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12. HYDROLOGY, HYDROGEOLOGY, GEOLOGY AND SOILS

12.1 Introduction

12.1.1 This chapter presents the assessment of potential effects on hydrology, hydrogeology, geology and soils resulting from the Proposed Development. For each of these topics it details the baseline description, identifies and assesses the effects on each receptor and, where relevant, identifies proposed mitigation and describes the likely residual effects following the implementation of mitigation. The chapter is not intended to be read as a standalone assessment and reference should be made to the introductory chapters of this EIA Report (**Volume 2, Chapters 1-7**) and the following figures and appendices:

- **Volume 3, Figure 12.1: Hydrology Overview;**
- **Volume 3, Figure 12.2: Private Water Supplies;**
- **Volume 4, Technical Appendix 3.1: Drainage Strategy;**
- **Volume 4, Technical Appendix: 3.2: General Environmental Management Plans (GEMPs) and Species Protection Plans (SPPs);**
- **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA);**
- **Volume 4, Technical Appendix 12.2: Flood Risk Assessment; and**
- **Volume 4, Technical Appendix 12.3: Fluvial Geomorphology Assessment.**

12.1.2 Refer to **Volume 4, Technical Appendix 1.1 EIA Team** for details on the competent experts who undertook the assessment.

12.2 Legislation, Policy, and Guidance

Legislation

12.2.1 This assessment is conducted in accordance with the principles contained within the following legislation:

- The Water Environment and Water Services (Scotland) Act 2003¹⁶⁴;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011, as amended (CAR)¹⁶⁵;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017¹⁶⁶; and
- The Flood Risk Management (Scotland) Act 2009¹⁶⁷.

Policy

12.2.2 This assessment is conducted in accordance with the principles contained within the following documents:

- Scottish Government (2023), National Planning Framework 4¹⁶⁸;
- Aberdeenshire Council (2023), Aberdeenshire Local Development Plan¹⁶⁹; and
- Scottish Environment Protection Agency (SEPA) Environmental Policy Number 19, Groundwater Protection Policy for Scotland v3¹⁷⁰.

¹⁶⁴ Water Environment and Water Services (Scotland) Act 2003. Available at: <https://www.legislation.gov.uk/asp/2003/3/contents>.

¹⁶⁵ The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: <https://www.legislation.gov.uk/ssi/2011/209/contents/made>.

¹⁶⁶ UK Government (2017). The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 [online] Available at: <https://www.legislation.gov.uk/ssi/2017/282/contents/made>.

¹⁶⁷ Scottish Government (2009). Flood Risk Management (Scotland) Act 2009. Available at: <https://www.legislation.gov.uk/asp/2009/6/contents>.

¹⁶⁸ The Scottish Government, (2023). National Planning Framework 4. [Online] Available at: <https://www.gov.scot/publications/national-planning-framework-4/>.

¹⁶⁹ Aberdeenshire Council, (January 2023). Aberdeenshire Local Development Plan January 2023. [Online] Available at: <https://online.aberdeenshire.gov.uk/ldpmedia/LDP2021/AberdeenshireLocalDevelopmentPlan2023IntroductionAndPolicies.pdf>.

¹⁷⁰ SEPA, (November 2009). Groundwater protection policy for Scotland – Version 3. Available at: https://www.sepa.org.uk/media/60033/policy-19_groundwaternov09.pdf.

Guidance

12.2.3 This assessment has been conducted in accordance with the principles contained within the following documents:

- Climate change allowances for flood risk assessment in land use planning¹⁷¹;
- Construction industry research and information association (CIRIA) Report C532 – Control of water pollution from construction sites: Guidance for consultants and contractors¹⁷²;
- CIRIA Report C753 – The SuDS Manual¹⁷³;
- Scottish Government – River crossings & migratory fish: Design guidance (2012)¹⁷⁴;
- Scottish Natural Heritage (now ‘NatureScot’) – A handbook on environmental impact assessment Version 5 (2018)¹⁷⁵;
- SEPA – The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide (Version 9.3, June 2023)¹⁷⁶;
- SEPA (2010) WAT-SG-25, Engineering in the water environment: good practice guide¹⁷⁷;
- SEPA – WAT-SG-31, Special requirements for civil engineering contracts for the prevention of pollution¹⁷⁸;
- SEPA – Land Use Planning System Guidance Note 31, Guidance on assessing the impacts of development proposals on groundwater abstractions and groundwater dependent terrestrial ecosystems (GWDTE)¹⁷⁹; and
- NetRegs – Guidance for Pollution Prevention Guidelines (GPP)¹⁸⁰; GPP 1: Understanding your environmental responsibilities - good environmental practices, GPP 2: Above ground oil storage and GPP 21: Pollution incident response planning.

12.3 Assessment Methodology and Significance Criteria

Scope of the Assessment

12.3.1 This chapter focuses on the potential effects of the construction phase and operational phase of the Proposed Development upon sensitive hydrology, hydrogeology, geology, and soils features within the Site Boundary and a 1 km buffer of the Proposed Development.

12.3.2 During the construction phase of the Proposed Development, there is, in the absence of mitigation measures, the potential for the following short-term impacts on the hydrology, hydrogeology, geology, and soils environment:

- pollution of surface waters (including fisheries), groundwaters and associated water resources;
- impact on water resources (including private water supplies (PWS));
- short-term increase in flood risk;
- soil erosion, compaction, and excavation; and
- impacts upon groundwater dependent terrestrial ecosystems (GWDTE).

¹⁷¹ Climate change allowances for flood risk assessment in land use planning. [Online] Available at: <https://www.sepa.org.uk/media/594168/climate-change-guidance.pdf> [Accessed: May 2024].

¹⁷² Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Hendrie, M. and Owens, D. (2001). CIRIA C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors.

¹⁷³ CIRIA (2015). The SuDS Manual (C753).

¹⁷⁴ Scottish Government (2012). River Crossings and Migratory Fish: Design Guidance.

¹⁷⁵ Scottish Natural Heritage and Historic Environment Scotland (2018). Environmental Impact Assessment Handbook.

¹⁷⁶ Scottish Environment Protection Agency (2022). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) – A Practical Guide (Version 9.3, June 2023).

¹⁷⁷ SEPA (2010) WAT-SG-25, Engineering in the water environment: good practice guide [online] Available at: <https://www.sepa.org.uk/media/151036/wat-sg-25.pdf> [Accessed May 2024].

¹⁷⁸ Scottish Environment Protection Agency (2006). Prevention of Pollution from Civil Engineering Contracts: Special Requirements (Version 2, June 2006) [Accessed: May 2024].

¹⁷⁹ Scottish Environment Protection Agency (2017). Land Use Planning System Guidance Note 31, Guidance on assessing the impacts of development proposals on groundwater abstractions and groundwater dependent terrestrial ecosystems.

¹⁸⁰ NetRegs (online). Guidance for Pollution Prevention (GPP) documents | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland [Accessed: May 2024].

12.3.3 During the operation of the Proposed Development, it is anticipated that routine maintenance of infrastructure and drainage would be required. Notwithstanding, the Proposed Development would potentially result in the following effects without appropriate controls or mitigation:

- modification of groundwater levels;
- modification of surface water (including fisheries) drainage and flood risk; and
- impacts on water resources (PWS).

Issues Scoped Out

12.3.4 There are no designated sites relating to flora, fauna, geology, geomorphology, wetlands or habitat of migratory birds (Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPAs), Ramsar sites or Marine Protection Areas (MPA)) identified within 1 km of the Proposed Development. Therefore, an assessment of the impacts on designated sites has been scoped out of further assessment.

12.3.5 There are no peat soils, peat or peatland located within the Site Boundary, and therefore an impact assessment is not required. An assessment has been undertaken to consider potential impacts to agricultural land (including the loss of prime agricultural land), which is presented in the **Volume 2, Chapter 14: Land Use and Agriculture**.

12.3.6 Due to the nature of river flood likelihood not being 'high' within the Proposed Development, river flooding has been scoped out.

12.3.7 There are no regulated abstractions or Drinking Water Protected Areas (DWPA) for surface water within 1 km of the Proposed Development and therefore impacts on public water supplies have been scoped out of further assessment within the EIA.

Extent of Study Area

12.3.8 The extent of the study area for the assessment encompasses sensitive hydrology, hydrogeology, geology, and soil receptors within the Site (shown in **Volume 3, Figure 12.1: Hydrology Overview**), and up to 1 km around the Site Boundary for PWS (**Volume 3, Figure 12.2: Private Water Supplies**).

12.3.9 SEPA's guidance on assessing the impacts of developments on GWDTE, Land Use Planning System Guidance (LUPS-GU31)¹⁸¹, requires assessment of potential GWDTE located within 250 m of excavations greater than 1 m and within 100 m of excavations less than 1 m. Therefore, the GWDTE Study Area comprises a 250 m buffer from the Proposed Development.

Consultation Undertaken to Date

12.3.10 **Table 12-1** provides a summary of the consultation activities undertaken in support of the preparation of this chapter.

¹⁸¹ SEPA, (2017). Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. [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: May 2024].

