Environmental Impact Assessment Report

Teindland Wind Farm

Volume 1

Chapter 12: Hydrology, Hydrogeology and Soils

Document prepared by Envams Ltd for: Teindland Wind Farm Ltd

April 2025

Contents

12 HYDROLOGY

12.1 INTRODUCTION

This Chapter of the Environmental Impact Assessment Report (EIAR) evaluates the effects of the proposed Teindland Wind Farm (the Development) on land owned by Forestry and Land Scotland approximately 3 km north of Rothes, Moray, (the Site) on the hydrology and hydrogeology resources.

This Chapter of the EIAR is supported by the following figure provided in Volume 2a: Figures:

- Figure 4.1: Site Layout;
- Figure 12.1: Study Areas;
- Figure 12.2: Core Study Area Catchments;
- Figure 12.3: Badentinan Groundwater Risk Zone; and
- Figure 12.4: Private Water Supply Sources.

This Chapter of the EIAR is supported by the following Technical Appendix (TA) documents provided in Volume 3 Technical Appendices:

- TA A4.2: Outline Construction Environmental Management Plan (oCEMP);
- TA A12.1: Peat Assessment and Peat Management Plan; and
- TA A12.2: Watercourse Crossings Inventory.

This assessment was undertaken by Liam Nevins, director of Raincloud Consulting Ltd, a water and environmental consultancy. Liam has over 17 years of experience of assessing the effects of developments on the water environment, specialising in renewable energy developments in the UK. Liam is a Chartered member of CIWEM.

12.1.1 Scoping Responses and Consultations

Consultation for this EIA topic was undertaken with the organisations and is shown in Table 12.1.

Table 12.1 Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
Moray Council	Scoping Response 23rd August 2022	A Flood Risk Assessment (FRA) should provide details of the proposed development, flood risk from all sources, results of hydrological and hydraulic studies and proposed mitigation	Section 12.6.1.7 of this Chapter assesses all sources of potential flooding. All Development infrastructure is located outside the floodplain of the River Spey. The Development does not impact pluvial flow paths.
		A Drainage Impact Assessment for the site should be provided in line with the Moray Council Flood Risk and Drainage Impact Supplementary Guidance	The principles of a SuDS drainage are outlined within TA A4.2: oCEMP.
Marine Scotland Science (MSS)	Scoping Response 23rd August 2022	Post Consent Monitoring - Water quality (and fish population) monitoring	An outline of proposed water quality monitoring is provided in TA A4.2: oCEMP.
SEPA	Scoping Response 23rd August 2022	Any watercourse crossings to be designed to 1 in 200-year event	All watercourse crossings will be designed to a 1 in 200-year event, as outlined in TA A4.2: oCEMP.

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
		Map and Assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems and buffers	As per the Ecology Chapter, no Groundwater Dependent Terrestrial Ecosystems (GWDTEs) were identified within the Site and therefore have been scoped out of this assessment.
		Map and assessment of impact upon groundwater abstractions and buffers	Abstractions are identified within the Private Water Supply section of the Chapter.
		Peat depth survey and table detailing re-use proposals	A peat depth survey is provided in TA A12.1, which discusses the re-use of peat.
		Schedule of mitigation including pollution prevention measures	TA A4.2 oCEMP outlines all pollution prevention measures to protect the water environment.
		Proposed waste water drainage layout	The principles are outlined within TA A4.2: oCEMP. Finalised layout will be undertaken at detailed design prior to the construction phase and confirmed with SEPA.
		Proposed surface water drainage layout	The principles are outlined within TA A4.2: oCEMP. Finalised layout will be undertaken at detailed design prior to the construction phase and confirmed with SEPA.
		Proposed water abstractions including details of the proposed operating regime	There are no proposed water abstractions as part of the Development.

12.2 LEGISLATION, POLICY AND GUIDANCE

The following guidance, legislation and information sources have been considered in carrying out this assessment:

- The Water Framework Directive (WFD) (2000/60/EC)[1];
- (Scotland) Act 2003[2] and subsidiary Regulations;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, as amended ('the EIA Regulations')[3];
- The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003[4];

[1] European Commission (2000) The Water Framework Directive (2000/60/EC) [Online] Available at: https://ec.europa.eu/environment/water/water-framework/index_en.html [Accessed 27/01/2025].
[2] Scottish Government (2003) The Water Environment and Water Services (Scotland) Act 2003 [Online] Available at: http://www.legislation.gov.uk/asp/2003/3/contents [Accessed 27/01/2025].
[3] Scottish Government. (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations). Available at: https://www.legislation.gov.uk/ssi/2017/101/made. [Accessed 27/01/2025].
[4] Scottish Government (2003) Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 [Online] Available at: http://www.opsi.gov.uk/legislation/scotland/acts2003/asp_20030015_en_1 [Accessed 27/01/2025].

- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017[5]; and
- The Public and Private Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2017[6].

12.2.1 Scottish Planning Policy and Guidance

National Planning Framework 4 ('NPF4') was adopted in February 2023 and sets the long-term context for development planning in Scotland.

It contains policies with relevance to this Water Resources assessment, including Policy 22 (Flood risk and water management – including in relation to sustainable drainage systems ('SuDS')), and provides support for renewable technologies such as wind farms via Policy 11 (Energy).

Local policy context is set out in the Planning Statement, which accompanies the application for Section 36 consent for the Development.

12.2.2 Pollution Prevention Guidelines (PPGs) and Guidance for Pollution Prevention (GPPs)

GPPs give advice on statutory responsibilities and good environmental practice. Each PPG and GPP addresses a specific industrial sector or activity. SEPA and Northern Ireland Environment Agency (NIEA) are in the process of replacing the PPGs with GPPs. The following guidance are of relevance principally to surface water, however as surface water has the potential to affect groundwater, they are also of relevance to the assessment of groundwater.

Netregs PPGs were replaced by GPPs[7]:

- GPP1: Understanding your environmental responsibilities – good environmental practices (October 2020);
- GPP2: Above ground oil storage tanks (January 2018);
- GPP3: Use and design of oil separators in surface water drainage systems (March 2022);
- GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (November 2017);
- GPP5: Works and maintenance in or near water (January 2017);
- GPP6: Working at construction and demolition sites (April 2023);
- GPP8: Safe storage and disposal of used oils (July 2017);
- GPP13: Vehicle washing and cleaning (April 2017);
- GPP21: Pollution incident response planning (July 2017); and
- GPP22: Dealing with spills (October 2018).

12.2.3 Other Guidance

Other relevant guidance comprises the following:

- The Scottish Government (2001), PAN 61: Planning and Sustainable Urban Drainage Systems[8];
- SEPA (2010) Land Use Planning System Guidance Note 2, Version 8 (LUPS-GU2)[9];

[5] Scottish Government (2017) the Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 [Online] Available at: https://www.legislation.gov.uk/ssi/2017/282/note/made [Accessed 27/01/2025].
[6] Scottish Government (2017) the Private and Public Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2017 [Online] Available at: http://www.legislation.gov.uk/ssi/2017/321/made [Accessed 27/01/2025].
[7] Guidance for Pollution Prevention (GPPs) – Full List [Online] Available at: https://www.netregs.org.uk/environmentaltopics/pollution-prevention-guidelines-ppgs-and-replacement-series/ [Accessed: 22/01/2025].
[8] The Scottish Government (2001) PAN61 Planning and Sustainable Urban Drainage Systems [Online] Available at: https://www.gov.scot/publications/pan-61-sustainable-urban-drainage-systems/ [Accessed: 27/01/2025].
[9] SEPA (2010) Land Use Planning System Guidance Note 2, Planning advice on Sustainable Drainage Systems (SUDS), Version 8 [Online] Available at: https://www.sepa.org.uk/media/143195/lups-gu2-planning-guidance-on-sustainable-drainage-systems-suds.pdf [Accessed: 27/01/2025].

- SEPA (2010) Engineering in the water environment: good practice guide: River crossings[10];
- SEPA (2015) Culverting of watercourses: position statement and supporting guidance[11];
- SEPA (2017), Land Use Planning System Guidance Note 31, Version 3, (LUPSGU31)[12];
- SEPA (2024) Climate change allowances for flood risk assessment in land use planning (Version 5)[13];
- SEPA (2002) Managing River Habitats for Fisheries[14];
- The Water Environment (Controlled Activities) (Scotland) Amended Regulations 2021 (the CAR Regulations)[15];
- SEPA (2024), CAR - A Practical Guide, Version 9.4[16];
- The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013[17];
- SEPA (2021), The River Basin Management Plan for Scotland[18];
- Scottish Water (SW) List of Precautions for Drinking Water and Assets – Wind Farms EdE[19];
- NatureScot (2024), Good Practice During Wind Farm Construction[20];
- The Construction Industry Research and Information Association (CIRIA) (2023), Environmental Good Practice on Site guide (Fifth edition) (C811)[21];
- CIRIA (2001) Control of Water Pollution from Construction Sites (C532)[22];
- CIRIA (2015) The SuDS Manual (C753)[23];
- Forestry Commission (2011) Forests and Water. UK Forestry Standard Guidelines[24];
- Forestry Commission (2017) The UK Forestry Standard[25]; and
- Forestry Commission (2019) Managing forest operations to protect the water environment[26].

