Technical Appendix 8.3: Watercourse Crossings

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1.1 Introduction

1.1.1 This assessment has been prepared in accordance with requirements of the Water Framework Directive (WFD) to evaluate the hydrological implications of the Proposed Development's watercourse crossings and compliance with consenting requirements.

1.1.2 The Proposed Development is a renewable energy development comprised of up to eight wind turbines, a Battery Energy Storage System (BESS) and associated infrastructure adjacent to Sullom Voe Oil Terminal (SVT) and the Shetland Gas Plant in Shetland, Scotland. The Proposed Development is described in **Chapter 2: Proposed Development (EIAR Volume 2)**.

1.1.3 The purpose of this Technical Appendix is to provide a conceptual assessment of watercourse crossings and to outline the strategic approach to those proposed crossings. It does not comment on the detailed engineering design. The Principal Contractor (the 'Contractor') would have overall responsibility for designing water crossings, for the production of a final Watercourse Crossing Plan and for compliance with Environmental Authorisations (Scotland) Regulations (EASR)[1] and the Scottish Environment Protection Agency's (SEPA's) good practice guidance[2] for water activities (further described below).

1.1.4 Field surveys of likely watercourse crossings, based on the layout of the Proposed Development have been used to determine the channel width and depth, bed substrate and bankside vegetation to identify the likely level of authorisation required. This Technical Appendix also sets out the general principles of design which the Contractor would be required to follow in order to minimise changes to the hydrological regime and reduce any potential impacts on river morphology and aquatic ecology.

1.2 Legislation

1.2.1 The principal legislation with regard to the water environment is provided by the WFD which aims to protect and enhance the quality of surface freshwater (including lakes, rivers and streams), groundwater, Groundwater Dependent Terrestrial Ecosystems (GWDTEs), estuaries and coastal waters.

1.2.2 The key objectives of the WFD relevant to this assessment are:

- To prevent deterioration and enhance aquatic ecosystems; and
- To establish a framework of protection of surface freshwater and groundwater.

1.2.3 The WFD has been transposed into Scottish legislation as the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act)[3], which gives Scottish Ministers powers to introduce regulatory controls over water activities, in order to protect, improve and promote sustainable use of Scotland's water environment.

1.2.4 From 1 November 2025, the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended in 2021) (CAR)[4] have been replaced by the SEPA EASR.

1.2.5 EASR guidance sets out the required level of authorisation for engineering works in the environment and provides specific guidance for watercourse crossings (under Engineering Activities).

1.2.6 The SEPA Position Statement on Culverting of Watercourses (WAT-PS-06-02)[5], Supporting Guidance on Sediment Management (WAT-SG-78)[6] and SEPA EASR Guidance: Engineering: Activity Guide: Crossings (WAT-G-024)[7] have also been taken into account within this Technical Appendix, along with the supporting guidance provided in the River Crossings Good Practice Guide[8].

1.3 Identification of Watercourse Crossing Locations

1.3.1 A hydrology survey walkover was carried out by Ramboll in May 2025 at locations across the Proposed Development. Details pertaining to watercourses within the Site are included within **Chapter 8: Hydrology, Hydrogeology, Geology and Soils (Volume 2)**. Ramboll is not aware of any significant alterations to the hydrology of the surrounding area since April 2025 and this has been confirmed through a review of regulatory mapping and aerial imagery.

1.3.2 Field surveys of the hydrological setting of the Proposed Development from May 2025 collected watercourse data and recorded GPS locations to a minimum accuracy of +/- 10 m. The survey was undertaken based on a preliminary layout design. The survey locations were chosen to provide an overview of the hydrological conditions, and therefore the relative sensitivity, of watercourses across the Proposed Development. In Table 8.2.1, watercourse crossing locations are identified along with images from the May 2025 hydrological investigation at survey locations from respective watercourses or as close as feasibly practical, given site conditions. Whilst the survey did not assess each potential crossing in detail, it is considered suitable for a conceptual assessment of potential crossing type and potential for environmental impacts.