Table 12-1 Consultation relevant hydrology, hydrogeology, geology, and soils

Body/ organisation	Type of consultation/ date	Response	How response has been considered
SEPA	Pre-application consultation (ENQ/2023/0426) 20 April 2023.	<p>Flood risk</p> <p>SEPA noted the site appears to lie well outwith their future fluvial flood extents on their Future Flood Risk Maps and there are a number of small watercourses and drains that are too small for inclusion on their Future Flood Risk Maps, and the potential flood risk from these should be considered going forward.</p> <p>They also noted that there is a large surface water flooding extent to the north of the Site on A950 by Flushing.</p> <p>Impact on the water environment</p> <p>SEPA highlighted the importance of offsetting environmental impacts, as the Site covers a large area it would provide opportunity to improve the water environment within the Site boundary. This could be done by fencing off and creating buffer strips for watercourses to reduce diffuse pollution and protect any riparian habitat.</p> <p>SEPA provided advice that a number of watercourses on the Site look to be straightened and that they would welcome investigation in to re-naturalising and removing any man made features. This could help biodiversity net gain and add length and width to help mitigate surface flooding down stream.</p>	<p>Volume 4, Technical Appendix 3.1 Drainage Strategy and Volume 4, Technical Appendix 12.2 Flood Risk Assessment provide details on mitigation measures to avoid and minimise downstream flood risk.</p> <p>Details of the proposed watercourse realignment are provided in Volume 4, Technical Appendix 3.1: Drainage Strategy, with its location shown on Volume 3, Figure 3.1: Proposed Development and Volume 3, Figure 8.5: Illustrative Landscape Masterplan.</p> <p>A Phase 1 Fluvial Geomorphology Assessment is provided with the EIA at Volume 4, Technical Appendix 12.3: Fluvial Geomorphology Assessment.</p> <p>Volume 2, Chapter 9: Ecology, Nature Conservation and Ornithology summarises how the Proposed Development would deliver positive effects for biodiversity in proportion to the scale of the Proposed Development, and is supported by Volume 4, Technical Appendix 9.4: Biodiversity Net Gain Assessment. Stock/deer proof fence would be installed around the site boundary to exclude grazing animals and allow habitats to become established.</p>

Body/ organisation	Type of consultation/ date	Response	How response has been considered
		<p>Existing groundwater abstractions</p> <p>Excavations and other construction works can disrupt groundwater flow and impact on existing groundwater flows and PWS. An assessment of PWS and groundwater abstractions should be provided.</p>	<p>An assessment of PWS including bespoke assessment for groundwater abstractions within 250 m of excavation greater than 1 m can be found in Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA).</p>
Aberdeenshire Council	Teams meeting to discuss existing flooding issues at Flushing, 24 August 2023.	<p>Aberdeenshire Council Flood Team advised that the current cause for flooding at Flushing was unknown. Information was provided to SSEN Transmission on historic site investigation Aberdeenshire Council had carried out along the A950.</p> <p>They advised that the detailed design solution for the Proposed Development would have to show that site drainage would not exacerbate any of the current flooding issues at Flushing.</p>	<p>SSEN Transmission has carried out independent site investigation of the existing drainage at Flushing and along the A950 in order to ensure the detailed design of the Proposed Development does not exacerbate the current flooding issue at Flushing.</p>
SEPA and Aberdeenshire Council	Teams meeting with Aberdeenshire Council and SEPA to discuss proposed drainage strategy for the Proposed Development, 21 September 2023.	<p>SEPA/Aberdeenshire Council advised that the watercourse running south to north through the Site should be treated as a natural watercourse and realigned.</p> <p>SEPA/Aberdeenshire Council advised that the new drainage strategy should mimic the existing natural catchment.</p>	<p>A Phase 1 Fluvial Geomorphology Assessment (Volume 4, Technical Appendix 12.3: Fluvial Geomorphology Assessment) has been carried out to confirm the need to realign the natural watercourse. A Phase 2 Fluvial Geomorphology Assessment will be undertaken during detailed design, in order to advise the final design of the watercourse realignment.</p> <p>Proposed new site catchments look to match the existing greenfield run-off rates and catchment splits as per the existing site drainage.</p>
Aberdeenshire Council	PWS data for Aberdeenshire administrative area was requested in October 2023.	<p>Aberdeenshire Council provided PWS information for the Aberdeenshire administrative area. Response received November 2023, with updated data provided in January and February 2024.</p>	<p>This information is considered further in Section 12.5 – Water Supplies.</p> <p>PWS information within 1 km of the Proposed Development have been included in Volume 3, Figure 12.2: Private Water Supplies and also in Volume 5,</p>

Body/ organisation	Type of consultation/ date	Response	How response has been considered
			Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA).
SEPA	SEPA abstractions data for the whole of Scotland was requested via email in October 2023.	Response received October 2023. SEPA provided all records of activities authorised under CAR ¹⁸² .	This information is considered further in Section 12.5 – Water Supplies . There are no registered authorisations under CAR within 1 km of the Proposed Development.
Scottish Water	Scoping Response (ENQ/2023/1465), 1 November 2023.	Scottish Water indicated that there are Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Area (DWPA) under the Water Framework Directive (WFD).	This information has been taken into consideration and presented within this assessment in Section 12.5 .
Aberdeenshire Council – Flood Risk and Coastal Protection	Scoping Response (ENQ/2023/1465), 7 November 2023.	Aberdeenshire Council acknowledged SEPA and the Applicants discussions regarding flooding and drainage issues on site. At this time they had nothing additional to request with the EIA.	Responses noted.
SEPA	Scoping Response (ENQ/2023/1465), 7 November 2023.	SEPA advised that GWDTE can be disrupted by construction and excavations and any works should aim to avoid disrupting groundwater flows and impact on GWDTE and groundwater abstractions as per LUPS 31 guidance.	An assessment of the likelihood that GWDTE are critically dependent on groundwater is presented in Section 12.5 .
		Flood risk has been indicated by SEPA at the A950 Flushing. So consideration to improving a previously straightened watercourse that flows south to north may help this. In addition, the layout should be designed to minimise any water crossing and avoid any other direct impacts to water features. No culverting for land gain would be accepted. All proposed temporary or permanent infrastructure needs to be shown overlain with all watercourses. A minimum buffer of 10 m around	Volume 4, Technical Appendix 3.1: Drainage Strategy provides an overview of how runoff from the Site will be managed to avoid pollution of downstream watercourses but also maintain or provide betterment on the current greenfield runoff rate through sustainable drainage measures. Details of the proposed watercourse realignment are provided in Volume 4, Technical Appendix 3.1: Drainage Strategy .

¹⁸² The Water Environment (Controlled Activities) (Scotland) Regulations 2011. [Online] Available at: <https://www.legislation.gov.uk/ssi/2011/209/contents/made> [Accessed: April 2024].

Body/ organisation	Type of consultation/ date	Response	How response has been considered
		<p>each watercourse should be achieved and if this cannot be achieved, each breach must provide a plan which includes locations, plans, drawings and photographs of the area.</p>	<p>A Phase 1 Fluvial Geomorphology Assessment is provided with the EIA at Volume 4, Technical Appendix 12.3: Fluvial Geomorphology Assessment. A Phase 2 geomorphology assessment will be provided post-consent and is expected to be secured by way of an appropriately worded planning condition.</p> <p>The proposed temporary and permanent infrastructure is shown on Volume 3, Figure 12.1: Hydrology Overview.</p>
SEPA	<p>Post Scoping response to ENQ/2023/0426, 16 January 2024.</p>	<p>SEPA advised that the realignment of the watercourse within the Site would be subject to Geomorphological Stage 1 and Stage 2 Assessment.</p>	<p>A Phase 1 Fluvial Geomorphology Assessment is provided in Volume 4, Technical Appendix 12.3: Fluvial Geomorphology Assessment.</p> <p>A Phase/Stage 2 geomorphology assessment will be provided post-consent and is expected to be secured by way of an appropriately worded planning condition.</p>
Fisheries (Ugie District Salmon Fishery Board (UDSFB))	<p>Email 19 February 2024, 15 March 2024, 27 March 2024 and online meeting with the Applicant and WSP Ecology Lead, 3 May 2024.</p>	<p>A number of emails and an online meeting has taken place between UDSFB, the WSP Ecology Team and Applicant. A full summary of UDSFB responses is provided in Table 9-2 in Volume 2, Chapter 9: Ecology, Nature Conservation and Ornithology.</p> <p>Through the consultation it has been established that UDSFB want to ensure that no harm will come to the Atlantic salmon and sea trout fry and parr using the Burn of Ludquharn and Burn of Faichfield, or that may be present in the future.</p> <p>UDSFB provided a sample of fish population data from watercourses in the catchment which showed juvenile populations of Atlantic salmon and sea trout in the River Ugie. UDSFB commented that most burns leading into the Ugie would be suitable for juvenile salmon and sea trout.</p>	<p>The consultation and information provided has been discussed with the WSP Ecology team, and taken into consideration during the assessment of potential impacts to fisheries and mitigation measures provided within this chapter.</p>

Body/ organisation	Type of consultation/ date	Response	How response has been considered
SEPA	Post Scoping email ENQ/2023/1465 - SEPA Ref: PCS-20001093, 16 April 2024.	<p>SEPA response to further information provided post scoping by WSP on the proposed approach to the assessment of GWDTE and groundwater abstractions, and a request for advice (email, 2 April 2024).</p> <p>In their response, SEPA noted and welcomed the commitment to assess the impact to GWDTE and PWS within the EIA process.</p> <p>SEPA indicated they would prefer any PWS that will be potentially impacted to be decommissioned and a permanent alternative supply provided. It is confirmed that should a permanent supply not be committed to where a PWS is likely to be impacted SEPA will expect a detailed assessment to be included in the EIA Report and that this should comply with our LUPS-31 Guidance Note, Option 4.</p>	<p>This information has been taken in to consideration and presented in Volume 3, Figure 12.2: Private Water Supplies and also in Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA).</p> <p>An assessment of GWDTE is presented in Section 12.5.</p>

Method of Baseline Data Collation

12.3.11 To investigate baseline conditions and to consider potential effects of the Proposed Development with respect to hydrology, hydrogeology, geology and soils, a review of available desk-based information has been undertaken. In addition, a site walkover and PWS site visit has been undertaken, to further assess the baseline information.