[10] SEPA (2010) Engineering in the water environment good practice guide: River Crossings, WAT-SG-25 [Online] Available at: http://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/ [Accessed 25/01/2025].
[11] SEPA (2015) Culverting of watercourses: position statement and supporting guidance WAT-PS-06-02, Version 2.0 [Online] Available at: https://www.sepa.org.uk/media/150919/wat_ps_06_02.pdf [Accessed: 27/01/2025].
[12] SEPA (2017) Land Use Planning System Guidance Note 31. Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3 [Online] Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf [Accessed: 27/01/2025].
[13] SEPA (2024) Climate change allowances for flood risk assessment in land use planning. Version 5 [Online] Available at: https://www.sepa.org.uk/media/fxjqfjmf/climate-change-allowances-guidance.docx [Accessed: 27/01/2025].
[14] SEPA (2002) Managing River Habitats for Fisheries: a guide to best practice [Online] Available at: https://www.sepa.org.uk/media/151323/managing_river_habitats_fisheries.pdf [Accessed: 27/01/2025].
[15] Scottish Government (2021) the Water Environment (Controlled Activities) (Scotland) Amened Regulations 2021 [Online] Available at: https://www.legislation.gov.uk/ssi/2021/412/contents/made [Accessed 27/01/2025].
[16] Scottish Government (2013) The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013 [Online] Available at: https://www.legislation.gov.uk/ssi/2013/29/made [Accessed 27/01/2025].
[17] Scottish Government (2013) The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013 [Online] Available at: https://www.legislation.gov.uk/ssi/2013/29/made [Accessed: 27/01/2025].
[18] SEPA (2021) River Basin Management Plan [Online] Available at: https://www.sepa.org.uk/media/594088/211222-final-rbmp3-scotland.pdf [Accessed: 27/01/2025].
[19] Scottish Water List of Precautions for Drinking Water and Assets – Wind Farms EdE [Online] Available at: https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Key-Publications/Energy-and-Sustainability/Sustainable-Land-Management/091120SWListOfPrecautionsForDrinkingWaterAndAssetsWindFarmsEdE.pdf [Accessed 27/01/2025].
[20] NatureScot (2024) Good Practice during Wind Farm Construction [Online] Available at: https://www.nature.scot/doc/good-practice-during-wind-farm-construction [Accessed: 27/01/2025]
[21] CIRIA (2023) Environmental Good Practice on site guide (Fifth edition) [Online] Available at: https://www.ciria.org/ci/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=C811&Category=BOOK [Accessed 27/01/2025].
[22] CIRIA (2001), Control of Water Pollution from Construction Sites (C532) [Online] Available at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C532 [Accessed: 27/01/2025].
[23] CIRIA (2015) The SuDS Manual (C753) [Online] Available at:
https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C753 [Accessed 27/01/2025].
[24] Forestry Commission (2011). Forests and Water. UK Forestry Standard Guidelines. [Online] Available at:
https://cdn.forestresearch.gov.uk/2006/03/ukfs_water_fcgl007.pdf [Accessed 27/01/2025].
[25] Forestry Commission (2017). The UK Forestry Standard. [Online] Available at:
https://www.forestresearch.gov.uk/publications/the-uk-forestry-standard-2017/ [Accessed: 27/01/2025].
[26] Forestry Commission (2019). Managing forest operations to protect the water environment. [Online] Available at: https://cdn.forestresearch.gov.uk/2025/01/FCPG025B-WEB-compressed.pdf [Accessed 27/01/2025].

12.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

12.3.1 Scope of Assessment

The key issues for the assessment of potential hydrological effects relating to the Development include both short-term (construction and decommissioning) and long-term (operation) effects.

Short-term effects arising from the construction an decommissioning phases such as:

- Chemical pollution and sedimentation of watercourses and the wider hydrological environment as a result of construction works;
- Impediments to watercourse and near-surface water flow from turbine foundations and shallow excavation works, including changes in soil and peat interflow patterns;
- Potential changes to quality and / or quantity of Private Water Supplies (PWS) or Public Water Supplies (PuWS);
- Potential effects on the hydrological function of groundwater dependent terrestrial ecosystems (GWDTEs);
- Potential changes to the groundwater body;
- Acidification of watercourses as a result of construction works and related tree felling;
- Increased run-off and flood risk from increased hardstanding including access tracks; and
- Compaction of soils and superficial deposits and reduction in ability of such deposits to store water.

Long-term effects arising from the operational phase potentially include:

- Increased run-off and flood risk from increased hardstanding including permanent access tracks; and
- Severance or reduced quantity of water supplying PWS.

The key sensitive receptors are considered to be:

- Surface water watercourses hydrologically connected designated receptors such as the River Spey Special Area of Conservation (SAC);
- Groundwater receptors;
- Near-surface water:
- PWS; and
- PuWS.

Effects during construction, operation and decommissioning have been assessed, as well as potential cumulative effects.

12.3.2 Elements Scoped Out of Assessment

The following effects are scoped out of the assessment:

- Groundwater Dependent Terrestrial Ecosystems (GWDTEs) – none were identified on Site; and
- Peat slide risk on watercourses – peat probing showed only shallow peat was recorded on site, as per TA A12.1.

12.3.3 Study Area

The hydrology and hydrogeology study area (‘the Core Study Area’) is defined by the Planning Application boundary and is shown in Figure 12.1. A study area of 2 km from the Core Study Area has been defined to assess the potential effects on PWS (‘the PWS Study Area’), and a wider study area of 10 km form the Core Study Area to assess potential effects on the downstream water environment (‘the Wider Study Area’). All three study areas are shown in Figure 12.1. At distances greater than 10 km within upland catchments, it is considered the Development is unlikely to contribute to a hydrological effect, in terms of chemical or sedimentation effects, due to dilution and attenuation of potentially polluting chemicals.

12.3.4 Baseline Survey Methodology

A desk-based assessment, consultation, and site walkover have been conducted to inform the hydrology and hydrogeology assessment.

12.3.5 Desk-based assessment

The desk-based assessment included:

- Identification of watercourses, surface water catchments and springs;
- Identification of underlying geology and hydrogeology and connectivity to the Development;
- Assessment of topography and slope to inform drainage patterns;
- Collation of data provided through consultation, including details on PWS and their sources; and
- Assessment of flood risk data and mapping.

The following sources of information were used to inform the desk-based assessment:

- The Ordnance Survey (OS) 1:50,000 (Digital);
- OS 1:25,000 Map (Digital);
- National River Flow Archive (NRFA)[27];
- SEPA Flood Map 2025[28];
- Meteorological Office Rainfall Data[29];
- Scotland's Environment web-based maps[30]; and
- The British Geological Survey (BGS) GeoIndex onshore geology viewer[31].

12.3.6 Consultation

In addition to the Scoping consultation outlined in Section 12.1.1. The following consultees were contacted to inform this assessment:

- Moray Council Environment Health Officer (EHO) via email to obtain information on registered PWS within the PWS Study Area; and
- Residents and owners of properties which are identified as being supplied by a PWS to obtain information on the source and supply of the PWS.

12.3.7 Site Walkover

A site walkover was conducted on 11th February 2025 to visually inspect watercourses, surface water features, obtain an understanding of the local topography and drainage patterns and to ground-truth the information reviewed and collated in the desk-based assessment.

The site walkover focussed on hydrological receptors within the Core Study Area and, specifically, surface hydrology and PWS. The findings of the site walkover are detailed in Section 12.4.1.

Properties identified as being supplied by a PWS were visited on 11th February 2025. The PWS site visit was conducted to confirm the information provided by the Moray Council EHO.

12.3.8 Methodology for the Assessment of Effects

The significance of the potential effects of the Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect.

[27] Centre for Ecology and Hydrology (undated) National River Flow Archive [Online] Available at: https://nrfa.ceh.ac.uk/data?gad_source=1&gclid=CjwKCAiAneK8BhAVEiwAoy2HYYpgf0dYLWsefVxpqnc7znvNVq4F2T_goJ9do0WxrQWq2Q3ksL8zRhoCljsQAvD_BwE [Accessed 28/01/2025].
[28] SEPA (2019) Flood Maps [Online] Available at: https://map.sepa.org.uk/floodmaps [Accessed 28/01/2025]
[29] Met Office (2019) Climate Data [Online] Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages [Accessed 28/01/2025].
[30] Scotland's Environment (n.d.) [Online] Available at: https://www.environment.gov.scot/legal/terms-and-conditions/ [Accessed: 28/01/2025]
[31] BGS (2019) GeoIndex Onshore [Online] Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed 28/01/2025].

The methodology outlined in Sections 12.3.9.1 to 12.3.9.3 has been developed by the authors of this chapter in consultation with SEPA, NatureScot, Marine Scotland, Forestry and Land Scotland and various Councils across Scotland. The assessment is based on a source-pathway-receptor methodology, where the sensitivity of the receptors and the magnitude of potential change upon those receptors identified within the study areas outlined in Section 12.3.3.

12.3.8.1 Sensitivity of Receptors

The sensitivity of the baseline conditions – including the importance of environmental features on or near to the Site, or the sensitivity of potentially affected receptors – has been assessed in line with best practice guidance, legislation, statutory designation assessment guidance and / or professional judgement. A framework for this is set out in Table 12.2.