1.3.3 A total of nine new watercourse crossings have been identified as part of the Proposed Development and are presented in **Figure 8.2: Water Resources (EIAR Volume 3a)**. Assessment has been provided for crossings of watercourses identified on 1:10,000 scale OS mapping. Cross-drainage measures would be implemented for smaller flow paths (in line with standard industry practice for engineering on watercourses). Further consideration has also been given to locations at which the requirement for the continued downslope supply of surface water runoff to sensitive peatland habitats has been identified.

1.4 Type of Crossings

1.4.1 Watercourse characteristics, both physical and ecological, would be matched to the most appropriate crossing type as part of detailed design. The potential crossing types as detailed within the EASR[9] are described below:

[1] Environmental Authorisations (Scotland) Regulations (EASR) (2018). Available at: https://beta.sepa.scot/regulation/authorisations-and-compliance/easr-authorisations/ [Last accessed September 2025]

[2] Scottish Environment Protection Agency's (SEPA's) good practice guidance. Available at:https://www.sepa.org.uk/environment/land/planning/guidance-and-advice-notes/ [Last accessed September 2025]

[3] WEWS Act (2003). Available at: https://www.legislation.gov.uk/asp/2003/3/contents [Last accessed September 2025]

[4] Water Environment (Controlled Activites) (Scotland) Regulations 2011 (as amended in 2021) (CAR). Available at: https://www.legislation.gov.uk/ssi/2021/412/body/made

[5] Regulations 2011: WAT-PS-06-02: Culverting of Watercourses Position Statement and Supporting Guidance. Version 2.0, June 2015. - https://www.sepa.org.uk/media/150919/wat_ps_06_02.pdf [Last accessed September 2025]

[6] Regulations 2011 WAT-SG-78: Supporting Guidance on Sediment Management: https://www.sepa.org.uk/media/150919/wat_ps_06_02.pdf [Last accessed September 2025]

[7] SEPA (2026a). Crossing with part of crossing only on the banks | Beta | SEPA | Scottish Environment Protection Agency. [online] Sepa.scot. Available at: https://beta.sepa.scot/regulation/authorisations-and-compliance/easr-authorisations/water-activities/engineering/crossings/crossing-with-part-of-crossing-only-on-the-banks/ [Accessed 07/04/2026]

[8] The River Crossings Good Practice Guide (Nature Scot and SEPA) (2010). Available at: https://www.confor.org.uk/media/246360/good-practice-guide-river-crossings.pdf [Accessed 20/04/2026]

[9] EASR Watercourse Crossings Guidance (2025). Available at: https://beta.sepa.scot/regulation/authorisations-and-compliance/easr-authorisations/water-activities/engineering/crossings/

- Single span structures: recommended where there is a need to reduce disturbance to the bank and bed of the watercourse. Where it is possible to set back abutments from the watercourse, it is possible to maintain bank habitats under the crossing. Taking into account the maximum width of crossings to be undertaken for the Proposed Development, it is not anticipated that in-stream supports would be necessary at any crossings. Such crossings include half barrel culverts with a sufficient span to incorporate the existing bed and banks of watercourses.
- Bottomless Box/Arches: can be used where there are watercourses narrower than those appropriate for bridge construction, but which have a requirement to provide mammal and/or fish passage and ensure sufficient hydraulic capacity during peak flow periods. Arches minimise disruption to the stream bed. Box culverts may incorporate mammal ledges and can be buried below stream bed level to enable bed material replacement.
- Circular Culverts: where potential impact is negligible due to the size, location or typology of the watercourse, circular culverts can be embedded into the channel to allow the natural bed to re-establish and, where necessary, provision can be made for mammals adjacent to the culvert. Where a circular culvert is utilised, it is assumed that neither natural bed material, nor water velocity nor depth are critical other than in the purely hydraulic sense.
- Porous granular rock fill blanket and perforated pipes – where there is no clearly defined channel flow, flow can be maintained by a drainage blanket wrapped in geotextile placed below the road construction. Where such a crossing structure is utilised, flow is predominantly sub-surface interflow and a porous fill below the track provides flow continuity without concentrating the discharges into a narrow channel.
- Directional drilling, isolated open cut, open cut trenching and mole ploughing – for pipes or cables to be installed below the bed of a watercourse or loch.