12.3.12 The general methodology used to assess the effect of the Proposed Development on the hydrology, hydrogeology, geology, and soils receptors is as follows:

- desktop study to obtain baseline and historical data;
- consultation with Scottish Water, Aberdeenshire Council, SEPA and landowners to identify water abstractions and PWS;
- information regarding Scottish Water abstractions was gathered in January 2024 from Scottish Water's asset database. This information is considered further within the water supplies section of this chapter;
- a site walkover and PWS identification visit in April 2024;
- identification of the potential effects of the Proposed Development on sensitive receptors; and
- identification of options for the mitigation of potential effects, taking account of the Applicant's General Environmental Management Plans (GEMPs).

Determining Magnitude of Change and Sensitivity of Receptors

12.3.13 The assessment of significance will consider the magnitude of change (from the baseline conditions), the sensitivity of the affected environment/receptors and (in terms of determining residual effects) the extent to which mitigation and enhancement will reduce or reverse adverse effects.

Sensitivity of Receptors

12.3.14 The sensitivity of the receptor has been determined using professional judgement, consideration of existing designations and quantifiable data, where possible. The criteria used to determine the sensitivity of receptors is shown in **Table 12-2**.

Table 12-2 Sensitivity of Receptor Criteria

Sensitivity	Example of Characteristics
High	<ul style="list-style-type: none"> • Receptor has 'High' or 'Good' Water Framework Directive (WFD) overall status and/or water quality status for surface water or groundwater body. • Receptor is a designated site protected under national or international legislation, such as SSSI, SAC, and SPA, for the disciplines assessed in this chapter. • Receptor contains Geological Conservation Review (GCR) sites designated as SSSIs or Candidate SSSIs. • Receptor contains areas of regionally important economic mineral deposits. • Receptor supports key species and habitats sensitive to changes in suspended sediment concentrations and turbidity, such as salmon or freshwater pearl mussels. • Receptor supports GWDTE confirmed as potentially highly groundwater dependent. • Receptor contains a range of hydromorphological features with very little modification. • Receptor is a watercourse or floodplain, with a possibility of direct flood risk to populated areas, which are sensitive to increased flood risk by the possible increase in water levels. • Receptor provides clear flood alleviation benefits. • Receptor is used for abstraction for public water supply, or private water supply (domestic). • Receptor is Class 1 or 2 priority peatland, with carbon-rich and peaty soils covering ≥20% of the Site.

Sensitivity	Example of Characteristics
	<ul style="list-style-type: none"> Receptor is classed as a high productivity aquifer.
Medium	<ul style="list-style-type: none"> Receptor has 'Moderate' WFD overall status and/or water quality status for surface water or groundwater body. Receptor contains GCR sites with Local Geodiversity Site (LGS) status. Receptor contains areas of locally important economic mineral deposits. Receptor supports GWDTE confirmed as potentially moderately groundwater dependent. Receptor contains limited hydromorphological features and a limited range of fluvial processes; such areas may have been subject to past modification such as straightening, bank protection and culverting or other anthropogenic pressures. Receptor is a watercourse or floodplain, with a possibility of direct flood risk to high value agricultural areas, which are moderately sensitive to increased flood risk by the possible increase in water levels. Receptor provides limited flood alleviation benefits. Receptor used for abstraction or storage for private water supply for agricultural/industrial use. Receptor contains Class 1 or 2 priority peatland, with carbon-rich and peaty soils covering <20% of the Proposed Development, or Class 3 and 5 peatland areas, carbon rich and peaty soils present within the Proposed Development. Receptor is classed as a moderate or low productivity aquifer. Receptor groundwater vulnerability contains classes 2 and 3.
Low	<ul style="list-style-type: none"> Receptor has 'Poor' or 'Bad' WFD overall status and/or water quality status for surface water or groundwater body. Receptor contains GCR sites without SSSI (or Candidate SSSI) designation or LGS status, and non GCR sites with potential geodiversity interest. Receptor supports no key species and habitats sensitive to changes in suspended sediment concentrations and turbidity. Receptor supports GWDTE based on NVC mapping, with local water sources not considered as predominantly groundwater. Receptor contains no hydromorphological diversity and/or are identified as 'heavily modified water bodies' or 'artificial water bodies'. Receptor is a watercourse or floodplain which passes through low value agricultural areas, less sensitive to increased flood risk by the possible increase in water levels. Receptor provides limited flood alleviation benefits. Receptor does not support any water abstractions. Receptor contains Class -2, -1, 0, and 4 non-peatland areas, with no carbon-rich and peaty soils. Receptor is classed as a very low productivity aquifer. Receptor groundwater vulnerability contains classes 0 and 1.

Magnitude of Change

12.3.15 The likely magnitude or extent of an impact (or change) on a receptor is established by assessing the degree of the impact relative to the nature and extent of the Proposed Development. The criteria used to determine the magnitude of change is shown in **Table 12-3**.

Table 12-3 Magnitude of Change Criteria

Magnitude of Change	
Major	<ul style="list-style-type: none"> • Long-term (≥ 12 months) or permanent change in surface water quality, resulting in a change in WFD status and/or prevention of attainment of target status of 'Good'. • Results in loss of feature(s) and failure of hydromorphological elements (morphology, quantity and dynamics of flow) resulting from the works. Loss or damage to existing habitats. Replacement of natural bed and/or banks with artificial materials. Extensive change to channel planform. • Loss of floodplain due to construction within flood risk area. • Permanent loss of water supply. • Major or total loss of a geological site or mineral deposit, where the value of the receptor would be severely affected. • Major or total loss of soils or peatland deposits or where the value of the receptor would be severely affected. • Long-term (≥ 12 months) or permanent change in groundwater quality, resulting in a permanent change in WFD status and/or prevention of attainment of target status of 'Good'. • Major loss of an aquifer in terms of water level or yield, with total loss of or major changes to dependent abstractions/habitats. • Major change or total loss of a GWDTE, where the value of the receptor would be severely affected.
Moderate	<ul style="list-style-type: none"> • Mid-term (≥ 6 months) change in local surface water quality, potentially resulting in a temporary change of WFD status (or equivalent status at local scale) or preventing attainment of target overall status of 'Good' during this period. • Results in adverse change in the integrity of hydrological feature(s) or loss of part of feature, resulting in a moderate shift away from baseline conditions. Failure of one or more hydromorphological elements (morphology, quantity and dynamics of flow) resulting from the works. Some damage or loss to habitat due to the modifications. Replacement of the natural bed and/or banks with artificial material. • Floodplain reduction due to extensive increases in impermeable area within catchment and/or drainage design which would result in an increase in peak flood level. • Temporary loss of water supply. • Partial loss of a geological site or mineral deposit, with major change to the settings, or where the value of the receptor would be affected. • Partial loss of soils or peatland deposits or where the value of the receptor would be affected. • Mid-term (≥ 6 months) change in local groundwater quality, not affecting overall WFD status. • Changes to an aquifer in terms of water level or yield, with small changes to nearby dependent abstractions/habitats. • Partial change or loss of a GWDTE, where the value of the receptor would be affected.
Minor	<ul style="list-style-type: none"> • Short-term (≥ 1 month) change in local surface water quality, resulting in minor temporary changes such that ecology is affected for short-term. Equivalent to a temporary minor, but measurable, change within WFD status class. • Potential failure in one of hydromorphological elements (morphology, quantity and dynamics of flow) resulting from the works. Results in minimal shift away from baseline conditions or partial loss or damage to habitat due to modifications. • Floodplain changes due to limited increases in impermeable area within catchment and/or drainage design which would result in a minor increase in peak flood level.

Magnitude of Change	
	<ul style="list-style-type: none"> • Temporarily reduced quality and quantity of water supply. • Small loss to a geological site or mineral deposit, such that the value of the receptor would not be affected. • Small loss of soils or peatland, or where soils will be disturbed but the value not affected. • Short-term (≥ 1 month) change in local groundwater quality. • Small change to an aquifer in terms of water level or yield, with little discernible change to dependent abstractions/habitats. • Small change to or loss of a GWDTE, where the value of the receptor would not be affected.
Negligible	<ul style="list-style-type: none"> • Negligible change to surface water quality, very slight temporary change in water quality with no discernible change to watercourse ecology. • No alteration to hydromorphological elements. Some change to feature(s), but of insufficient level to affect the use/integrity, approximating to a 'no change' situation. • Floodplain variations of negligible change. • No anticipated change to water supply. • Minimal or no change to a geological site or mineral deposit. • Minimal or no change to soils or peatland deposits. • Negligible change to groundwater quality, very slight temporary change in local water quality. • Minimal or no change to an aquifer in terms of water level or yield, with no discernible change to dependent abstractions/habitats. • Minimal or no change to or loss of a GWDTE.

Probability

12.3.16 The probability of the occurrence of an effect has been evaluated as being high, medium, or low during the phase of work being assessed. Professional judgement is used to determine the probability of occurrence.