Table 12.2 Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	• A large, medium or small waterbody with a SEPA water quality classification of 'High'. • The hydrological receptor is used for recreational use (e.g. bathing waters). • The hydrological receptor and downstream environment has no capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics / natural processes. • Local groundwater constitutes a valuable resource because of its high quality and yield. Aquifer classified by the British Geological Survey (BGS) as 'highly productive aquifer' and is of regional importance. Statutorily designated nature conservation sites dependent on groundwater. • Groundwater vulnerability class 5: vulnerable to most pollutants, with rapid impact in many scenarios. • The hydrological receptor will support abstractions for public water supply or private water abstractions for the production of mass produced food and drinks. • The hydrological receptor will support abstractions for any public water supply, or private water abstractions which supply more than 25 people and / or 100 livestock (at any given point in the year) and / or is used for the mass-production of food and drinks. • Groundwater dependent terrestrial ecosystems (GWDTEs) which are classified by SEPA as "highly groundwater dependent" and are have no (<1 %) functional impairment by man-made influence (such as drainage or forestry). • The hydrological receptor is of high environmental importance or is designated as European or international importance, such as a Special Area of Conservation (SAC), Special Protections Areas (SPA) or Wetland of International Importance (Ramsar) with an Assessed condition of 'Favourable'. • The receptor acts as an active or future floodplain or other flood defence, in accordance with NPF4.
High	• Land use is highly sensitive to hydrological change (e.g. peat and blanket bog). • A large, medium or small waterbody with a SEPA water quality classification of 'Good'. • A Site of Special Scientific Interest (SSSI) or hydrological receptor is of high environmental importance designated as European or international importance, such as a SAC, SPA or Wetland of International Importance (Ramsar) with an Assessed condition of 'Unfavourable'. • The hydrological receptor and downstream environment has limited capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics / natural processes. • Aquifer of local importance. Groundwater body is classified by the BGS as a 'moderately productive aquifer', with moderate yield from secondary fractures and near-surface weathering. Exploitation of local groundwater is not far-reaching. Local areas of nature conservation known to be sensitive to groundwater effects. • Groundwater vulnerability class 4a – 4b: vulnerable to those pollutants not readily adsorbed or transformed. • The hydrological receptor supports abstractions for private water supply for up to 25 people and / or 100 livestock (at any given point in the year). • GWDTEs which are classified by SEPA as "highly groundwater dependent" have minor (1 - 25 %) functional impairment by manmade influence (such as drainage or forestry). • The hydrological receptor is designated as national environmental importance, such as a SSSI and National Nature Reserves (NNR). • The receptor is located within an active flood plain, in accordance with SPP 2014.
Medium	• Land use is moderately sensitive to hydrological change (e.g. commercial forestry).

Sensitivity of Receptor	Definition
	• A large, medium or small waterbody with a SEPA water quality classification of 'Moderate'. • The hydrological receptor and downstream environment will have moderate capacity to attenuate natural fluctuations in hydrochemistry but cannot absorb certain changes without fundamentally altering its baseline characteristics / natural processes. • Aquifer of limited value (less than local) and is classified by the BGS as a 'low productivity aquifer' as water quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not far-reaching. Local areas of nature conservation known to be sensitive to groundwater effects. • Groundwater vulnerability class 2-3: vulnerable to some pollutants. • GWDTEs / wetlands which are classified by SEPA as "highly groundwater dependent" but have moderate (25 % - 50 %) functional impairment by man-made influence (such as drainage or forestry). • GWDTEs which are classified by SEPA as "moderately groundwater dependent" have no functional impairment by man-made influence (such as drainage or forestry). • The hydrological receptor does not act as an active floodplain or other flood defence but is considered to provide some degree of natural flood management (e.g. peat soils). • The hydrological receptor is of local environmental importance (such as Local Nature Reserves (LNR)).
Low	• Land use not sensitive to change in hydrological regime (e.g. intensive grazing). • The hydrological receptor is not used for recreational use. • A large, medium or small waterbody with a SEPA water quality classification of 'Poor' or 'Bad'. • The hydrological receptor and downstream environment will have capacity to attenuate natural fluctuations in hydrochemistry but can absorb any changes without fundamentally altering its baseline characteristics / natural processes. • Poor groundwater quality and / or very low permeability make exploitation of groundwater unfeasible. Changes to groundwater not expected to affect local ecology. • Groundwater vulnerability class 1: vulnerable to conservative pollutants. • The hydrological receptor does not support abstractions for public water supply or private water abstractions. • GWDTEs which are classified by SEPA as "highly groundwater dependent" but have major (>50%) functional impairment by manmade influence (such as drainage or forestry). • GWDTEs which are classified by SEPA as "moderately groundwater dependent" but have functional impairment by man-made influence (such as drainage or forestry). • GWDTEs which are classified by SEPA as "highly or moderately groundwater dependent" but are ombrotrophic. • The hydrological receptor does not act as an active floodplain or other flood defence. • The hydrological receptor is not of regional, national or international environmental importance. • The hydrological receptor is not designated for supporting freshwater ecological interest.
Negligible	The receptor is resistant to change and is of little environmental value.

12.3.8.2 Magnitude of Effect

The magnitude of potential effects has been identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

The criteria for assessing the magnitude of an effect are provided in Table 12.3.

Table 12.3 Framework for Determining Magnitude of Effects

Magnitude of Effects	Definition
High	• A short or long-term major shift in hydrochemistry or hydrological conditions sufficient to negatively change the ecology of the receptor. This change will equate to a downgrading of a SEPA water quality classification by two classes e.g. from 'High' to 'Moderate'.

Magnitude of Effects	Definition
	• A sufficient material increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with NPF4). • A major (greater than 50 %) or total loss of a geological receptor or peat habitat site, or where there will be complete severance of a site such as to fundamentally affect the integrity of the site (e.g. blocking hydrological connectivity). • A major loss of (greater than 50 % of study area) or total loss of highly dependent and high value GWDTE, or where there will be complete hydrological severance which will fundamentally affect the integrity of the feature. • A major permanent or long-term negative change to groundwater quality or available yield. • A major permanent or long-term negative change to geological receptor, such as the alteration of pH or drying out of peat. • Changes to groundwater quality or water table level that will negatively alter local ecology or will lead to a groundwater flooding issue.
Medium	• A short or long term non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change will equate to a downgrading of a SEPA water quality classification by one class e.g. from 'High' to 'Good.' • A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with NPF4). • A loss of part (approximately 5 % to 50 %) of a geological receptor or peat habitat site, major severance, major effects to its integrity as a feature, or disturbance such that the value of the site will be affected, but could still function. • A loss of part (approximately 10 % to 50 % of study area) of a moderately dependent and moderate value GWDTE – significant hydrological severance affects the integrity of the feature, but it could still function. • Changes to the local groundwater regime that may slightly affect the use of the receptor. • The yield of existing PWS may be reduced or quality slightly deteriorated. • Fundamental negative changes to local habitats may occur, resulting in impaired functionality.
Low	• A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change will not result in a downgrading of the SEPA water quality classification. • A marginal increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP). • A detectable but non-material effect on the receptor (up to 5 %) or a moderate effect on its integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected. • A detectable effect on a GWDTE (loss of between 5 % - 10 % of study area) or a minor effect on a GWDTE's integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected. • Changes to groundwater quality, levels or yields do not represent a risk to existing baseline conditions or ecology.
Negligible[32]	• No perceptible changes to the baseline hydrochemistry or hydrological environment. • No change to the SEPA water quality classification. • No increase in the probability of flooding onsite and offsite. • A slight or negligible change from baseline condition of geological resources. • Change hardly discernible, approximating to a 'no change' in geological condition. • Minimal detectable effect on a GWDTE (between to 0.1 % - 5 % of study area) or no discernible effect on its integrity as a feature or its functionality.

[32] Negligible magnitude of change also includes magnitude of effects that are assessed as no change to the baseline scenario

12.3.8.3 Significance of Effect

The sensitivity of the asset and the magnitude of the predicted effects has been used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 12.4 summarises guideline criteria for assessing the significance of effects. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded in light grey in the table.

Table 12.4 Framework for Assessment of the Significance of Effects

Magnitude of Effect	**Sensitivity of Resource or Receptor**				
	Very High	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

An oCEMP (provided as Technical Appendix A4.2) accompanies the EIAR and forms part of the embedded Development design. The oCEMP comprises methods and works that are established and effective measures to which the Applicant will be committed through the development consent. Accordingly, the assessment of significance of effects of the Development are considered with the inclusion of the oCEMP as standard mitigation procedure and are based on good construction practice outlined in the aforementioned guidance documents in Sections 12.2.2 and 12.2.3.

The conclusions of the assessment, therefore, state whether the significance will be major, moderate, minor or negligible, before appropriate mitigation (beyond measures specified in the oCEMP) has been implemented. This assessment relies on professional judgement to ensure that the effects are appropriately assessed. Residual effects are assessed on the same basis, but when also considering any additional mitigation proposed.

A residual effect is considered to be a likely significant effect in accordance with the EIA Regulations if assessed as moderate or major following the preceding methodology.

12.3.9 Assessment Limitations

All data considered necessary to identify and assess the potential significant effects resulting from the Development was available and was used in the assessment reported in this Chapter.

12.3.10 Embedded Measures

12.3.10.1 oCEMP

Embedded control measures are set out within the oCEMP (provided as TA A4.2) which sets out specific measures which relate to this Development. They comprise good practice methods and works that are established and effective measures to which the Developer will be committed through the development consent.

Although the oCEMP is draft and will evolve to take account of consultee feedback and detailed design, there is sufficient confidence in the effectiveness of the measures set out in the oCEMP for them to be treated as part of the Development for the purposes of this assessment. Measures outlined in the oCEMP will be adopted and incorporated into a single working document to be agreed with statutory consultees and the planning authority following consent by way of an appropriately worded planning condition. For ease of reference through this Chapter, reference to specific sections in the oCEMP, detailing the appropriate embedded mitigation measures, are provided.

Accordingly, the identification of likely significant effects from the Development is considered following implementation of the measures in TA A4.2: oCEMP.

The oCEMP describes water management measures to control surface water run-off and drain hardstanding and other structures during the construction and operation of the Development. Additionally, a Pollution Prevention Plan (PPP) will be implemented for the Development. The measures discussed in the oCEMP are inherently part of all wind farm development design and should be treated as embedded mitigation.

This approach has withstood legal review on all hydrology EIA work undertaken by Raincloud and has received positive comments from consultees for proposing appropriate embedded mitigation on a project specific basis.

The oCEMP incorporates measures outlined in Scottish Water's List of Precautions for Drinking Water and Assets – Wind Farms EdE guidance.

The requirement for access tracks crossing watercourses has been minimised during the design stage, by utilising existing forestry tracks where possible.

12.3.10.2 Buffers

A buffer distance of 50 m has been established between watercourses and Development infrastructure (except for necessary track crossings of watercourses).