1.5 EASR Authorisations

1.5.1 Under SEPA Guidance[1], engineering activities that could impact the water environment (except culverting for land-gain, dredging and permanent diversions or realignments) on minor watercourses do not require authorisation under EASR. A minor watercourse is one that is not shown on the 1:50,000 scale Ordnance Survey maps (Landranger series). However, activities to cause, or become likely to cause, environmental harm, SEPA may take enforcement action even where authorisation is not required.

1.5.2 Where authorisation is required, the following four types of authorisations are used for all activities.

General Binding Rules (GBRs)

1.5.3 General Binding Rules (GBRs) are mandatory rules that apply to low-risk activities. If the activity you are carrying out is covered by a GBR, as long as you comply with the rules in full, you are authorised. There is no need to apply for any other authorisation and there is no need to let SEPA know.

Notification

1.5.4 Notifications are used for low-risk activities that SEPA require to know are being carried out and by who, but SEPA do not need to decide whether to grant or refuse an authorisation. The activity is considered authorised as soon as SEPA have been notified.

Registration

1.5.5 Registrations are used for activities that need a simple assessment before SEPA decide to grant or refuse the authorisation following application for a registration.

1.5.6 Activities that are authorised by a registration have standard conditions (rules) that apply and must be complied with.

Permit

1.5.7 Permits are used for higher risk and non-standard activities that need a rigorous assessment before SEPA decide to grant or refuse the application. Activities that need a detailed Fit and Proper Person assessment, bespoke conditions or involve public consultation would be authorised under a permit.

1.5.8 The detailed design of crossings for the Proposed Development would include the application to SEPA for the necessary consents under EASR.

1.6 Likely Levels of EASR Authorisation

1.6.1 Identified watercourse crossings all cross watercourses present on OS 1:50,000 scale mapping. WC03 spans the Aywick Burn with a notably wider embankment width as detailed within **Figure 8.3.1: Watercourse Crossings**. This stream is larger than the other proposed crossings and is of more natural form and ecological function. SEPA guidance suggests that single span structures should be designed where feasible, where watercourse crossings would comprise half barrel culverts. Typically, precast concrete culverts with independent foundations on to rock would be considered appropriate. Where closed culverts are employed, SEPA guidance states that crossings should maintain natural channel width, bed level and slope ensuring adequate water depth and water velocity for fish passage. It is anticipated that were half barrel culverts structures employed, these would not include construction on the riverbed and plans indicate that there would be ≤20 m of total bank affected at each crossing. As such, the proposed single-span crossing at WC03 would require Registration under EASR as a water activity for a crossing with part of crossing only on the banks, provided no in-bed works are undertaken.

1.6.2 The other proposed watercourse crossings would be of smaller streams (WC01, WC02, and WC04 to WC09). It is noted that while these small watercourses comprise both natural watercourses and cut drains within peat topsoil's, in places they may support vegetation communities distinct from the surrounding mire habitat. Where feasible, bottomless arced culverts could be installed. However, it is noted that closed culverts are likely to be appropriate at most locations due the small size of watercourses, artificial morphology or intermittent flow.

1.6.3 This suggests any crossing would require Registration or a Simple Licence, subject to detailed design. In order to adopt a conservative approach, it is assumed the watercourses at these locations would require a Simple Licence. However, this would need to be confirmed by the Contractor through further consultation with the Applicant and SEPA at detailed design stage. These crossings may only require Registration, dependent on detailed design, where closed culverts are proposed on single track roads and where the watercourses are less than or equal to 2 m wide.

1.6.4 This suggests any crossing would require Registration, subject to detailed design. This would need to be confirmed by the Contractor through further consultation with the Applicant and SEPA at detailed design stage.

1.6.5 Should crossings be constructed as temporary features and installed solely for the construction phase of the Proposed Development, regulation under the relevant General Binding Rules (GBRs) is feasible. Consideration for GBRs requires that crossings are installed and fully removed within the construction phase, involve no significant bed modification, and comply with fish passage, sediment control, and restoration requirements. Where the works fall outside the scope of the applicable GBRs, were bed disturbance or engineering to exceed minor EASR thresholds, Registration would be required.

