that surface water runoff paths are from the infrastructure towards the watercourse, however there is an existing wind farm track between the Proposed Development and the watercourse. The Proposed Development is ~5 m higher than the burn and ~1.5 m higher than the track. It is not considered to be at flood risk from the burn. Even if the culvert were to be become blocked, flood water would flow over the track and back into the burn downstream and would not impact the Proposed Development. Embedded mitigation (i.e. construction SuDS and permanent drainage) around the battery storage area will be included in the design. Surface water runoff will be treated and attenuated. Buffer width is considered adequate for size of water feature.	Additional mitigation (e.g. silt fences, settlement ponds) will be installed during construction to reduce the risk of sediment/silt run-off during construction.	
B	Dye Water	4.8	Wide, shallow watercourse located in wide, incised valley several meters below the existing track.	Borrow Pit 3 (and search area)	Temporary	31 m	Downgradient	Flow path analysis indicates that surface water runoff paths are from the borrow pit towards the watercourse, however the existing access track is between the proposed borrow pit and the watercourse. The Proposed Development is ~7 m higher than the Dye Water and is not considered to be at flood risk. Embedded mitigation (i.e. cut-off drains, construction SuDS) around the borrow pit will be included in the design. Surface water runoff will be treated and attenuated. Buffer width is considered adequate for size of water feature.	Additional mitigation (e.g. silt fences, settlement ponds) will be installed during construction to reduce the risk of sediment/silt run-off to the watercourse during construction.	

ID	Name	Width of watercourse (top of bank)	Watercourse Description	Infrastructure and Ancillary Works Description	Temporary or Permanent	Width of buffer strip achieved	Water feature upgradient or downgradient of Proposed Development	Potential Effect/ Comment	Additional Mitigation	Photograph
C	Dye Water and tributaries	~5 m	Wide, shallow watercourse located in wide, incised valley several meters below the existing track. Main watercourse in the area	Upgrades/ repairs to existing Fallago Rig access track. There is ~2.48 km of track repairs required along sections where the access track is within the 50 m buffer; the locations are shown on **Figure 8.2**.	Permanent	The buffer width achieved varies depending on the existing track location and varies from 10 m to 50 m. The existing Fallago Rig access track follows the Dye Water up the valley for most of its length and crosses a number of tributaries.	Downgradient	The existing access track sits higher than the watercourse and surface water flow paths will flow towards the watercourse. Embedded mitigation (i.e. construction SuDS and drainage) will be included in the design. Given the location of the existing track, a 50 m buffer could not be achieved.	Additional mitigation (e.g. silt fences, settlement ponds) will be installed during construction to reduce the risk of sediment/silt run-off to the watercourse during track upgrades.