A buffer zone distance of 250 m has been established from turbine bases and groundwater abstractions via boreholes, in accordance with LUPS-GU31. Beyond this, the separation of construction groundworks from watercourses has been maximised.

The 250 m buffer from turbine bases and boreholes, and the 50 m buffer zone of watercourses, in conjunction with the measures set out in the oCEMP will be sufficient to avoid potential effects on the hydrological and hydrogeological resource, as their effectiveness has been demonstrated on several wind farm construction sites for which Raincloud Consulting Ltd (the authors of this chapter) have provided technical advice.

The existing network of access tracks which serve the forestry operations within Teindland Forest have been utilised, where possible, limiting the requirement to disturb peaty soils and limit felling operations to access the Development. Where new access tracks are required they have been designed to avoid crossing watercourses, where possible. Further description of this is provided in TA A4.1: Forestry and in Section 6 of TA A4.2: oCEMP.

Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a PPP. The Development will be subject to a Construction Site Licence, for which a site-specific PPP and incident response plan will be detailed by the Construction Contractor. The PPP will be incorporated into a detailed CEMP, to be agreed with SEPA prior to the construction phase.

The PPP will set out measures to be employed to avoid or mitigate potential effects for all phases of the Development and will also include an Incident Plan to be followed should a pollution event occur. This plan will be produced following consultation and agreement with SEPA and all appropriate personnel working on the construction site will be trained in its use. The Construction Project Manager will have specific responsibility for implementation of the PPP.

Method statements will also be applied, which will follow the principles laid out in relevant SEPA Pollution Prevention Guidelines.

12.3.10.3 Decommissioning Environmental Management

As for construction, the activities during decommissioning would be controlled by a PPP which would be incorporated into a detailed Decommissioning Environmental Management Plan (DEMP), which would cover the same activities as the CEMP and be based on good practice at the time of decommissioning.

12.4 BASELINE CONDITIONS

12.4.1 Topography and Land Use

The Core Study Area is located within commercial forestry at Teindland Woods, located on and north of Teindland Hill. A further description is provided in Chapter 6: Ecology.

The Core Study Area has a topographical high of 253 m Above Ordnance Datum (AOD) (Findlay's Seat) located on the western side of the Core Study Area. The Core Study Area slopes from its centre out to its extremities where the topographical low is 65 m AOD located at Orton in the southeastern corner.

There are a number of existing tracks within the Core Study Area associated with the forestry plantation, as shown in Image 12.1.

Image 12.1: Existing forestry tracks (left) NGR 328780 855161 (right) NGR 328142 853219

The location of the BESS compound is located within an area of existing felling, as shown in Image 12.2.

Image 12.2: Proposed BESS compound area NGR 328780 853219

Felling has also occurred on the border of the existing access track located in the western section of the Core Study Area, as shown in Image 12.3.

Image 12.3: Tree felling on Site NGR 344365 397581

In addition, extensive felling has occurred north of the Speyburn Distillery approximately 2 km south of wind turbine 12, as shown in Image 12.4.

Image 12.4: Tree felling on north of Speyburn Distillery (left) NGR 327229 850493 (right) NGR 327435 850294

12.4.2 Climate

The closest SEPA gauging station[33] to the Development is on the River Spey at Boat o Brig (Station 8006), which is located at National Grid reference NJ31851, approximately 900 m southeast of the Core Study Area.

The station is located at an elevation 43 m AOD, downstream of the Burn of Garbity which is located within the Core Study Area. The Average Annual Rainfall (SAAR 1961 – 1990) is recorded at 1,119 mm across the Core Study Area.

Precipitation data from the Meteorological Office is reviewed for the nearest climate station to the Site, which is located at Keith, approximately 12.1 km east of the Core Study Area. The climate station at Keith provides the average annual rainfall in the period 1991 - 2020 as 888.75 mm.

Table 12.5 summarises the average annual rainfall for the Keith climate station.

Table 12.5 Average rainfall for Keith climate station.

Month	Jan	Feb	Mar	Ap	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average precipitation (mm)	62.57	55.86	54.92	59.85	61.6	91.55	73.21	81.19	83.61	109.5	89.72	65.17

12.4.3 Surface Hydrology

The Core Study Area lies within the primary catchment of the River Spey.

A number of named and unnamed watercourses rise within the Core Study Area and flow south and west and ultimately discharge into the River Spey. The Whities Stripe flows into the Sauchenbush Burn, Gawrie Burn and Suachenbush Burn, connects to the Millstoneford Burn and then Broad Burn before joining the River Spey, approximately 2 km south of the Site. The Burn of Sourden flows south into the River Spey, approximately 1.1 km south of the Site. The Feith Burn flows south into the Burn of Garbity before joining the River Spey, approximately 630 m south of the Site. The Henderson's Well flows east into the Carra Burn which connects into the River Spey, approximately 2.9 km east of the Site. An unnamed watercourse flows east into the Mannoch Burn which connects to the River Spey, approximately 2.7 km east of the Site. The Cushley Burn flows north into the Red Burn which flows east into the River Spey, approximately 3 km east of the Site.

The Core Study Area catchment areas are shown on Figure 12.2 and summarised in Table 12.6.

Table 12.6 Core Study Area catchments

Primary Catchment	Catchment	Sub-catchment	Additional catchments
River Spey	Broad Burn	Millstonefond Burn	Gawrie Burn
			Sauchenbush Burn
			Whities Stripe
			Wells Stripe
		Small Burn	
	Burn of Crofts	n/a	n/a
	Burn of Sourden	n/a	n/a
	Burn of Garbity	Feith Burn	n/a
		Brandoch Burn	
	Carra Burn		n/a

[33] SEPA (2020) Water Level Data [Online] Available at: https://waterlevels.sepa.org.uk/Map [Accessed 28/01/2025].

Primary Catchment	Catchment	Sub-catchment	Additional catchments
	Red Burn	Mannoch Burn	n/a
		Sprot Burn	
		Sauchen Burn	
		Cushlev Burn	
		Commissary Burn	

The Broad Burn and River Spey have a SEPA overall classification of 'Good' while the Red Burn has a SEPA overall classification of 'Moderate'. Smaller watercourse which do not connect to either the Broad Burn or Red Burn are not covered in the SEPA classifications.

12.4.4 Hydrogeology

The BGS groundwater vulnerability[34] for the core study area ranges between 3 to 5 defining the underlying rocks as vulnerable to pollutants not readily absorbed.

Groundwater vulnerability classes range from 1 to 5, with 5 being most vulnerable. Class 4 is subdivided into 4a, 4b, 4c and 4d. It is the hydrogeological characteristics within the pathway rather than the 'importance' of a particular aquifer that results in the final vulnerability classification. The methodology behind the classification assumes that where contaminants move through unsaturated fractured bedrock, no attenuation of pollutants can take place. Large parts of Scotland show areas of Classes 4 and 5, reflecting the widespread occurrence of rocks dominated by facture flow. Rocks which are not exposed at the surface and are overlain by superficial deposits have a reduced potential for attenuation of contaminants.

Table 12.7 shows the maximum peat depth at each turbine location and demonstrates shallow peat depths across Development Areas, as shown in Drawing No 161624/9103 in TA A12.1.

Table 12.7: Peat Depth Data

Turbine number	Location (Eastings & Northings)	Max Peat Depth (m)	Max Peat Depth within 150 m (m)
1	E 328975 N 855376	0.20	0.35
2	E 328542 N 854715	0.20	0.20
3	E 329214 N 853690	0.20	0.20
4	E 329575 N 853251	0.30	0.20
5	E 328597 N 853271	0.10	0.20
6	E 328301 N 853740	0.10	0.50
7	E 327650 N 853876	0.60	0.60
8	E 327475 N 854326	0.40	0.60
9	E 327961 N 853139	0.40	0.70
10	E 328775 N 852676	0.30	0.35
11	E 328138 N 852710	0.30	0.40
12	E 328350 N 852176	0.20	0.40

12.4.4.1 Borehole Records

The nearest BGS borehole is located at Brown Muir (BGS ID: 19210238, BGS reference: NJ25SE3), located approximately 1.51 km west of the Core Study Area. This identifies no ground water level to a depth of 1.75 m below ground level where the borehole terminated. The second nearest BGS (BGS ID: 624624, BGS reference: NJ24NE675/10), located

[34] BGS (2015) Groundwater Vulnerability (Scotland) GIS dataset, Version 2 [Online] Available at: http://nora.nerc.ac.uk/id/eprint/509618/1/OR15002.pdf [Accessed: 11/03/2025].

approximately 1.9 km south of the Core Study Area identifies no ground water level to a depth of approximately 7.6 m below ground level, where the borehole terminated.

12.4.5 Designated Hydrological Receptors

The statutory designated sites relating to water within the Wider Study Area were identified through the use of NatureScot[35] and SEPA GIS[36] datasets.

The Statutory designations that are considered hydrologically connected to the Development are listed in Table 12.8, below. Statutory designations which were identified within the Wider Study Area but were deemed not hydrologically connected to the Development are listed in Table 12.9, below, and have been scoped out of further assessment.

12.4.6 Private and Public Water Supplies

12.4.6.1 Public Water Supplies

One PuWS, a Scottish Water abstraction and Drinking Water Protected Area (DWPA) is located partially within the Core Study Area. The DWPA is associated to the Spey Scheme (Badentinan) Water Treatment Works (WTW). Scottish Water provided a groundwater protection zone map associated with the Spey Scheme (Badentinan) Water Treatment Works (WTW). As shown in Figure 12.3, only one turbine and associated track (WTG 2), is located within the groundwater protection zone identified by Scottish Water.