1.6.6 In order for activities to be carried out under Registration the appointed contractor would need to confirm that 'Standard Conditions' under EASR can be followed. Standard Conditions for watercourse crossings have the reference EASR-SC-055. The Applicant's registration application would only be granted once they have provided SEPA with confirmation that they are able to comply with the standard conditions.

1.7 Watercourse Crossings

1.7.1 The detailed design of each watercourse crossing would seek to ensure hydraulic conveyance is maintained to prevent any restriction of flows, as well as allowing the free passage of mammals and aquatic ecology. Therefore, it is proposed each watercourse crossing would have sufficient capacity to convey the climate change-adjusted 1:200-year flood including a 40% allowance for potential partial blockage. Anticipated watercourse crossing types are specified in Table 8.2.1 below. Flow calculations would be undertaken by the Contractor in order to inform detailed design and applications for EASR authorisation. Should any new crossings be identified, consideration should be given to any local variations in channel dimensions and to bankside conditions. Where feasible within micro-siting allowances, the narrowest locations should be selected, and the stability of the channel banks considered.

1.7.2 The proposed locations of watercourse crossings are presented on **Figure 8.3.1: Watercourse Crossings**. At watercourse crossings bed level and slope would be maintained and culvert outfalls would be designed such that bed scour would be minimised. It is anticipated that the culvert apertures would allow the natural bed width to be maintained and where possible crossings would incorporate suitable mammal crossings.

1.7.3 During construction, splash boards and runoff diversion measures, including silt fencing adjacent and parallel to watercourses beneath crossings, would be used at all crossings to prevent direct siltation of watercourses and would be delivered via means of a detailed Construction Environmental Management Plan (CEMP).

1.8 Track Drainage

1.8.1 To ensure that all drainage measures employed during the construction phase of the Proposed Development are maintained appropriately and remain effective, the performance of the drainage measures would be monitored. The drainage management works would, therefore, be supervised by the Environmental Clerk of Works (EnvCoW) as part of a SuDS strategy which would be included at the detailed design stage. All monitoring and supervision of the drainage management works would be recorded. A CEMP would be produced by the Contractor, which would set out the principles for the protection of water quality during construction. It is also anticipated that the Proposed Development would be subject to a construction site license (the Proposed Development incorporates a road or track length in excess of 5 km) and preparation of suitable materials for such a licence would be undertaken by the Contractor.

1.8.2 Greenfield 'clean' runoff and track runoff should be kept separate, where possible, and be channelled separately to suitably vegetated areas at least 50 m from watercourses to allow for the settlement of solids. Silt traps or settlement lagoons could be utilised and monitored to ensure stored surface water would be kept to a minimum.

1.8.3 Track drainage within areas of peat would be designed to avoid deep cut ditches where practicable and favouring shallow interceptor drainage, cross-drains, and dispersed discharge to maintain natural hydrological function. It is noted that numerous surface water flow pathways are present across the Site which would require consideration at detailed design stage through a SuDs strategy. Cross drains would be installed at regular intervals along trackside drainage. Cross drains would be installed as pipe culverts under the track surface. The frequency of cross drains should increase in areas where higher flows are anticipated such as in areas of high surface flow (e.g. flushes or low-lying areas); where bank seepages are noted; and where historical or active drains are intercepted. Requirements for a temporary silt trap at each end of a cross drain would be assessed prior to the works being undertaken.

1.8.4 Pipe culverts used for cross drainage would be long enough so that road fill would not extend beyond the end of a culvert. Pipes would be laid at grades at least 2% (1:50) but no greater than 10% (1:10) and angled 30° to 45° cross-track to improve inlet efficiency. Check dams would be installed immediately above a cross-drain inlet and silt traps are required at the inlet points to prevent blockage of the pipe due to silt build up.