12.3.17 The application of good practice and mitigation measures reduces the probability of an effect occurring.

Significance

12.3.18 The findings of the three criteria considered in the evaluation of an effect has been applied to a matrix for each potential effect (**Table 12-4**) to assess its significance.

12.3.19 Through the assessment, potential effects are concluded to be of major, moderate, minor, or negligible significance. Major and moderate effects are considered significant, and minor and negligible effects are considered not significant. Effects are considered adverse unless stated otherwise.

Table 12-4 Significance Matrix

Sensitivity	Magnitude of Change	Probability	Significance of Effect
High	Major	High	Major
		Medium	Major
		Low	Moderate
	Moderate	High	Moderate
		Medium	Moderate
		Low	Minor
	Minor	High	Minor
		Medium	Minor
		Low	Minor
	Negligible	High	Minor
		Medium	Negligible
		Low	Negligible
Medium	Major	High	Major
		Medium	Moderate
		Low	Minor
	Moderate	High	Moderate
		Medium	Minor
		Low	Minor
	Minor	High	Minor
		Medium	Minor
		Low	Negligible
	Negligible	High	Negligible
		Medium	Negligible
		Low	Negligible
Low	Major	High	Moderate
		Medium	Minor
		Low	Negligible
	Moderate	High	Minor
		Medium	Minor
		Low	Minor
	Minor	High	Minor
		Medium	Negligible
		Low	Negligible
	Negligible	High	Negligible
		Medium	Negligible
		Low	Negligible

Limitations and Assumptions

- 12.3.20 Baseline conditions have been established from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions are likely to change during the construction and operation of the Proposed Development. It is assumed that information received by third parties is complete and up to date, this includes information concerning PWS. The accuracy of this information is considered to be sufficient to inform EIA.
- 12.3.21 It is assumed that the detailed design, construction and operation stages of the Proposed Development will satisfy minimum environmental standards, consistent with contemporary legislation, practice, and knowledge.
- 12.3.22 Limitations also include not being able to obtain information on PWS from all sources contacted. This was through multiple methods to obtain PWS data during the baseline data collection. The site walkover encountered difficulties as permission to access properties PWS to review and confirm locations was unable to be gained on a number of occasions, therefore resulting in delayed site investigation and PWSRA.

12.4 Baseline Conditions*Surface Water Hydrology*

- 12.4.1 The Proposed Development is approximately 750 m south of the River Ugie, entirely within the River Ugie Catchment. The River Ugie flows in an easterly direction before discharging into the Ugie Estuary coastal water body at Peterhead.
- 12.4.2 The Burn of Ludquharn is located immediately adjacent at the west of the Proposed Development due to foul discharge connection. The Burn of Ludquharn then discharges into the Ugie Water at the village of Longside. The Burn of Faichfield is located immediately adjacent to the east of the Proposed Development, due to the surface water discharge connection. Both watercourses are tributaries of the Ugie Water.
- 12.4.3 Within the Proposed Development there are several minor watercourses adjacent to field boundaries, and which eventually discharge into the Burn of Cairngall, or the Burn of Faichfield, and ultimately the Ugie Water. The minor watercourses are heavily modified/artificial drainage ditches, associated with the Sites existing use for pastoral and arable farming. There are also likely to be buried field drains which discharge into the ditches. The hydrological regime of the Proposed Development would be modified on account of these factors.

Water Quality

- 12.4.4 The 'South Ugie – Stuartfield to Longside' (SEPA Water Body name) (ID: 23224) has been classified by SEPA under the (WFD) as having moderate overall status (2020). The 'North Ugie – North/South to tidal limit' (ID: 23215) is classified as having poor overall status (2020).
- 12.4.5 'Faichfield Burn' (ID: 23217) is classified as a heavily modified water body with moderate overall status on account of bad overall ecology status. The 'Burn of Ludquharn' (ID: 23225) (Burn of Cairngall) has been classified as a heavily modified water body with moderate overall status on account of poor overall ecology status. Both the Faichfield Burn and Burn of Ludquharn are predicted to be of 'Good' status by 2027.
- 12.4.6 Due to the water bodies being classified as heavily modified and strongly influenced by farming practices, the water features within the Site are likely to have the same classifications as these water bodies and therefore are artificial and heavily modified.

Fisheries

- 12.4.7 The Proposed Development is located in an area managed by the Ugie District Salmon Fishery Board. The Ugie Angling Association and the river management team are responsible for the operation of a hatchery, the commissioning of electro surveys of juvenile population, the repairing of riverbanks and improving the accessibility to the spawning beds of the returning adult salmon and trout.

12.4.8 The Ugie catchment supports populations of Atlantic salmon and sea trout (see **Volume 2, Chapter 9: Ecology, Nature Conservation and Ornithology** for further details).

Designated Sites

12.4.9 According to NatureScot Sitelink¹⁸³, there are no SSSI, SAC, SPA, Ramsar sites or MPAs located within 1 km of the Proposed Development.

Geology and Soils

Bedrock Geology

12.4.10 According to British Geological Survey (BGS) Bedrock Geology 1:50,000 scale mapping¹⁸⁴, the bedrock formations underlying the Proposed Development are Forest of Deer Pluton - Melagranite, biotite. Igneous bedrock formed between 485.4 and 443.8 million years ago during the Ordovician period. A small area on the western edge of the Site is mapped as being underlain by Neoproterozoic Era Crinan Subgroup and Tayvallich Subgroup (DBCT) comprising of metamorphic semipelite, pelite and psammite rock.

12.4.11 The only structural or linear features mapped within the Study Area is a single basalt dyke striking east-west, located south of Netherton Farm, in the south of the Proposed Development. Its identified as an unnamed igneous intrusion, Carboniferous to Permian period and may be coincident with more minor unmapped deformity.

Superficial Geology

12.4.12 The Site is underlain by the Banchory Till Formation, a Quaternary glacial deposit comprising a gravelly and sandy Diamicton. To the west and east of the Site, Glaciofluvial Ice Contact Deposits, Glaciofluvial Sheet Deposits and Alluvial deposits are recorded associated with glacial deposition and nearby paleo meltwater channels and burns.

12.4.13 There are areas within the Proposed Development where no superficial deposits are mapped, and thin soils lay directly over the bedrock.

Soils and Peat

12.4.14 The James Hutton Institute National Soil Map of Scotland¹⁸⁵ indicates that the majority of the Proposed Development is mapped as Noncalcareous gleys with peaty gleys with a central pocket of the Proposed Development. Both derive from the Tarves formations which include drifts derived from intermediate rocks or mixed acid and basic rocks, both metamorphic and igneous and the resulting land being undulating lowlands with gentle slopes. This is evident from the land use which is modified on account of pastoral farming.

12.4.15 According to the national scale land capability for agriculture (LCA) map provided by the James Hutton Institute¹⁸⁶ the soils within the Proposed Development are identified as follows;

- Class 3.1: land capable of producing consistently high yields of a narrow range of crops and/ or moderate yields of a wider range. Short grass leys are common;
- Class 3.2: land capable of average production though high yields of barley, oats and grass can be obtained. Grass leys are common; and
- Class 4.2: land capable of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops.

¹⁸³ NatureScot, (2021). Sitelink [online] Available at: <https://sitelink.nature.scot/map> [Accessed: January 2024].

¹⁸⁴ BGS, (2021). Geology of Britain viewer [online]. Available at: https://geologyviewer.bgs.ac.uk/?_ga=2.85547613.553318703.1716538812-714471721.1716538812 [Accessed: January 2024].

¹⁸⁵ James Hutton Institute. Scotland's Soils [online]. Available at: http://map.environment.gov.scot/Soil_maps/?layer=1 [Accessed: April 2024].

¹⁸⁶ James Hutton Institute. Capability Maps [online]. Available at: https://map.environment.gov.scot/Soil_maps/?layer=5 (Accessed: April 2024).

12.4.16 Prime agricultural land is defined as LCA Classes 1, 2 and 3.1. An assessment has been undertaken to consider impacts on agricultural land (including prime agricultural land) and is presented in **Volume 2, Chapter 14: Land Use and Agriculture**.

12.4.17 According to the NatureScot Carbon and Peatland map¹⁸⁷, the Proposed Development is underlain by Class 0 (mineral), Class 4, Class 5, which are not classified as potential priority peatland habitats. However, a small area of Class 1 and Class 2 (Nationally important carbon-rich soils) is noted within the 1 km Study Area and is approximately 850 m south of the Proposed Development.

Contaminated Land

12.4.18 There are no historical records of contaminated land within the Proposed Development. Contaminated soil is unlikely to be present within the Site due to it being previously undeveloped, with historical and present land use being for agricultural.

Mineral Extraction

12.4.19 The Proposed Development is not within a mineral safeguarding area or areas of search for mineral development according to Aberdeenshire Council.

12.4.20 Evidence of piecemeal legacy mineral extraction is present within the Study Area, including small quarries as well as sand and gravel pits, but none are situated within the Proposed Development.

Groundwater

12.4.21 The groundwater body underlying the Proposed Development is the Mintlaw groundwater unit (ID: 150655). It is 323.1 square kilometres in area which was classified by SEPA, under the WFD, as having an overall status of 'Good' in 2022.

12.4.22 The Proposed Development is underlain by unnamed igneous intrusion, Ordovician to Silurian, which is classed as a low productivity aquifer. These formations may support small amounts of groundwater in the near surface weathered zone and secondary fractures and rare springs. In addition, the western extent of the Proposed Development is underlain by Argyll Group, which is also a low productivity aquifer and similarly may support small amounts of groundwater in near surface weathered zone and fractures.