The Badentinan WTW is located approximately 1.2 km north of the construction compound and draws water from wellfields; treatment is provided by membrane filtration units which produce a 'very high quality final water'[37]. The raw water supplying Badentinan WTW is abstracted from the Dipple North and South well fields (approximately 6 km from the works south of Mosstodloch). There are 36 wells in total in river gravels adjacent to the banks of the River Spey. Raw water is pumped via two 450 mm diameter ductile iron mains to the existing treatment works. Existing treatment comprised a raw water tank, lime dosing to raise pH, chloramination disinfection and chlorine contact[38].

12.4.6.2 Private Water Supplies

A total of 17 PWS were identified by Moray Council within the PWS Study Area, as shown in Figure 12.4 and Table 12.10.

No PWS are located within 1 km of any Development infrastructure. A list of PWS identified as the closest receptors to infrastructure (> 1 km) is provided in Table 12.10.

[35] NatureScot Open Data [Online] Available at: https://opendata.nature.scot/ [Accessed 16/04/2025].
[36] SEPA (2019) Datasets [Online] Available at: https://informatics.sepa.org.uk/WaterClassificationHub/ [Accessed 28/01/2025].
[37] Drinking Water Quality Register for Scotland: Technical Inspection of Scottish Water Treatment Works Spey Badentinan WTW, Moray 11 March 2014
[38] Water Treatment and Supply: *Badentinan WTW improved water treatment in the Elgin and east coastal area*

Table 12.8 Statutory Designated Sites hydrologically connected to the Development (within 10 km Study Area)

Designation	Approximate Distance from the Development	Qualifying Interest	Hydrologically Connected to the Development
River Spey SSSI	650 m (Southeast)	Atlantic Salmon (salmo Salar), otter (Lutra lutra), sea lamprey (Petromyzon marinus) and freshwater pearl mussel (Margaritifera margaritifera) Latest Assessed Condition[39] Atlantic Salmon – unfavourable recovering (2007) Otter – favourable maintained (2017) Freshwater pearl mussel – unfavourable declining (2015) Sea Lamprey – favourable maintained (2014)	Yes – Multiple watercourses located on the Site discharge into the River Spey
Teindland Quarry SSSI	Within the Site boundary	Quaternary of Scotland Latest Assessed Condition[40] – favourable maintained (2005)	Yes – Located within the Site's boundary
River Spey SAC	650 m (Southeast)	Atlantic Salmon, otter, sea lamprey and freshwater pearl mussel. Latest Assessed Condition[41] Atlantic Salmon – unfavourable recovering (2015) Otter – favourable maintained (2015) Freshwater pearl mussel – unfavourable declining (2015) Sea Lamprey – Favourable maintained (2014)	Yes - Multiple watercourses located on the Site discharge into the River Spey
Lower River Spey Bay SAC	8.5 km (North)	Atlantic Salmon (salmo Salar), otter (Lutra lutra), sea lamprey (Petromyzon marinus), freshwater pearl mussel (Margaritifera margaritifera), Alder woodland on floodplains and Coastal shingle vegetation outside the reach of waves. Latest assessed conditions[42] Alder woodland on floodplains – unfavourable no change (2015) Coastal shingle vegetation outside the reach of waves – favourable declining (2014)	Yes - located downstream of the Development, linked to River Spey.

[39] NatureScot, River Spey SSSI [Online] Available at: https://sitelink.nature.scot/site/1699 [Accessed 29/01/2025].
[40] NatureScot, Teindland Quarry SSSI [Online] Available at: https://sitelink.nature.scot/site/1526 [Accessed 29/01/2025].
[41] NatureScot, River Spey SSSI [Online] Available at: https://sitelink.nature.scot/site/1699 [Accessed 29/01/2025].
[42] NatureScot,

Table 12.9 Statutory Designated Sites not hydrologically connected to the Development (within 10 km Study Area)

Designation	Approximate Distance from the Development	Qualifying Interest	Hydrologically Connected to the Development
Gull Nest SSSI	4.2 km (West)	Blanket bog Latest Assessed Condition[43] – favourable maintained (2012)	No – separated by the Broad Burn. Outside the Core Study Area watershed.
Coleburn Pasture SSSI	2.4 km (West)	Lowland acid grassland Latest Assessed Condition[44] – favourable maintained (2010)	No – On the opposite side of the Brown Muir peak, outside the Site's catchment. Upstream of the Development
Scaat Craig SSSI	4.2 km (West)	Silurian-Devonian Chordata Latest Assessed Condition[45] – favourable maintained (2010)	No - On the opposite side of the Brown Muir peak, outside the Site's catchment. Upstream of the Development
Buinach and Glenlatterach SSSI	7.3 km (West)	Lowland dry heath, Upland birch woodland and upland oak woodland Latest Assessed Condition[46] Lowland dry heath – unfavourable declining (2009) Upland birch woodland – unfavourable declining (2015) Upland oak woodland – favourable maintained (2005)	No – Separated by Glen Burn, Granty Burn and Broad Burn. Outside the Core Study Area watershed
Loch Oire SSSI	3.5 km (North)	Mesotropic loch Latest Assessed Condition[47] Unfavourable Declining (2024)	No – Outside the Core Study Area watershed
Dipple Brae SSSI	3.0 km (Northeast)	Silurian – Devonian Chordata Latest Assessed Condition[48] – favourable maintained (2009)	No - Outside the Core Study Area watershed
Tynet Burn SSSI	9.4 km (Northeast)	Non-marine Devonian and Silurian – Devonian Chordata Latest Assessed Condition[49] – favourable maintained (both) (2016 and 2012)	No – located on the opposite side of the River Spey

[43] NatureScot, Gull Nest SSSI [Online] Available at: https://sitelink.nature.scot/site/752 [Accessed 29/01/2025]
[44] NatureScot, Coleburn Pasture SSSI [Online] Available at: https://sitelink.nature.scot/site/391 [Accessed 29/01/2025]
[45] NatureScot, Scaat Craig SSSI [Online] Available at: https://sitelink.nature.scot/site/391 [Accessed 29/01/2025]
[46] NatureScot, Buinach and Glenatterach SSSI [Online] Available at: https://sitelink.nature.scot/site/270 [Accessed 29/01/2025]
[47] NatureScot, Loch Oire SSSI [Online] Available at: https://sitelink.nature.scot/site/1043 [Accessed 29/01/2025]
[48] NatureScot, Dipple Brae SSSI [Online] Available at: https://sitelink.nature.scot/site/516 [Accessed 29/01/2025]
[49] NatureScot, Tynet Burn SSSI [Online] Available at: https://sitelink.nature.scot/site/1577 [Accessed 29/01/2025]

Designation	Approximate Distance from the Development	Qualifying Interest	Hydrologically Connected to the Development
Spey Bay / Lower River Spey SSSI	8.6 km (North) / 4.7 km (Northeast)	Coastal Geomorphology of Scotland, Dingy Skipper butterfly (Erynnis tages), Hydromorphological mire range, Saltmarsh, Shingle, Small blue butterfly (Cupido minimus), Vascular plant assemblage and wet woodland Latest Assessed Condition[50] Coastal geomorphology of Scotland – unfavourable no change (2005) Dingy skipper butterfly – favourable maintained (2016) Hydromorphological mire range – unfavourable declining (2018) Saltmarsh – favourable maintained (2015) Shingle – favourable maintained (2005) Small blue butterfly – favourable maintained (2016) Vascular plant assemblage – favourable maintained (2016) Wet woodland – unfavourable no change (2015)	No – located downstream of the Development.

[50] NatureScot, Spey Bay SSSI [Online] Available at: https://sitelink.nature.scot/site/1461 [Accessed 29/01/2025]

Table 12.10 Private Water Supplies

Reference	Type	Location	Address	Property visited / visit notes	Requires Assessment?
06/00122/SPRING	Spring	Eastings 326993 Northings 856284	Source: Teindland Mains Elgin Moray	No	**No** Source is located outside the Core Study Area watershed catchments. Source located 2.1 km to the nearest Development infrastructure.
07/00050/WELL	Well	Eastings 329975 Northings 854758	Source: Carraburn, Orton	Yes Resident confirmed source is a borehole not a well. Groundwater abstracted from approximately 150 m deep.	**No** Source is located outside the Core Study Area watershed catchments. Source located 1.1 km to the nearest Development infrastructure.
07/00054/BOREHO	Borehole	Eastings 332829 Northings 853542	Source: Cairnty Cottage	No	**No** Source is located outside the Core Study Area watershed catchments and on the other side of the River Spey / Wood Pool. Source located 2 km to the nearest Development infrastructure.
13/00001/BOREHO	Borehole	Eastings 332509 Northings 852594	Source: Cairnty House	No	**No** Source is located outside the Core Study Area watershed catchments and on the other side of the River Spey / Wood Pool. Source located 1.7 km to the nearest Development infrastructure.
07/00240/SPRING	Spring	Eastings 332017 Northings 851858	Source: Delfur	No	**No** Source is located outside the Core Study Area watershed catchments and on the other side of the River Spey / Wood Pool. Source located 1.6 km to the nearest Development infrastructure.
16/00002/SPRING	Spring	Eastings 32914 Northings 850012	Source: Aikenway Farmhouse	No	**No** Source is located outside the Core Study Area watershed catchments. Source located 2.2 km to the nearest Development infrastructure.
13/00003/SPRING	Spring	Eastings 326812 Northings 850860	Source: Small Rothes	No	**No** Source is located outside the Core Study Area watershed catchments. Source located 2 km to the nearest Development infrastructure.