Table 8.2.1: Watercourse Crossing Inventory

ID:	Grid Reference(s):	Watercourse:	Infrastructure Location(s):	Type of Crossing(s):	Description: Ephemeral Flow Path with some exposed channel sections
WC01 **WC02**	HU 41056 77512 HU 41063 77501	Ephemeral Flow Path/ Stream	North-west of site – Turbine 3 platform and access tracks	Bottomless/arched culverts	**Width: 1** **Depth: 0.3** **Substrate: Peat**

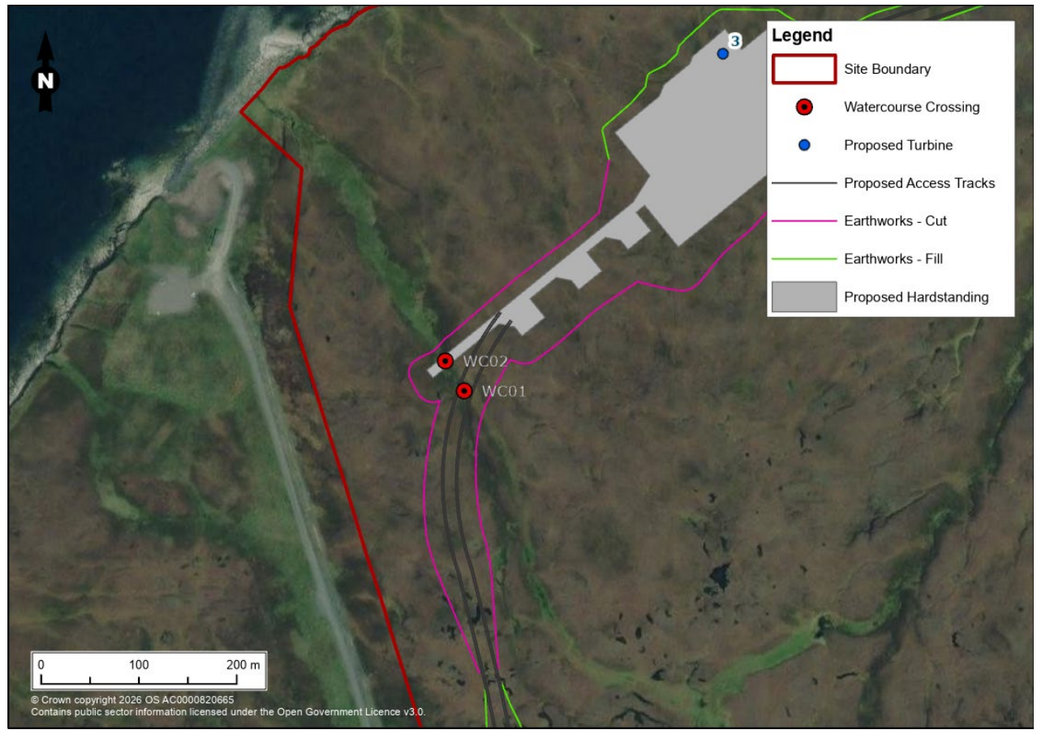
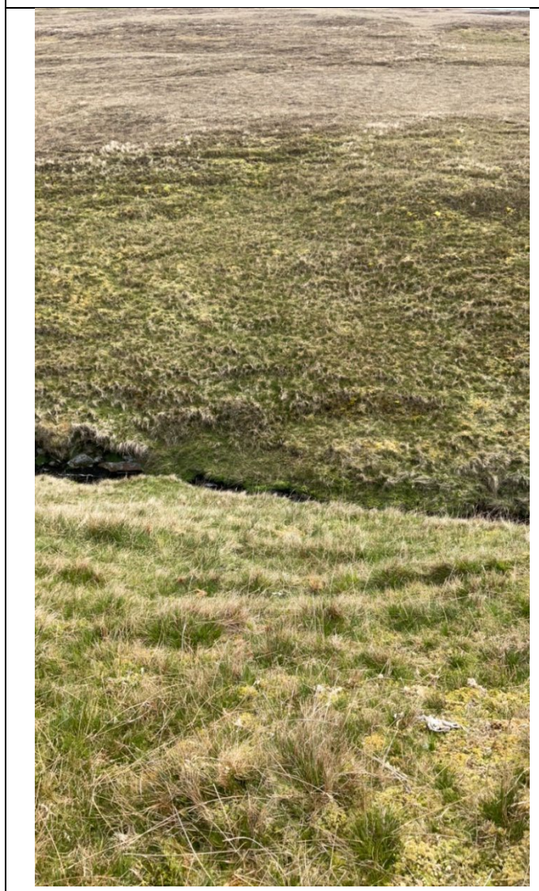
Cross Stream	Upstream	Downstream	Watercourse Crossing Locations
			