12.4.23 Groundwater vulnerability to pollution is predominantly Class 2-3¹⁸⁸, which is defined as 'vulnerable to some pollutants, with slow impact in many scenarios. Due to the high degree of heterogeneity in the aquifer associated the flow being constrained to the upper weathered zone (and thereby controlled by topography) as well as fractures, connectivity of the aquifer at the Proposed Development with the wider Mintlaw groundwater body will be limited.

12.4.24 Intrusive Site Investigation has also been undertaken within the Proposed Development and identified a typical water table depth of approximately 0.5 m to 10 m below ground level. The investigation identified spatially discontinuous perched groundwater in the overlying superficial deposits and soils, and a deeper groundwater table in the underlying bedrock that was semi-confined by the impermeable nature of the igneous rocks.

¹⁸⁷ NatureScot. Carbon and Peatland Map 2016 [online]. Available at: <https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/>.

¹⁸⁸ BGS (2011) User Guide: Groundwater Vulnerability (Scotland) GIS dataset, Version 2 [online] Available at: <http://nora.nerc.ac.uk/id/eprint/17084/1/OR11064.pdf>.

Groundwater Dependent Terrestrial Ecosystems

- 12.4.25 SEPA’s guidance on assessing the impacts of developments on GWDTE (LUPS-GU31)¹⁸⁹ requires assessment of potential GWDTE located within 250 m of excavations greater than 1 m and within 100 m of excavations less than 1 m.
- 12.4.26 A targeted National Vegetation Classification (NVC) survey was undertaken in January 2024 (further details are provided in **Volume 4, Technical Appendix 9.1: Habitats Baseline**). The NVC communities identified within the Site Boundary and the surrounding 250 m of supporting GWDTE are displayed in **Table 12-5**.
- 12.4.27 The NVC survey focussed on areas with the potential to support GWDTE; thus, communities mapped are predominantly grasses and rushes.

Table 12-5 NVC communities within 250 m of the Proposed Development

NVC Community	Potential Groundwater Dependency based on SEPA LUPS-GU31
<i>MG9 Holcus lanatus – Deschampsia cespitosa grassland</i>	Moderate
<i>MG10 Holcus lanatus – Juncus effusus rush-pasture</i>	Moderate

- 12.4.28 Communities identified on-site are often associated with surface water or direct rainfall, with surface water flowing downslope locally to eventually form or join surface water channels. It was within these areas of flow convergence that the GWDTE communities were identified.
- 12.4.29 The hydrogeology within 250 m of the Proposed Development igneous bedrock aquifer underlying the Proposed Development has low productivity likely to be the primary source of water nourishing these habitats. Furthermore, site investigation¹⁹⁰ has identified a water table typically beneath the likely rooting layer for these communities, further evidencing a dependence on rainfall and overland flow, with wetting in flatter areas exacerbated by the dominance of gley soils.
- 12.4.30 Rush pasture (MG10) communities are noted in small clusters within the Proposed Development and grassland communities noted at the north of the Site. These are likely to be associated with poor drainage to unnamed tributaries and Burn of Faichfield and are coincident with the area of surface water flooding. Therefore, the combination of poor permeable geology, inadequate drainage and primary land used to be cattle/livestock grazing would suggest that the area is unable to sustain GWDTE.
- 12.4.31 The majority of the Site is therefore assessed to be of Low sensitivity with regards to GWDTEs as the majority of the NVC habitats have been assessed as not being groundwater dependent.

Water Supplies

Private Water Supplies

- 12.4.32 The Aberdeenshire Council Register of PWS indicates there are 35 potential PWS within 1 km of the Proposed Development (as shown on **Volume 3, Figure 12.2: Private Water Supplies**). Through consultation with landowners and site visits a further two PWS were identified, one at Parkhill and one at Cairngall Farmhouse.
- 12.4.33 The list of PWS was screened to determine the potential to be impacted based on the source-pathway-receptor (S-P-R) framework. The screening has been undertaken using baseline information presented in this chapter,

¹⁸⁹ SEPA (2017). Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. [online]. Available at: <https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf>.

¹⁹⁰ BAM (2024, January). ASTI Substation Site – LT444 Netherton Hub, Ground Investigation Factual Report.

including considerations of hydrology, hydrogeology and topography. The screening also took account of further information obtained via direct consultation with PWS users, as well as site walkover surveys.

12.4.34 The screening identified six PWS (seven PWS sources) which require more detailed assessment. These PWS are summarised in **Table 12-6**.

Table 12-6 Private Water Supplies

PWS ID	PWS Name	Source Location*	Source Type	PWS distance from Proposed Infrastructure (approximate)	Further Assessment Required?
4	Tiffery	404513, 845965	Borehole	140 m west	Yes
8	Salish Lodge	404123, 845417	Well	480 m west	Yes
14	Monyruey	405724, 847237	Borehole	300 m north	Yes
24	Hillhead Cairngall	404952, 847108	Well	600 m north	Yes
30	Cairngall Farmhouse	404400, 845800 Well (1) and 404741, 845896 Well (2)	Two Wells	Well (1) 50 m west Well (2) within proposed infrastructure footprint	Yes
37	Parkhill	406268, 845995	Well	225 m east	Yes

12.4.35 Further assessment of these PWS is presented in **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**. This follows SEPA's guidance (LUPS-GU31) on assessing the impacts of any potential infrastructure involving development on sensitive receptor and/or excavations greater than 1 m within 250 m of sensitive receptor or within 100 m of excavations less than 1 m. If any of these requirements are met, then a bespoke assessment is required. **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**, has therefore been completed with reference to this guidance.

Public Water Supplies/Regulated Sites

12.4.36 No abstractions regulated by SEPA under CAR were identified within 1 km of the Proposed Development.

12.4.37 According to the Scottish Government website¹⁹¹, the Proposed Development is within a DWPA for groundwater; however, not for surface water. Scottish Water confirmed the Proposed Development is not located within a DWPA for surface water. Information regarding public registered assets would be sought from Scottish Water at the detailed design stage of the Proposed Development.

Flooding and Flood Risk

12.4.38 SEPA's indicative flood risk mapping¹⁹², suggests that the Proposed Development is not at risk of fluvial flooding (Low, Medium or High risk). Within the wider Study Area, there is an envelope of High fluvial flood risk associated with the South Ugie, Burn of Cairngall and Burn of Faichfield, approximately 500 m north, 350 m west and 500 m east respectively, of the Proposed Development.

12.4.39 There is a small, localised areas at high risk of pluvial (surface water) flooding within the Proposed Development abutting the A950 near to the Flushing area. Due to the presence of high-risk surface water flooding at the north of the Site, surface water flooding should remain as a risk.

12.4.40 As detailed within the **Flood Risk Assessment** presented in **Volume 4, Technical Appendix 12.2**, there is very low to no risk of fluvial, coastal, groundwater, and sewer flooding.

¹⁹¹ Scottish Government (2014). Drinking water protected areas - Scotland River basin district: map 7 [Online]. Available at: <https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/> [Accessed: July 2024].

¹⁹² Scottish Environment Protection Agency – Flood Maps. [Online] Available at: <https://map.sepa.org.uk/floodmap/map.htm> [Accessed: July 2024].

Future Baseline

- 12.4.41 There is potential for climate change to impact on future baseline conditions. Climate change studies predict a decrease in summer precipitation and an increase in winter precipitation alongside slightly higher annual average temperatures. This suggests that there may be greater pressures on water supplies in summer months in the future. Storms are predicted to be of greater intensity. Therefore, peak fluvial flows associated with extreme storm events may also increase in volume and velocity. These climate change factors have been considered when considering the potential for significant effects.
- 12.4.42 In the absence of the Proposed Development, the prevailing morphology and hydrological present within the Proposed Development are likely to be present in their current form, which according to the River Basin Management Planning (RBMP) are generally highly modified.

12.5 Sensitive Receptors

- 12.5.1 Receptor sensitivity has been determined using the criteria provided in **Table 12-2**. The Proposed Development covers a large area and therefore sensitivity classification may vary spatially. To adopt a conservative approach, the receptor sensitivity will be based on the most sensitive ranking.
- 12.5.2 On the basis of the baseline surveys and available information, **Table 12-7** below presents the sensitivity of the identified receptors.

Table 12-7 Sensitive receptors

Receptor	Sensitivity	Justification
Surface Water	Medium	There are no major watercourses within the Proposed Development (shown on a 1:50k OS), with the minor watercourses / drainage ditches that are present being highly modified. Watercourses in the wider Study Area are identified as being of 'Poor' status under WFD. Notwithstanding, to accommodate for the predicted improvement in WFD status of 'Good' by 2027, surface water features within the Site are considered to be of medium sensitivity.
Flooding	Medium	The Proposed Development is not at risk of flooding from fluvial, groundwater, sewage or coastal sources. There is high risk of pluvial (surface water) flooding at the northern extent of Proposed Development and low, medium and high fluvial flood risk downgradient of the Site within the Study Area.
Fisheries	Medium	Considered to be of Medium sensitivity as the Ugie is a locally important fishery.
Geology	Low	The bedrock geology is typical of wider area with no designated sites of geological interest located within the Proposed Development or in a location downstream that could be impacted.
Soils (none peat or peatland)	Low	Soils are not of notable quality or habitat. There is also no evidence of contaminated land within the Proposed Development.
Groundwater	Low	On account of the aquifers low productivity, and likely limited vertical and lateral extent, groundwater is considered to be of Low sensitivity. The relative importance of groundwater to surface water baseflow or private water supplies is recognised by those sensitivity classifications.
GWDTE	Low	Hydrological assessment of potential GWDTE communities within the vicinity of the Proposed Development, as identified through consideration of the prevailing hydrogeology and NVC survey results, has shown these habitats are unlikely to be groundwater dependent.
Private Water Supplies	High	Whilst PWS are typically not of regional or national importance, they are of high importance of the user and so are identified as Highly sensitive. A

Receptor	Sensitivity	Justification
		<p>S-P-R assessment has confirmed that the majority of PWS identified within the Study Area are not at risk of impact from the Proposed Development. Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA) has identified that the following PWS could be impacted by the Proposed Development:</p> <ul style="list-style-type: none"> • Tiffery; • Salish Lodge; • Monyruy; • Hillhead Cairngall; • Cairngall Farmhouse; and • Parkhill.