Reference	Type	Location	Address	Property visited / visit notes	Requires Assessment?
23/00013/BOREHO	Borehole	Eastings 327385 Northings 851541	Source: Smallburn House	Yes – resident confirmed source is a borehole	**No** Source is located outside the Core Study Area watershed catchments. Source located 1.1 km to the nearest Development infrastructure.
06/00153/SPRING	Spring	Eastings 327352 Northings 851751	Source: Sauchenbush	Yes – resident confirmed source is a spring.	**No** Source located 1 km to the nearest Development infrastructure.
06/00150/SPRING	Spring	Eastings 327273 Northings 851847	Source: Auchenroath	No No property located at the location	**No** Source located 1 km to the nearest Development infrastructure.
06/00005/SPRING	Spring	Eastings 326580 Northings 851360	Source: Glen of Rothes	No	**No** Source located 1.9 km to the nearest Development infrastructure.
06/00146/SPRING	Spring	Eastings 325859 Northings 851699	Source: Pitcraigie	No	**No** Source is located outside the Core Study Area watershed catchments. Source located 1.9 km to the nearest Development infrastructure.
06/00149/SPRING	Spring	Eastings 326937 Northings 852559 and Eastings 326759 Northings 852699	Source: Barluack	No	**No** Sources are located 1.2 km and 1.3 km to the nearest Development infrastructure.
06/00148/SPRING	Spring	Eastings 325350 Northings 852280 and Eastings 325316 Northings 852327	Source: Brylach	No	**No** Sources are located outside the Core Study Area watershed catchments. Sources are located 2.8 km to the nearest Development infrastructure.
06/00155/SPRING	Spring	Eastings 325593 Northings 853095	Source: Birchfield	No	**No** Source is located outside the Core Study Area watershed catchments. Source located 2.2 km to the nearest Development infrastructure.

SEPA provided a list of registered abstractions; no abstractions are located within 1 km of any Development infrastructure. The nearest abstraction to the Development is located at the Orton Estate, approximately 1.58 km northeast of the BESS compound.

The closest abstraction to turbine infrastructure is the Rothes Malting borehole abstraction, located approximately 1.9 km south of the nearest turbine.

12.4.7 Flood Risk

12.4.7.1 Fluvial sources

The SEPA Flood Map indicates only the northern boundary of the Site is located within the High, Medium, Low likelihood fluvial scenarios and future medium likelihood scenario where the Site boundary borders the Red Burn.

However, the Development infrastructure is located outside all fluvial return periods and it is therefore scoped out of this assessment.

12.4.7.2 Pluvial sources

The SEPA Flood Map indicates there are isolated areas of surface water flood risk. Turbines will have as minimal footprint as possible to reduce potential runoff generated. A drainage system will be incorporated as part of the Development to manage runoff generated.

Therefore pluvial flooding has been scoped out of this assessment.

12.4.7.3 Tidal sources

The Site is located at a minimum elevation 65 m AOD and is located greater than 8 km from where the River Spey is tidally influenced. Therefore tidal flooding has been scoped out of this assessment.

12.4.7.4 Groundwater sources

The Core Study Area is located on elevated terrain and therefore groundwater is unlikely to rise significantly to emerge at the surface. The Development will be located at ground level or slightly raised and therefore is unlikely to interact or impact groundwater levels.

Therefore groundwater flooding has been scoped out of this assessment.

12.4.7.5 Reservoir and artificial sources

The northern boundary of the Site is shown to be located within the SEPA Reservoir mapping associated to the Badentinan Reservoir.

The Development infrastructure associated to the Site is located outside the Badentinan Reservoir flood extents and therefore reservoir flooding has been scoped out of this assessment.

12.4.7.6 Sewer and drainage sources

The Development is located within a rural area and does not require a sewer connection and has therefore been scoped out of this assessment.

12.5 SENSITIVITY OF RECEPTORS

The sensitivities of the identified receptors and their relationship to the potential effects from the construction of the Development, are outlined below in Table 12.11.

Table 12.11 Sensitivity of Receptors

Receptor	Potential Effects	Sensitivity	Sensitivity Description
Surface watercourses	Increased run-off, erosion and sedimentation, stream flow impediments and pollution as a result of construction groundworks and chemical handling and storage.	Very High	A large, medium or small waterbody with a SEPA water quality classification of 'High' or 'Good'. Surface watercourses are hydrologically linked to designated hydrological receptors (SSSI and SAC) downstream of the Development.
Groundwater	Pollution as a result of erosion and sedimentation from construction activities and uncontained spills from chemical handling and storage.	High	Groundwater body is classified as 'low quality aquifer'. Exploitation of local groundwater is not far reaching. Local areas of nature conservation are thought to be sensitive to groundwater effects. Groundwater vulnerability is classified as 5a to 4a (high).
Near-surface water	Diversion of near-surface flow as a result of track construction and the installation of turbine foundation / hardstanding	High	Supports peaty soils
PWS	Pollution as a result of track upgrades and contained spills from vehicles, and chemical handing / storage. Drying out or changes to quantity as a result of upgrades to access track	High	The hydrological receptors support abstractions for private water supply for up to 25 people and / or 100 livestock (at any given point in the year).
PuWS	Pollution as a result of track upgrades and contained spills from vehicles, and chemical handing / storage. Drying out or changes to quantity as a result of upgrades to access track	Very High	The hydrological receptor will support abstractions for public water supply.

12.6 ASSESSMENT OF POTENTIAL EFFECTS

The potential effects of the Development on hydrological receptors have been considered for the construction, operation and decommissioning phases. Effects occurring during construction and decommissioning are considered to be short-term effects, with those occurring as a result of the operational phase of the Development being considered to be long term effects.

12.6.1 Potential Construction Effects

The nature and magnitude of effects that could result from the following construction activities, described further in Chapter 4: Development Description, are assessed in the following paragraphs:

- The upgrade of both existing access tracks from the operational forestry for the construction of the Development; and
- Construction of new access tracks, turbines and associated infrastructure, watercourse crossings, hardstandings, substation, BESS compound and temporary construction compounds for the Development.

12.6.1.1 Chemical Pollution

Potential effects from construction are a risk management issue, with effects being assessed should the risk be realised. Should the Development proceed as described in Chapter 4: Development Description, i.e., with no spills, there would be no effects.

Potential risks include the spillage or leakage of chemicals, fresh concrete, foul water, fuel or oil, during use or storage onsite. These pollutants have the potential to adversely affect soils, subsurface water quality, peat, surface water quality, and groundwater; and hence effects on the biodiversity of receiving watercourses.

The transportation, storage and use of potentially polluting chemicals at a wind farm is limited. The greatest use of such chemicals is of fresh concrete, used in foundations and hardstandings, which may be created on-site or transported onto site.

Surface Hydrology and Designated Hydrological Receptors.

Watercourses could be at risk from a pollution incident during construction. Surface watercourses and surface water bodies are considered to be of High sensitivity.

Buffer distances between proposed construction works and watercourses have been implemented to reduce the potential for chemical pollutants to be transferred to the water environment. A minimum 50 m buffer for natural watercourses from infrastructure (excluding watercourse crossings and access tracks) has been adopted.

The closest working area to a watercourse is 65 m away from wind turbine 2.

Micro-siting of infrastructure will not encroach within the 50 m buffer except for access tracks and crossings, as detailed in Chapter 4: Development Description.

Construction good practice methods, as outlined in Section 6 of TA A4.2: oCEMP, include the use of impermeable membranes and bunding of the construction compound which will safeguard water quality.

Measures such as absorbent spill pads / kits and other measures highlighted within the oCEMP, found in Section 6.7 of TA A4.2, will effectively limit the uncontained release of chemicals to minor fugitive releases. These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance. Routine training practices such as staff inductions and toolbox talks will be conducted throughout the construction phase of the Development. Information regarding staff training is detailed in the oCEMP.

Therefore, given the embedded measures detailed above, the magnitude of change on both watercourses and Designated Hydrological Receptors (High and Very High sensitivity) is considered to be Negligible. As the magnitude of change is negligible, and receptors range from High to Very High sensitivity, the effect of the Development on surface hydrology (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

Groundwater and Near Surface Water.

Pollutants coming into contact with bedrock also have the potential to indirectly alter the quality of the groundwater resource. pH and chemical alterations to groundwater are difficult to rectify due to the fractured nature of the rock and the lengthy attenuation and dispersal of chemicals.

As noted previously, due to the underlying hydrogeology consisting of a low productivity aquifer with small amounts of groundwater in the near surface weathered zone and secondary fractures, groundwater is unlikely to be present near the surface, meaning there is limited potential for pollutants to come into contact with groundwater.

Measures such as spill pads, impermeable geotextile membranes and measures described within the oCEMP (TA A4.2, Section 6.7) will effectively limit the uncontained release of chemicals to minor fugitive releases. Therefore, the magnitude of change on both groundwater, near surface water (High sensitivity) is considered to be Negligible. As the magnitude of change is Negligible, and receptors are of High sensitivity, the effects of the Development on groundwater and near surface water (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

Private Water Supplies

SEPA guidance states that the quality of some PWS within 100 m of excavations of less than 1 m depth could be affected by chemical pollution during laying of load bearing surfaces on the existing public road.

Other PWS at greater distances are less likely to influenced by chemical pollution due to dilution and attenuation over distance.

There are no evacuations of greater than 1 m within 1 km of private water supplies.

In the absence of specific mitigation the magnitude of change is considered to be negligible. Effects on PWS, of High sensitivity, have the potential to be of Negligible magnitude and therefore (in accordance with Table 12.4) of Minor significance. This is not significant in terms of the EIA Regulations.

12.6.1.2 Erosion and Sedimentation

Erosion and sedimentation can occur from excavations, ground disturbance and overburden stockpiling. Sediment entering watercourses has the potential to affect water quality, ecology and flood storage capacity.

Surface Hydrology and Designated Hydrological Receptors

Given the overland distance between construction areas and watercourses, as a result of the embedded buffers of watercourses, any silt or other materials carried by overland flow as a result of construction are likely to be entrained in vegetation and existing drainage ditches before reaching watercourses.

Where the buffers are encroached by upgraded tracks, improvements to the public road, new access tracks, hardstanding, and load bearing surfaces, good practice construction measures will effectively prevent sediment entering watercourses e.g. adjacent to the proposed construction compound and the load bearing surface east of Early Burn (public road). Measures such as check dams, silt traps, settlement lagoons and buffer strips will minimise sedimentation and erosion; further details of these measures are detailed in the oCEMP (Sections 6.5 and 6.6 of TA A4.2).