Table 8.2.1: Watercourse Crossing Inventory

ID:	Grid Reference(s):	Watercourse:	Infrastructure Location(s):	Type of Crossing(s):	Description:
WC03	HU 41449 77746	Aywick Burn	Northern track between Turbine 3 and Turbine 4	Single Span	**Width: 3** **Depth: 0.5** **Substrate: Peat**

Cross Stream



Upstream

Watercourse Crossing Locations

Table 8.2.1: Watercourse Crossing Inventory

ID:	Grid Reference(s):	Watercourse:	Infrastructure Location(s):	Type of Crossing(s):	Description: Large, ephemeral cut drains within catchment of the burn of Toft
WC04 **WC05**	HU 42130 76691 HU 42117 76699	Engineered Field Drains	Eastern Extent of site, tracks between Turbine 7 and 8	Bottomless/arched culverts	**Width: 0.8** **Depth: 0.3** **Substrate: Vegetated Peat**

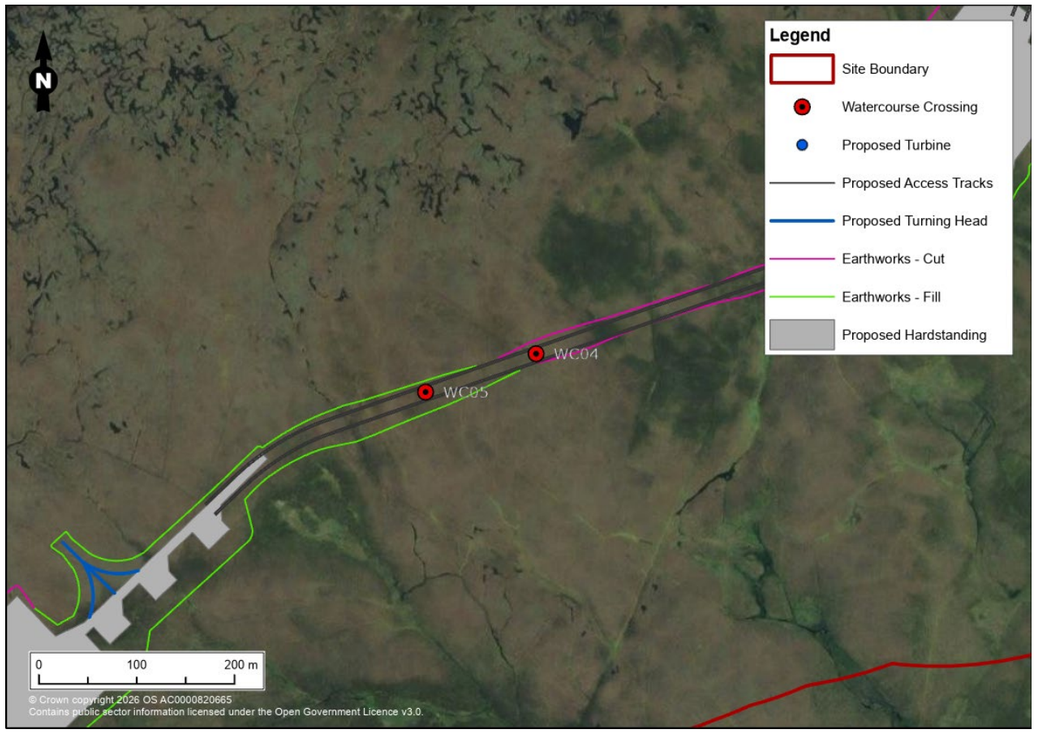
Upstream	Downstream	Watercourse Crossing Locations
		