12.6 Assessment of Effects, Mitigation and Residual Effects

Project Characteristics

12.6.1 The construction phase of the Proposed Development would involve a number of different elements. **Volume 2, Chapter 3: Description of the Proposed Development** provide further detail, however, with regards to hydrology, hydrogeology, geology and soils, the principal activities are as follows;

- construction of temporary and permanent access routes;
- excavation and construction of the permanent structures;
- creation of temporary construction compound and laydown areas;
- installation of drainage features around permanent infrastructure;
- storage of fuels and oils;
- batching of concrete;
- temporary welfare facilities and site utilities;
- temporary topsoil and subsoil storage; and
- temporary drainage during construction.

12.6.2 Following commissioning of the Proposed Development, all construction sites would be landscaped or reinstated. The landscaping and reinstatement would form part of the contract obligations for the successful Principal Contractor and would include the removal of all temporary access routes.

12.6.3 During the operational phase of the Proposed Development, activities with particular relevance are;

- modification of groundwater levels and flow;
- surface water drainage, including treatment and discharge of surface water drainage; and
- foul drainage, including treatment and discharge.

Mitigation by Design

12.6.4 The layout and location of the Proposed Development has, as far as possible, been selected to avoid direct effects on watercourses, PWS, geology and soils, and sensitive habitats.

12.6.5 The Proposed Development does not require any crossings or culverting of existing watercourse channels, shown on OS 1:50,000 mapping that would be subject to CAR licensing. There is likely to be combination of smaller or ephemeral surface channels and sub-surface field drainage within the Site, which may be more apparent during prolonged wet weather, and these will require appropriate management.

12.6.6 OS 1:10,000 scale mapping and aerial imagery indicate several small unnamed watercourses and drainage channels, crossed by the Proposed Development; the closest of which being located immediately adjacent to the Proposed Development. The identified unnamed tributary (drainage ditch) flowing from south to north in the centre of the Proposed Development is to be realigned during the construction of the Proposed Development

and maintained as an open channel. Requirements for authorisation under CAR would be secured by the appointed Principal Contractor.

- 12.6.7 A drainage strategy has been prepared for the Proposed Development, which includes drainage and Sustainable Drainage System (SuDS). SuDS mimic natural drainage processes to reduce the effect on the quality and quantity of runoff from developments and provide benefit to amenity and biodiversity. The SuDS have been integrated within the landscape proposals to enhance amenity, biodiversity, and habitat, whilst protecting and/or enhancing water quality. The drainage strategy for the Proposed Development will be design in accordance with current best practice to provide adequate capacity to not allow flooding out of the network for the 1 in 30 year storm event and flood water generated up to the critical 1 in 200 year, plus 37% climate change storm event shall be constrained within the areas on site as not to cause damage to buildings, essential services, adjoining developments and services.
- 12.6.8 Domestic foul flows will be conveyed across site in a below ground pipe network to a package treatment plant before combining with surface water flows to a suitable surface water discharge point.
- 12.6.9 Further details on the proposed site drainage are presented in **Volume 2, Chapter 3: Description of the Proposed Development (paragraphs 3.3.11 to 3.3.16)**, as well as in **Volume 4, Technical Appendix 3.1: Drainage Strategy**.

Good Practice Mitigation

- 12.6.10 The Applicant has established best practice construction techniques and procedures that have been agreed with statutory consultees, including SEPA. These are set out within the Applicant's General Environmental Management Plans (GEMPs), included in **Volume 4: Technical Appendix 3.2: General Environmental Management Plans (GEMPs) and Species Protection Plans (SPPs)**. A summary of those most relevant to hydrology, hydrogeology, geology, and soils of the Proposed Development is provided below.
- 12.6.11 The adoption of the applicable GEMPs would reduce the probability of an incident occurring and also reduce the magnitude of any incident due to a combination of good site environmental management procedures, including minimised storage of soil, soil management, staff training, contingency equipment, and emergency plans.
- 12.6.12 The GEMPs applicable to this chapter are:
- Oil Storage and Refuelling (TG-NET-ENV-510);
 - Soil Management (TG-NET-ENV-511);
 - Working in or Near water (TG-NET-ENV-512);
 - Working in Sensitive Habitats (TG-NET-ENV-513);
 - Working with Concrete (TG-NET-ENV-514);
 - Watercourse Crossings (TG-NET-ENV-515);
 - Contaminated Land (TG-NET-ENV-517);
 - Private Water Supplies (TG-NET-ENV-518); and
 - Bad Weather (TG-NET-ENV-523).
- 12.6.13 The following assessment of effects assumes that the measures contained within the GEMPs are implemented. The Proposed Development would be constructed in accordance with these plans.
- 12.6.14 A contractual management requirement of the successful Principal Contractor would be the development and implementation of a comprehensive and site-specific Construction Environmental Management Plan (CEMP). This document would detail how the successful Principal Contractor would manage the works in accordance with all commitments and mitigation detailed in the EIA, SSEN's GEMPs, statutory consents and authorisations, and industry best practise and guidance.
- 12.6.15 The CEMP will also outline measures to ensure that the works minimise the risk to soils, peat, geology, groundwater, surface water and PWS.

12.6.16 It is expected that the following will be included within the CEMP and would ensure the works are undertaken in accordance with good practice guidance¹⁹³;

- during construction there would be heavy plant and machinery required and as a result it is appropriate to adopt best working practices and measures to protect the water environment, including those set out in any Guidance for Pollution Prevention (GPP 1);
- in accordance with GPP 2 any above ground on-site fuel and chemical storage would be bunded;
- emergency spill response kits would be maintained during the construction works (GPP 21);
- a vehicle management system would be put in place wherever possible to reduce the potential conflicts between vehicles and thereby reduce the risk of collision (GPP21);
- suitable access routes would be chosen which minimise the potential requirement for either new temporary access tracks or for tracking across open land which could contribute to the generation of suspended solids;
- a speed limit would be used to reduce the likelihood and significance of any collisions;
- plant nappies would be placed under stationary vehicles which could potentially leak fuel / oils;
- any temporary construction / storage compounds required would be located remote from any sensitive surface water receptors and will be constructed to manage surface water run-off in accordance with best practice;
- any water contaminated with silt or chemicals would not be discharged directly or indirectly to a watercourse without prior treatment;
- water for temporary site welfare facilities would either be brought to site or a local surface water or groundwater abstraction would be identified. Any water abstraction would be made in accordance General Binding Rule or an authorisation would be obtained from SEPA in accordance with the Controlled Activity Regulations (CAR); and
- foul water would either be collected in a tank and collected for offsite disposal at an appropriately licensed facility or discharged to a septic tank or soakaway in accordance with the CAR.

12.6.17 The implementation of the CEMP would be managed on site by a suitably qualified and experienced Environmental Clerk of Works (EnvCoW), with support from other environmental professionals as required. The EnvCoW would have authority to stop any works that are or have potential to impair soils, geology, or the water environment. Additional surface water quality and groundwater monitoring strategies for the pre-construction, construction and post-construction phases should also be established. As per **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**, this may include monitoring at PWS.

12.6.18 It is anticipated that the Proposed Development would be subject to a construction site licence under CAR and, as such, the detailed design of proposed drainage works would be subject to licensing requirements and compliance with regulations. Specific requirements would be agreed in consultation with the Principal Contractor and SEPA and set out in the Construction Site License application.

Assessment of Potential Effects

12.6.19 The following have the potential to impair the soils, geology, local hydrology (surface water) and hydrogeology (groundwater):

- pollution incidents;
- erosion and sedimentation;
- loss and compaction of soils;
- modification of groundwater levels and flows;
- impacts on GWDTE;
- modification of surface water flow and runoff; and
- potential impacts on PWS.

¹⁹³ NetRegs. Guidance for Pollution Prevention (GPP) documents [Online]. Available at: <https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/> Guidance for Pollution Prevention (GPP) documents | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland.

12.6.20 An assessment of these impacts with reference to **Table 12-2, Table 12-3, Table 12-4** and **Table 12-7** are presented in the following sections.

Construction Phase

Pollution Incidents

12.6.21 During the construction phase, a number of potential pollutants would be present on-site to facilitate civil engineering activities, including oil, fuels, chemicals, unset cement and concrete, and waste and wastewater from construction activities. With chemicals and oil being stored and used on-site there is the potential for an incident. Potential sources of suspended sediments on the Proposed Development include the earthworks and excavation dewatering associated with the Proposed Development.