Other SuDS measures, such as the use of settlement lagoons, swales and interception bunds, will effectively prevent sediment entering watercourses via drainage ditches adjacent to access tracks. As such, there will be limited potential for sediment or erosion effects on watercourses in the Core Study Area, including the hydrology and water quality of onsite watercourses.

In addition, ditch blocking will be employed along heavily modified watercourses or ditches where the buffers are encroached to enhance the habitat and limit the potential of pollutants to be transferred to the wider hydrological network. Further details of these measures are found in Section 6.5 and 6.6 of TA A4.2.

As a result of the embedded mitigation detailed above, the magnitude of change on surface hydrology, including: watercourses (High sensitivity), and Designated Hydrological Receptors (Very High sensitivity), will be Negligible. As the magnitude of change is Negligible, and receptors range between High and Very High sensitivity, the effects of the Development on surface hydrology (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

Groundwater and Near Surface Water

Sediment also has the potential to change near surface water flow in superficial geology deposits and peaty soil characteristics by creating a physical barrier within naturally occurring drainage micropores. Sediment entering near-surface water in superficial deposits also has the potential to impact on groundwater quality within bedrock deposits /fissures.

Measures described in Section 6.7 of TA A4.2: oCEMP, such as impermeable ground membrane layers and bunded areas, will effectively prevent sediment entering sub-surface water in superficial deposits (and groundwater) and peat. For these reasons, the magnitude of change on groundwater and near surface water will be Negligible. As the magnitude of change is Negligible, and receptors are of High sensitivity, the residual effects of erosion and sedimentation of the Development on groundwater and near surface water (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

Private and Public Water Supplies

Measures detailed in Section 6.6 of TA A4.2: oCEMP, will reduce the potential for the mobilisation of sediment. Given the distance to to Development infrastructure the magnitude

of change is considered to be Negligible. Effects on PWS, of High sensitivity, have the potential to be of Negligible magnitude and therefore (in accordance with Table 12.4) of Minor residual significance. This is not significant in terms of the EIA Regulations.

Turbine 2 is located within the Badentinan groundwater risk zone. Measures outlined within the oCEMP, which include using wooden shuttering within the turbine base, quick blinding concrete for turbine bases and the use of a lined impermeable membrane within the foundation will limit the potential for concrete and other chemicals to enter the hydrological environment. To monitor the effectiveness of these measures, water quality monitoring will be conducted downstream of these measures, and the exact scope of the monitoring will be agreed with Scottish Water, in accordance with List of Precautions for Drinking Water and Assets – Wind Farms EdE.

With the embedded measures outlined within the oCEMP, the magnitude of change is considered to be negligible. Effects on Badentinan groundwater risk zone, of High sensitivity, have the potential to be of Negligible magnitude and therefore (in accordance with Table 12.4) of Minor residual significance. This is not significant in terms of the EIA Regulations.

12.6.1.3 Impediments to Surface Water Flow

Access tracks will only require the installation of five watercourse crossings across all sections of the Development, as shown in Appendix 12.1. Additionally, the use of the existing access track which serves the forestry operations has eliminated the requirement to upgrade existing watercourse crossings, therefore minimising the potential for impediment to flow.

The minimisation of the number of proposed watercourse crossings and the re-use of the existing watercourse crossings minimises one of the main activities that could give rise to impediment of flows. Additionally, measures described in Section 6.8 of TA A4.2: oCEMP, such as the use of wide bottomless-arched culverts, where appropriate, are likely to prevent impediments to flow being created.

Felling of trees can increase surface water run-off and cause impediments to river flow through accumulation and transfer of brash. Brash build up within watercourses has the potential to impede the passage of waterborne ecology and divert / concentrate flow to river banks. In the long-term, however, it is generally accepted that the removal of plantation forestry in proximity to watercourses can improve surface water conditions due to increased growth of bankside vegetation, improved ground level lighting and reduced potential for the introduction of impediments to flow.

It should be noted that the Core Study Area is an active commercial forestry site and debris was found in drainage ditches across the Core Study Area as shown in the baseline section of this report.

Measures described in Section 3.7 of TA A4.2: oCEMP, such as brash matting, not stockpiling brash and not allowing brash to block drainage ditches or enter watercourses, verified by visual inspections, further reduce the potential for this effect to occur.

Therefore, given the embedded mitigation, the magnitude of change on watercourses (High sensitivity) and Designated Hydrological Receptors (Very High sensitivity) is considered to be Negligible. As the magnitude of change is Negligible, and receptors range from High to Very High sensitivity, the effect of the Development on watercourses and Designated Hydrological Receptors (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

12.6.1.4 Changes in Groundwater Interflow Patterns

Groundwater and near Surface Water

Some wind turbine base excavations may need temporary sub-surface water controls, such as physical cut-offs or de-watering. This could temporarily divert flows away from the excavation and lower the local water table and sub-surface water levels. Localised temporary changes to groundwater and near surface water interflow patterns may therefore arise. Turbine foundations and crane hardstandings also have the potential to change sub-surface water flow by creating physical barriers within naturally occurring drainage macropores in superficial deposits, however it is it is anticipated that that near-surface water will migrate around the turbine foundation, directly downslope of the turbine location under

gravity, as new pathways within the peat are created (through macropores etc). Subsurface water controls are outlined in Section 6.8 of TA A4.2: oCEMP.

The drying out of peaty soil can result from alterations to the natural drainage regime. Measures set out in Section 8 of TA A4.2: oCEMP, such as the rewetting of peat through controlled irrigation techniques, are considered sufficient, and sufficiently reliable, to avoid substantial alterations to the natural drainage regime, particularly given the shallow peat levels within the Core Study Area. As a result, peat is not expected to dry out, beyond what would be the case in the baseline scenario.

No substantial impediments to near-surface water flow will be created as the detailed site drainage design will take into account any severance of saturated areas to ensure hydrological connectivity is maintained, in accordance with SEPA / NatureScot 'Good practice during wind farm construction'.

Therefore, given the embedded measures detailed in the oCEMP, the magnitude of change on Groundwater and Near Surface Water (High sensitivity receptors) are considered to be of Negligible magnitude. As the magnitude of change is Negligible, and receptors are of High sensitivity, the effect of the Development on Groundwater and Near Surface Water (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

Private Water Supplies

Due to the distance from the Development infrastructure and PWS sources (>1 km), the magnitude of change on PWS (High sensitivity receptors) are considered to be of Negligible magnitude. As the magnitude of change is Negligible, and receptors are of High sensitivity, the effect of the Development on PWS (in accordance with Table 12.4) is of Minor significance. This is not significant in terms of the EIA Regulations.

12.6.1.5 Migration of Pollutants from Contaminated Land

Desk studies have not identified any areas of contaminated land within the Development and no effects are anticipated.

Should potentially contaminated land be encountered during excavations, however, this would be tested and appropriate action taken in accordance with The Environmental Protection Act 1990. Effects associated with contaminated land are therefore considered to be of Negligible magnitude for receptors of High and Very High sensitivity, which results in a significance of Minor and not significant in terms of the EIA Regulations. Should an area of contaminated land be encountered during excavations, measures outlined in Section 6.6 and 9.3 of TA A4.2: oCEMP will be implemented.

12.6.1.6 Acidification of Watercourses

Large scale felling of forestry and the storage of brash could potentially result in a short term increase in the acidity of watercourses within the immediate catchment and have an effect on water quality and ecology. The acidification risk posed by felling is principally related to the disruption to the nitrogen cycling and resulting increased rates of mineralisation, nitrification, nitrate leaching and potential decline in acid neutralising capacity. Nitrate leaching from brash is a lesser issue, as is the impact of soil disturbance on surface water acidification. However, disturbance of the ground due to felling activities very close to watercourses could lead to flushing of acid from groundwater, if measures to prevent run-off from entering the watercourses directly are not achieved. Felling will also involve the movement of heavy machinery across a soft ground surface and hence will lead to soil disturbance which could have the potential to lead to acidification and sedimentation.

Forestry good practice measures are set out in Section 6.9 of TA A4.2: oCEMP, including specific measures for felling and for forestry activities within 100 m of natural watercourses. These measures will be implemented and maintained, and this will be carried out during the construction phase under supervision of an ECoW, whose role is described in Section 6.4 of TA A4.2: oCEMP.

Considering the small area requirement in each catchment for felling, and the adoption of measures identified in this Section, the magnitude and significance of resulting effects would be Negligible. Given the High sensitivity of watercourses the significance is Minor. This is not significant in terms of the EIA Regulations.

12.6.1.7 Increase in runoff and flood risk

Increase in run-off

The increase in hardstanding area associated with construction and operation of the Development could increase the volume and rate of localised surface run-off, although a large proportion of the proposed infrastructure hardstanding, including access tracks and crane hardstanding, would be permeable to some extent. The impermeable nature of the till and peat soils onsite means that, in the baseline scenario, there will be relatively low infiltration and relatively high run-off rates, and hence the addition of the Development would have minimal effect on the existing run-off scenario.

Measures, including SuDS measures, to attenuate run-off and intercept sediment prior to run-off entering watercourses are described in TA A4.2: oCEMP and form a part of the Development good construction practice.

The Forests and Water Guidelines document reports that, due to rainfall interception losses:

"*Research suggests there may be a 1.5-2.0% reduction of potential water yield [watercourse flow] for every 10% of a catchment under mature conifer forest*".

It is assumed, therefore, that felling of mature forest may result in an average increase in water yield of up to 1.5 to 2 % for every 10 % of the catchment area that is subject to felling. It should be noted that, as interception loss has limited effect during the latter stages of periods of heavy rain, when the trees surfaces are saturated, this is likely to have a potential effect on average run-off, but not flood risk.