Table 8.2.1: Watercourse Crossing Inventory

ID:	Grid Reference(s):	Watercourse:	Infrastructure Location(s):	Type of Crossing(s):	Description: Large, ephemeral cut drains within catchment of the burn of Toft
WC06 **WC07** **WC08**	HU 41817 76444 HU 41788 76336 HU 41774 76277	Small, ephemeral tributaries of the Burn of Toft	Central area of site – south of Turbine 8	Bottomless/arched culverts	**Width: 1** **Depth: 0.3** **Substrate: Peat**

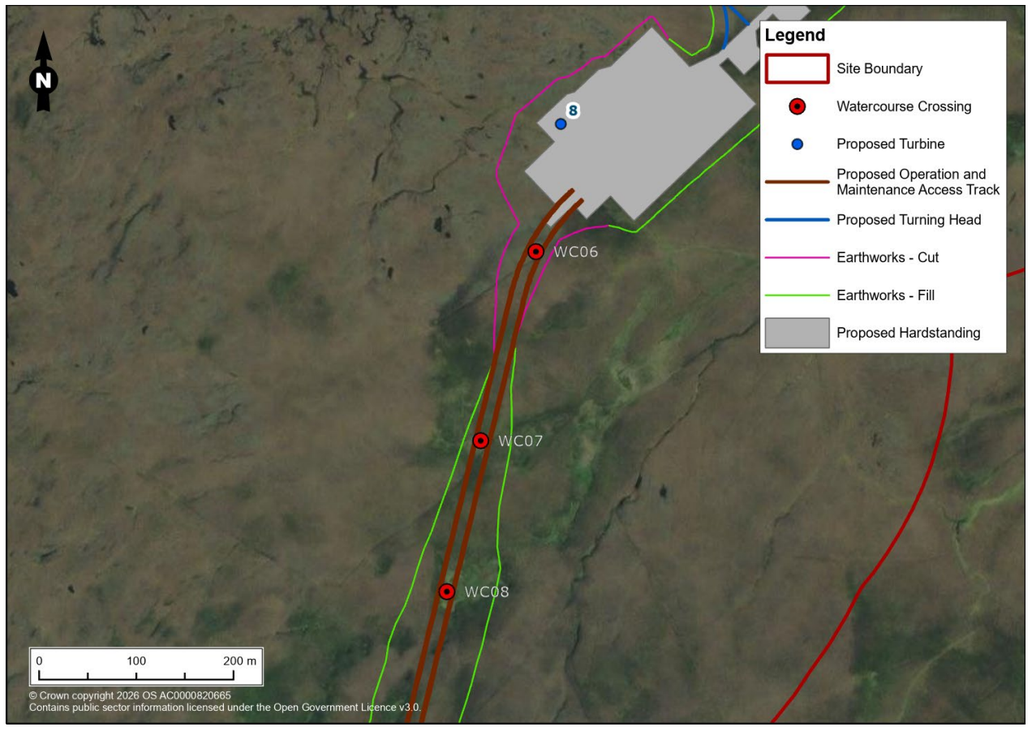
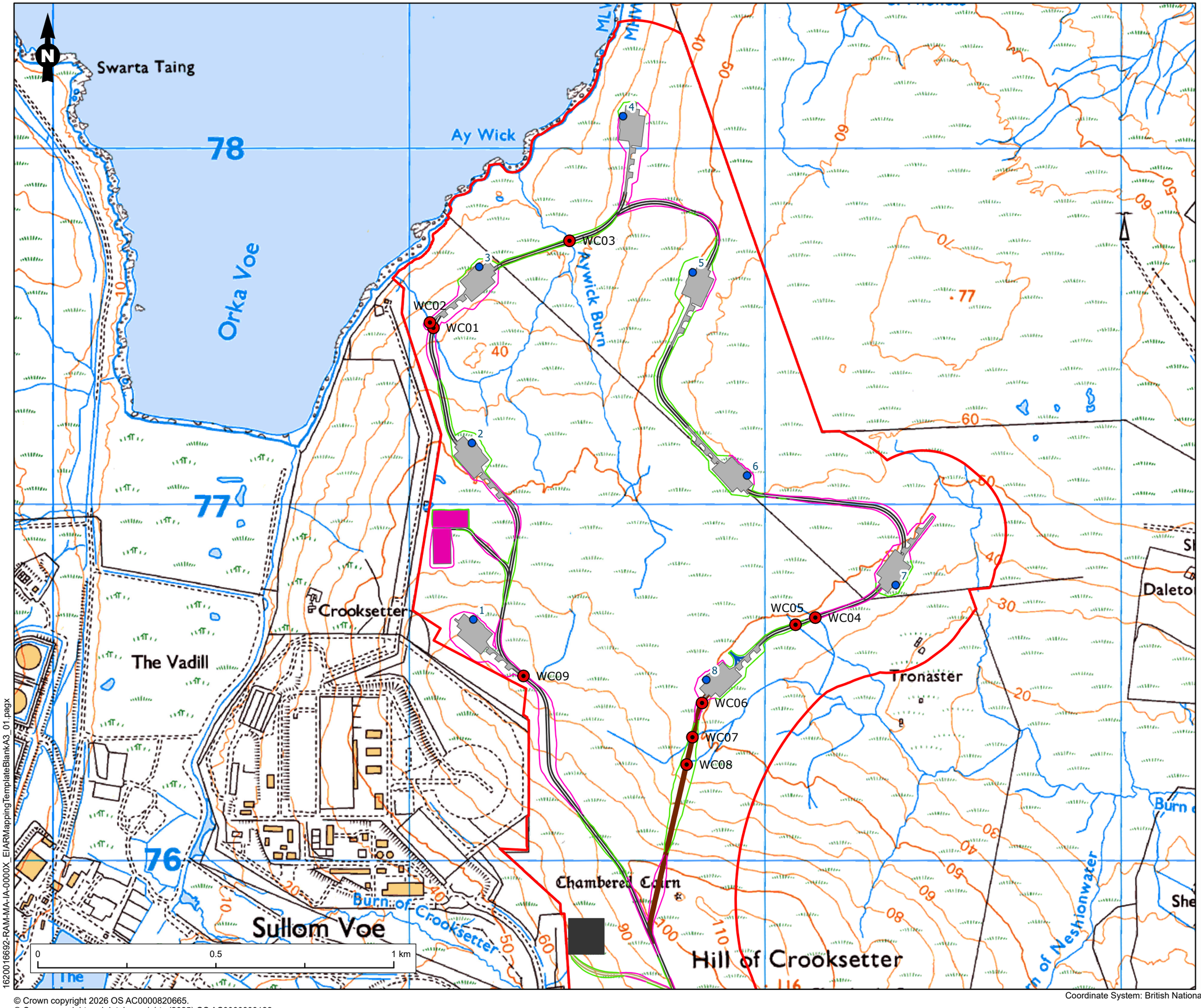
Upstream (WC07/08)	Downstream (WC07/08)	Upstream (WC06)	Watercourse Crossing Locations
			

Table 8.2.1: Watercourse Crossing Inventory

ID:	Grid Reference(s):	Watercourse:	Infrastructure Location(s):	Type of Crossing(s):	Description:
WC09	HU 41449 77746	Aywick Burn	Track at T1	Boxed Culvert	**Width: 2** **Depth: 0.8** **Substrate: Eroded Peat**

Downstream	Watercourse Crossing Location
	



Legend

- Application Boundary
- Proposed Turbine
- Proposed Hardstanding
- Earthworks - Cut
- Earthworks - Fill
- Proposed Substation, BESS and Lidar Area
- Proposed Access Tracks
- Proposed Turning Head
- Proposed Borrow Pit Search Area
- Proposed Temporary Borrow Pit Access Track
- Proposed Operation and Maintenance Access Track
- Watercourse Crossing

Figure Title
Watercourse Crossings

Project Name
Neshion Energy Park

Project No./Filery ID
1620016691 / REH2024N00248

Date	Figure No.	Revision
April 2026	8.3.1	1.0

Prepared By	Scale
KR	1:10,000 @A3

Client
Neshion Ltd

RAMBOLL

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Coordinate System: British National Grid. Projection: Transverse Mercator. Datum: OSGB 1936.