12.6.22 Any pollution incident occurring on site could have a detrimental effect on the water quality of the nearby surface waters (including the Burn of Ludquharn and Faichfield Burn), groundwater (Mintlaw groundwater body) and/or soil, thereby also affecting ecology (see **Volume 2, Chapter 9: Ecology, Nature Conservation and Ornithology**), as well as PWS. Major causes of environmental harm associated with working in or near watercourses include:

- silt, e.g. disturbance of riverbed or bank, dewatering and pumping of excavations, run-off from exposed ground, plant washing, accidental disturbance of buried field drains;
- cement and concrete – which is very alkaline and corrosive and can cause serious pollution;
- chemicals and solvents – oil storage, refuelling, trade materials etc; and
- waste materials (including special waste), e.g. oily wastes, spent acids and solvents.

12.6.23 Considering the design mitigation and construction good practice, specifically the Working in or Near Water, Watercourse Crossings, Private Water Supplies, Soil Management, Oil Storage and Refuelling, and Bad Weather GEMPs, the effects have been assessed as follows:

- The magnitude of the change of a pollution incident upon surface waters (Medium sensitivity) is Moderate and the probability is considered to be Low, which results in an overall **Minor (not significant)** effect.
- The magnitude of the change of a pollution incident on soils (Low sensitivity) is considered to be Minor and of Low probability to occur, resulting in a **Negligible (not significant)** effect.
- The magnitude of the change of a pollution incident upon groundwater (Low sensitivity) is Minor and the probability is considered to be Low, which results in a **Negligible (not significant)** effect.
- The magnitude of change of pollution on Ugie River fisheries (Medium sensitivity) is considered Minor and of Low probability to occur, giving an overall significance of **Negligible (not significant)**.

12.6.24 Considering the design mitigation and construction good practice, specifically the working in or near watercourses and Private Water Supplies GEMPs the effects have been assessed as follows:

- The magnitude of change of pollution effect on PWS (High sensitivity) is considered to be Moderate with a medium probability to occur, giving an overall significance of **Moderate (significant)** effect.

12.6.25 **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**, describes the qualitative and quantitative risks to PWS as a result of the construction and operation of the development. To safeguard PWS, additional mitigation is proposed including the preparation of a PWS Monitoring and Method Statement as well as other contingency arrangements, including the provision of permanent alternative supplies (connection to Scottish Water Mains supply) in some instances. The implication of this additional mitigation reduces the significance of the effect on PWS and is summarised in **Section 12.8, Residual Effects**.

Erosion and sedimentation

12.6.26 Soil erosion, loss of soil, and sediment generation may occur in areas where the ground has been disturbed during construction including in situations where:

- engineering activities occur close to or in watercourses;
- areas of substantial de-watering;

- watercourse realignment activities; and
- where higher velocity surface water flows may occur due to local slopes and drainage design.

12.6.27 Surface water passing through small surface drains, efficiently draining the new infrastructure, could exhibit higher localised flows, increasing the potential for bank erosion.

12.6.28 Sediment transport in watercourses can result in high turbidity levels which affect the ecology, particularly fish stocks, by reducing the light and oxygen levels in the water. Sediment deposition can further affect watercourses by potentially smothering plant life, invertebrates, and spawning grounds, and can reduce the flood storage capacity of channels and block culverts, resulting in an increased flood risk.

12.6.29 In the case of pollution incident effects, good practice site environmental management measures including the design of a construction phase drainage system would be expected to reduce any potential sedimentation effect downstream.

12.6.30 Vegetation cover would be re-established as quickly as possible on all areas of stripped ground, once activity involving these areas is complete. This would include track verges, screening bunds and cut slopes. Additional measures including hydroseeding and/or use of a biodegradable geotextile would be considered if insufficient topsoil is available and for areas of particular sensitivity that require immediate protection. Any water collecting within excavations would be pumped out prior to further work within the excavation. The water is likely to require treatment to remove suspended solids prior to discharge to ground.

12.6.31 Considering the design mitigation and construction good practice, specifically the Soil Management GEMP, the effects have been assessed as follows:

- The magnitude of change of erosion or loss of soils (Low sensitivity) is Minor, and the probability is considered to be Low, which results in a **Negligible (not significant)** effect.
- The magnitude of change of sedimentation of surface waters (Medium sensitivity) is Moderate and the probability is considered to be Low, which results in a **Minor (not significant)** effect.
- The magnitude of change of sedimentation of surface waters on Ugie Water fisheries (Medium sensitivity) is considered Minor and of Low probability to occur, giving an overall significance of **Negligible (not significant)**.

Loss and compaction of soils

12.6.32 Soil compaction as a result of construction works within the Proposed Development may damage the vegetation and result in a reduction in soil permeability and rainfall infiltration, thereby increasing the potential for longer-term erosion from surface water runoff. This would be most likely caused by tracking of heavy plant machinery.

12.6.33 Stockpiled and unvegetated/exposed areas of soils are also at risk of desiccation and erosion by wind and water, also potentially causing soil loss.

12.6.34 Considering the design mitigation and construction good practice, specifically the Soil Management GEMP, the effects have been assessed as follows:

- The magnitude of change upon soils (Low sensitivity) is Moderate and the probability of effect of soil loss is considered to be Medium which results in an overall **Minor (not significant)** effect on soils.
- The magnitude of change upon soils (Low sensitivity) is Moderate and the probability of effect of compaction of soil is considered to be Medium, which results in an overall **Minor (not significant)** effect on soils.

Modification of groundwater levels and flows

12.6.35 Ground investigation has identified that groundwater is typically within 0.5 to 10.0 m below ground level (bgl). Therefore, excavations could disrupt groundwater systems resulting in the lowering of groundwater levels in the immediate vicinity of the excavations and alterations to flow paths during dewatering activities and once permanent cut slopes are established.

- 12.6.36 Earthworks associated with the Proposed Development would likely result in moderate changes to the local subsurface and groundwater (which locally may be major) on account of the lowering of the existing ground level by up to 15 m, with the potential for up to 11 m depth cut into rock.
- 12.6.37 Changes in groundwater levels and flows have the potential to impact GWDTE and PWS, potentially affecting both the quality and quantity of water nourishing receptors. As described in **Section 12.4, paragraphs 12.4.26 to 12.4.31**, NVC communities at the Proposed Development have been identified as potentially groundwater dependent are unlikely to be connected with the groundwater, with water logging at the surface (and consequential nourishment) a factor of poor drainage and convergence of overland flow.
- 12.6.38 Pollution control during excavation and dewatering shall accord with the good practice mitigation associated with pollution incidents and erosion and sedimentation. Any required discharge licence for dewatering would be obtained prior to excavation commencing.
- 12.6.39 Considering the design mitigation and construction good practice, specifically the Working in Sensitive Habitats GEMP, the effects have been assessed as follows:
- The magnitude of change on groundwater levels and flows upon groundwater (Low sensitivity) is Moderate and the probability is considered to be High, which results in a **Minor effect (not significant)**.
 - The magnitude of change on GWDTE (Low sensitivity) is Moderate and the probability is considered to be High, which results in a **Minor effect (not significant)**.
- 12.6.40 **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**, describes the qualitative and quantitative risks to PWS as a result of the construction and operation of the Proposed Development. In order to safeguard PWS, additional mitigation is proposed including the preparation of a PWS Monitoring and Method Statement as well as other contingency arrangements, including the provision of permanent alternative supplies (connection to Scottish Water Mains supply) in some instances. The implication of this additional mitigation reduces the significance of the effect on PWS and is summarised in **Section 12.8, Residual Effects**.
- Modification of Surface Water Drainage Patterns
- 12.6.41 Surface flows could be impeded by construction activity in the vicinity of or adjacent to stream channels. Blockages could be caused by inadequate control of earthmoving plant, sedimentation, and poor waste management; all of which could lead to flooding upstream.
- 12.6.42 The Proposed Development would restrict the infiltration of rainfall into the soil and underlying superficial deposits through the introduction of impermeable areas. This results in localised increased volumes of surface runoff and could exacerbate flood risk downstream. New permanent impermeable areas may result in the interception of diffuse overland flow, which could disrupt the natural drainage regime of the Site by concentrating flows and influencing drainage in soils.
- 12.6.43 The design mitigation, GEMPs would reduce the impact of modification to surface water drainage patterns, with proposed artificial drainage installed only where necessary and wherever practical, being installed in advance of ground being cleared of vegetation. All structures would be designed and constructed following good practice techniques and would be of sufficient capacity to receive storm flows with an allowance for increased flows due to climate change. Key measures identified to minimise alterations to surface water drainage patterns include:
- application of sustainable drainage techniques to increase peak lag time and implementation of cross-drains at appropriate intervals and frequent discharge points to reduce scour potential;
 - the construction of suitably sized on-site attenuation storage;
 - minimising the size and duration of in-channel works; and
 - appropriate design of realignment to ensure sufficient capacity plus climate change allowance storm flows.
- 12.6.44 New drainage outfalls to the Burn of Faichfield and Burn of Ludquharn will benefit from source and site control methods to reduce peaks flows and provide betterment on the greenfield runoff, as outlined in **Volume 4, Technical Appendix 3.1: Drainage Strategy**. This will ensure no adverse change in the integrity of existing

geomorphological conditions that will likely increase channel flow velocity, affecting baseline sediment transport and potential causing erosion of downstream banks.