The required area to be felled to account for access tracks and turbine hardstanding for the entire core study area is 0.78 km^2. The total catchment area of the River Spey from the A96 bridge is 2,935.64 km^2. The percentage area of the River Spey catchment is 0.027 % and therefore the percentage surface water increase (as per Forests and Water Guidelines) is Negligible.

Whilst this has been assessed, it should be noted that the site is an active commercial forestry site with felling as part of the baseline and future baseline.

Regardless, in accordance with the Forestry Commission (2019) Managing forest operations to protect the water environment measures outlined within Section 6.9 of TA A4.2: oCEMP, such as cut-off ditches, check dams and forestry drainage, will control surface water flows to ensure surface water is not rapidly transferred to natural watercourses.

As such, the magnitude of change as a result of increased run-off as a result of felling is considered to be Negligible. Given the High sensitivity of watercourses the residual effect is of Minor significance. This is not significant in terms of the EIA Regulations Flooding.

No construction compounds, substations or meteorological masts are located within areas described as having a 0.5 % or greater annual risk of flooding.

The design of the Development layout has incorporated a buffer zone between watercourses and turbine bases of 50 m to watercourses, where possible, meaning any overtopping of minor watercourses is unlikely to reach infrastructure. As previously mentioned, flooding is restricted to minor isolated areas within the North of the Site where there is limited impact from construction and the Core Study Area.

For these reasons, the magnitude of change on watercourses of High sensitivity is considered to be Negligible, and therefore effects are assessed to be of Minor significance. This is not significant in terms of the EIA Regulations.

12.6.2 Potential Operational Effects

Potential effects associated with the operation of the Development are:

- Increased run-off rates and volume;
- Continued erosion and sedimentation from runoff from areas of hardstanding;
- Alterations to natural flow pathways from runoff from areas of hardstanding; and
- Risk of a pollution event from minor spills from maintenance vehicles.

The nature of these effects has been discussed in relation to the construction phase. As there would be substantially less activity during operation, and as there is unlikely to be any

significant ground disturbance during operation, the magnitude of these effects is similarly reduced.

There will be a minor reduction in the potential for increased surface water run-off during the operational phase due to the reduction in hardstanding areas used during the construction phase, such as the restoration of the construction compound.

Whilst alterations to natural flow pathways will not be introduced during the operational phase, any changes during construction will continue through operation, as the majority of infrastructure will remain in place. Alterations to natural flow pathways will be reduced through adopting good practice design and construction, as set out in TA A4.2: oCEMP, such as cross drainage, use of shallow drainage ditches and prevention of blockages.

As a result, the magnitude and significance of all effects associated with operation of the Development are assessed as being Minor to Negligible, and not significant in terms of the EIA Regulations.

12.6.3 Potential Decommissioning Effects

Potential effects of decommissioning the Development are similar in nature to those during construction, as some ground-work would be required to remove turbine foundations and hardstandings to 1 m below ground level. These effects would be substantially lesser in magnitude than during construction and would be controlled by a PPP which would be incorporated into a detailed Decommissioning Environmental Management Plan (DEMP), as set out in section 12.3.10.3. Where infrastructure would be left in place, drainage features would also be left in place, where this is compatible with the PPP.

As a result, the magnitude and significance of all effects associated with decommissioning are assessed as being negligible, and not significant in terms of the EIA Regulations.

12.7 MITIGATION AND RESIDUAL EFFECTS

With the embedded design measures described in TA A4.2 in place, all identified potential effects have been assessed as being of negligible significance, and therefore not significant in terms of the EIA Regulations.

TA A12.1 includes a peat assessment and a peat management plan. Although not required to mitigate likely significant effects, section 4.2 of TA A12.1 presents measures to be implemented for peat management during construction. These measures will be implemented in order to minimise potential impacts on peat.

No further mitigation is proposed.

No residual effects above Minor significance are predicted for all phases of Development and are therefore not significant in terms of the EIA Regulations.

12.8 CUMULATIVE EFFECT ASSESSMENT

A cumulative effect is considered to be an additional effect on hydrological resources (within the same hydrological catchment) arising from the Development in addition to the combination of other developments likely to affect the hydrological environment.

At distances greater than 10 km, it is considered that schemes are unlikely to contribute to a cumulative hydrological effect due to attenuation and dilution over distance of potentially polluting chemicals. Therefore, for the purposes of the assessment of potential cumulative effects on the immediate catchment and hydrological regime, only proposed developments, which require large scale construction / excavation e.g. onshore wind farm developments, within approximately 10 km of the Development have been considered.

Data searches have identified two wind farms within 10 km of the Development which are consented developments or subject to a valid planning application within the same catchments i.e. are hydrologically connected to the Development:

- Rothes III wind farm (consented) located approximately 7 km southwest of the Development; and
- Kellas Drum wind farm (in planning) is located approximately 9.9 km west of the Development.

Operational wind farms are considered part of the baseline.

The greatest potential for cumulative effects arises when the construction phase of another development overlaps with the construction phase of the Development. Cumulative effects are considered to have the potential to be significant only where such an overlap may exist, as activities that could be potentially detrimental to the hydrological environment are greatly reduced during the operational phase of developments (e.g. excavation works, concrete pouring etc.).

Assuming commencement of the construction of the Development in 2027, lasting for approximately 18 months (including the tree felling in the enabling phase), this is unlikely to coincide with the construction phase of Rothes III or Kellas Drum, as they are consented developments and likely to be constructed prior to the Development and therefore there is unlikely to be potential for cumulative effects between the developments. Given their respective locations, close to each other, the primary cumulative impact is likely to be an increase in flow rates associated with increased run-off from new hardstanding areas of the two wind farm developments.

12.8.1 Construction Phase

The increase in flow rates is considered to be of Negligible magnitude for the Development. It is assumed that water management measures will be implemented at both Rothes III and Kellas Drum, similar to those described in the oCEMP for the Development, as these are in line with standard practice as required by SEPA. Given this, the magnitude of cumulative impacts during the construction phase will be Negligible for all receptors (Very High to High sensitivity) and, therefore, of Minor significance.

This is not significant in terms of the EIA Regulations.

12.8.2 Operational Phase

It is anticipated that there will be a minor reduction in the potential for increase in flow rates during the operational phase of both wind farm developments, when compared to the construction phase, due to the reduction in overall hardstanding areas post-construction. Therefore, the magnitude of cumulative effects during the operational phase will be Negligible for all receptors (Very High to High sensitivity), and the significance of these effects will also be Minor, being not significant in terms of the EIA Regulations.

12.8.3 Decommissioning Phase

The increase in flow rates is considered to be of Negligible magnitude for the Development. It is assumed that any water management measures required at decommissioning, in addition to those already in place, will be implemented at both Rothes III and Kellas Drum, similar to those described in the oCEMP for the Development, as these are in line with standard practice as required by SEPA. Given this, the magnitude of cumulative impacts during the decommissioning phase will be Negligible for all receptors (Very High to High sensitivity) and, therefore, of Minor significance.

This is not significant in terms of the EIA Regulations.

12.8.4 Residual Cumulative Effects

As per the assessment in Section 12.8, no significant residual cumulative effects are predicted.

12.9 SUMMARY OF EFFECTS

Table 12.12 provides a summary of the effects detailed within this chapter.

Table 12.12 Summary of Effects

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
Surface hydrology (watercourses) and designated	Chemical Pollution	Minor	None beyond measures embedded in the oCEMP, including:	Minor

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
hydrological receptors			impermeable membranes, bunding of the construction compound and absorbent spill pads / kits.	
	Erosion and Sedimentation	Minor	None beyond measures embedded in the oCEMP, including: settlement bunding implemented in areas near watercourse buffers	Minor
	Pollution from contaminated land	Minor	None	Minor
	Impediments to flow	Minor	None beyond measures embedded in the oCEMP, including: arched culverts, brash matting, limited brash stockpiling to reduce the accumulation of brash in watercourses	Minor
	Acidification as a result of felling	Minor	None beyond measures embedded in the oCEMP, including: brash matting, limited brash stockpiling to reduce the accumulation of brash in watercourses	Minor
	Increase in Runoff and Flood Risk	Minor	None beyond measures embedded in the oCEMP, including: controlled irrigation techniques and detailed site drainage design	Minor
Groundwater and near surface water	Changes in Groundwater Interflow Patterns	Minor	None beyond measures embedded in the oCEMP, including: controlled irrigation techniques and detailed site drainage design	Minor

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
	Chemical Pollution	Minor	None beyond measures embedded in the oCEMP, including: spill-kits and Geotextile impermeable membranes.	Minor
Operational Phase				
Watercourses	Increase in Runoff and Flood Risk	Minor	None	Minor
Surface hydrology (watercourses) and Designated Hydrological Receptors, Groundwater, PWS and Nearsurface water	Erosion and Sedimentation	Minor	None	Minor
Groundwater, Near-surface water and PWS	Changes in Groundwater Interflow Patterns	Minor	None	Minor
Decommissioning				
Surface hydrology (watercourses) and Designated Hydrological Receptors, Groundwater, Near-surface water and PWS	Chemical Pollution	Minor	Measures similar to oCEMP to be included in a Decommissioning CEMP (DCEMP).	Minor
Surface hydrology (watercourses) and Designated Hydrological Receptors, Groundwater, Near-surface water and PWS	Erosion and Sedimentation	Minor	Measures similar to oCEMP to be included in a DCEMP.	Minor

12.10 STATEMENT OF SIGNIFICANCE

This Chapter has assessed the likely significance of effects of the Development on hydrology and hydrogeology. The Development has been assessed as having the potential to result in effects of Minor significance or lower.

Given that only effects of moderate significance or greater are considered significant in terms of the EIA Regulations, the potential effects on hydrology and hydrogeology are considered to be not significant.