- 12.6.45 The design of the realigned unnamed minor watercourse within the Site would accord with the recommendations of **Volume 4, Technical Appendix 3.1: Drainage Strategy**. The watercourse would be an open channel, with the specific design requirements identified through the completion of a Stage 2 Geomorphological Assessment that would be undertaken post-consent. Potential benefits of restoring the watercourse could be enhanced water quality, healthier ecosystems, ecological and biodiversity improvements, flood mitigation due improved water absorption and protecting surrounding areas.
- 12.6.46 Subject to appropriate surface water drainage design the Proposed Development will comply with Energy Networks Association Engineering Technical Report 138 (ENA ETR 138) and NPF4.
- 12.6.47 Considering design mitigation, GEMPs and the adoption of measures within the **Volume 4, Technical Appendix 3.1: Drainage Strategy**, the effect is assessed as follows:
- The magnitude of change of a short-term increase in flood risk on third parties and nearby developments (Medium sensitivity) is Minor and the probability of effect is considered to be Low, which results in a **Negligible (not significant)** effect.
 - The magnitude of change of a short-term increase in flood risk on floodplains and construction workers (Medium sensitivity) is considered Minor (as there may be works undertaken in areas of flood risk) and the probability of effect is considered to be Low, which results in a **Negligible (not significant)** effect.
 - The magnitude of change on surface water drainage patterns, with specific reference to the realignment of the unnamed tributary to Burn of Faichfield (Medium sensitivity) is Minor and the probability is considered to be High, which results in a **Minor (not significant)** effect.

Private Water Supplies

- 12.6.48 Consultation with property owners to verify the location, type, and use of PWS identified by desk study has been done as part of this assessment, and can be seen fully in **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**. The Principal Contractor will be required to consider all construction activities. They should also satisfy themselves that they are aware of all PWS and associated network infrastructure (in the local area), that may be at risk of adverse effects as a result of the Proposed Development.
- 12.6.49 As indicated in the PWSRA, standard good practice mitigation should be included within a CEMP which will be prepared by the Principal Contractor prior to construction. In addition to this mitigation, a Private Water Supply Management Plan (PWSMP) will be prepared (prior to construction) and will detail all relevant mitigation, pre-construction measures, management measures, monitoring requirements and contingency plans relevant to PWS and considered within this chapter and **Volume 5, Technical Appendix 12.1: Private Water Supply Risk Assessment (PWSRA)**.
- 12.6.50 Alternative new mains connection supplies have been recommended for PWS at Cairngall Farmhouse and Parkhill and this should be agreed with owner/occupier and SEPA prior to works commencing. If applicable, water quality and water quantity monitoring of the PWS, could be undertaken during and after construction to those not given permanent alternative supply. This includes supply protection measures required for Salish Lodge and Hillhead Cairngall, with no mitigation required at Monyruey.
- 12.6.51 Considering the design and mitigation, the effect is assessed as follows: for the PWS that are not being replaced, the magnitude of effect on PWS water quality/quantity (considered highly sensitive) is considered to be Minor and of Low probability to occur, giving an overall significance of **Minor (not significant)**.
- 12.6.52 The PWS that are being replaced with permanent alternative supplies are considered as **no change**, as this process will be agreed with relevant landowners, then installed ahead of construction disturbance.

Operation Phase

12.6.53 During the operation phase of the Proposed Development, it is expected the impacts on surface water quality, including pollution incidents as well as erosion and sedimentation would be considerably reduced by the absence of construction and completion of reinstatement.

12.6.54 However, there is the potential for the following long-term impacts on the hydrology, hydrogeology, geology, and soils environment, in the absence of mitigation measures.

Modification of groundwater levels and flows

12.6.55 Once the Proposed Development is constructed there will be only a limited need for ongoing excavations and consequential active dewatering (pumping). However, as a result of the removal of strata beneath the likely water table, passive dewatering may continue to occur as seepage from the floor or cut faces.

12.6.56 The final design of the Proposed Development will incorporate suitable groundwater control in accordance with CIRIA C750 (2016) to manage groundwater ingress. The discharge of this groundwater shall be incorporated into the permanent sustainable drainage design.

12.6.57 Considering the design mitigation the operational effects have been assessed as follows:

- The magnitude of change on groundwater levels and flows upon groundwater (Low sensitivity) is Moderate and considered to be Medium probability, which results in a **Minor effect (not significant)**.

12.6.58 Long-term dewatering may result in long-term adverse impacts on water quantity for nearby PWS.

Modification of Surface Water Drainage Patterns

12.6.59 No additional changes to overland drainage and surface water flows are anticipated during the operational phase of the Proposed Development. All permanent drainage infrastructure would remain in place during the Proposed Development's operation in accordance with the final drainage strategy. A monitoring and maintenance programme would be put in place for the drainage infrastructure, to include regular visual inspection of drainage ditches and sustainable drainage features, including an on-going maintenance strategy. The plan would be adopted by the Sites operator to ensure sustainable drainage features continue working effectively.

12.6.60 It is anticipated that once re-aligned to a more natural state, the unnamed watercourse within the Site would be done with the aim of improving upon the current WFD status of 'Poor'. The realignment would also seek to address flood risk associated with the current hydrological regime. These factors combined are likely to provide a beneficial effect.

12.6.61 Considering design mitigation and the adoption of measures within **Volume 4, Technical Appendix 3.1: Drainage Strategy**, the effect is assessed as follows:

- The magnitude of change on surface water drainage patterns (Medium sensitivity) is considered Minor and of Low probability to occur, giving an overall significance of **Negligible effect (not significant)**.
- The magnitude of change of a long-term increase in flood risk on third parties and nearby developments (Medium sensitivity) is Minor and the probability of effect is considered to be Low, which results in a **Negligible (not significant) effect**.
- The magnitude of change of a short-term increase in flood risk on floodplains (Medium sensitivity) is considered Minor (as there may be works undertaken in areas of flood risk) and the probability of effect is considered to be Low, which results in a **Negligible (not significant) effect**.

Private Water Supplies

12.6.62 During the operational phase of the Proposed Development, it is anticipated that the effects on the PWS will be in line with the construction phase. This is due to the significant earth and ground works affecting water yield for the PWS. The Principal Contractor must ensure that all operational activities are assessed to confirm that Proposed Development poses no risk of adverse effects to all PWS and associated infrastructure.

Residual Effects

- 12.6.63 Considering the design mitigation and GEMPs, potentially significant residual effects on PWS have been identified during both construction and operation phases.
- 12.6.64 If the Proposed Development is granted planning permission, two properties (Cairngall Farmhouse and Parkhill) will be given the option to connect to Scottish Water mains before construction begins. The Applicant will cover the costs of providing alternative supplies. These properties would be provided with a suitable option to connect to Scottish Water main before construction starts, ceasing the use of PWS abstractions.
- 12.6.65 The Applicant is in advanced negotiations to acquire/have acquired a property at Tiffery where one PWS is located and will either replace the PWS with a permanent alternative supply or decommission the PWS, as required.
- 12.6.66 One PWS at Monyruy required no additional mitigation and as such the effect remains Negligible (**not significant**).
- 12.6.67 The PWS that are being replaced with permanent alternative supplies or decommissioned are considered as **no change**, as this process will be agreed with relevant landowners, then installed ahead of construction disturbance.

12.7 Cumulative Effects

- 12.7.1 **Volume 2, Chapter 5** identifies other developments requiring consideration as part of the cumulative assessment. Together with these developments, the Proposed Development has the potential to result in cumulative effects with regards to hydrology, hydrogeology, geology and soils receptors.
- 12.7.2 The cumulative assessment identifies that potential effects are primarily associated with impacts on water quality and flood risk in watercourses and downstream receptors between developments. On the basis that there is unlikely to be any significant in combination or cumulative effects outwith the study area (1 km), the following developments have been identified as being within the same hydrological catchment area:
- Spittal to Peterhead HVDC underground cable route;
 - Eastern Green Link 3 HVDC underground cable route;
 - Netherton/Peterhead 400 kV OHL Diversion and Repurposing; and
 - Beauly to Blackhillock to New Deer to Peterhead 400 kV Overhead Line
- 12.7.3 **Volume 4, Technical Appendix 3.1: Drainage Strategy** and **Volume 4, Technical Appendix 12.2: Flood Risk Assessment** provide details on how effects associated with drainage and flood risk would be managed through permanent sustainable drainage design, which would incorporate multiple water quality treatments prior to discharge. Assuming that effective SUDS controls for each individual development and GEMPs/CEMPs are applied, cumulative effects are not anticipated, even if the other developments present potentially significant effects on the receiving hydrology, hydrogeology, geology, and soils environment.
- 12.7.4 The differing construction programming and activities that would be anticipated to occur across various developments reduces the probability that water quality and flow issues would be coincident across the catchments.

12.8 Summary

- 12.8.1 The following sensitive hydrology, hydrogeology, geology, and soils receptors associated within 1 km of the Proposed Development have been identified:
- surface water bodies;
 - groundwater bodies;
 - GWDTE
 - PWS;

- fisheries; and
- flood risk.

12.8.2 The assessment has considered how the Proposed Development would potentially affect the sensitive receptors listed above through the impacts of pollution of surface watercourses, groundwater, and water supplies; changes to resource availability; loss and compaction of soils; modification of groundwater levels and flows, and surface water drainage patterns, and short-term flood risk increase during the construction of the Proposed Development

12.8.3 The assessment considered how the Proposed Development would affect the above sensitive receptors. The assessment has concluded that with the implementation of mitigation measures the Proposed Development would not result in significant residual effects.