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Chapter 9: Water Resources and Flood Risk

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INDEX

9 WATER RESOURCES

9.1 Introduction

9.1.1.1 This Chapter presents an assessment of the potential significant effects on water resources associated with the construction, operation, and decommissioning of the Proposed Development as described in **Chapter 3: Development Description.**

9.1.1.2 The Chapter will:

- Describe the hydrological and hydrogeological baseline;
- Describe the assessment methodology and significance criteria used in completing the impacts assessment;
- Describe the potential effects, including direct, indirect, and cumulative effects;
- Describe the mitigation measures proposed to address potential significant effects; and
- Assess the residual effects remaining following implementation of mitigation.

9.1.1.3 This Chapter is supported by the following figures and technical appendices:

- Figures:
  - **Figure 9.1**: Water Resources and Flood Risk Study Area;
  - **Figure 9.2:** Surface Watercourses and Waterbodies;
  - **Figure 9.3**: Hydrogeology;
  - **Figure 9.4**: SEPA Flood Maps;
  - **Figure 9.5**: Private Water Supplies;
  - **Figure 9.6**: Protected Bathing Water Areas;
  - **Figure 9.7**: Watercourse Crossings; and
  - **Figure 9.8**: Designated Sites.
- Technical Appendices:
  - **Technical Appendix 9.1**: Outline Surface Water Drainage Strategy.

9.1.1.4 Figures and technical appendices are referenced in the text where relevant.

9.2 Methodology

9.2.1 Scope of Assessment

9.2.1.1 This Chapter considers the potential effects on:

- Water quality including impacts from pollution and sedimentation;
- Flood risk both to the Proposed Development and the direct and indirect effects of the Proposed Development on off-site flood risk;
- Water resources which include impacts to water quantity, flow paths, and geomorphological changes to watercourses as a result of proposed watercourse crossings;
- Private water supplies (PWS) which are within 250 m of the Proposed Development or in hydrological connectivity to the Site;
- Groundwater Dependent Terrestrial Ecosystems as a result of changes to flow regimes (although we note direct impact to habitats are covered in **Chapter 8: Ecology and Nature Conservation**); and
- Cumulative effects to hydrological resources as a result of the Proposed Development in combination with other developments.

9.2.2 Legislation, Policy, and Guidance

9.2.2.1 The national, regional, and local legislation and policy that provides the context for this EIA Chapter is summarised below.

Legislation

9.2.2.2 Any legislation referred to in this EIA Report is as subsequently amended and as currently in force at the date of this EIA Report.

9.2.2.3 The Water Framework Directive (WFD 2000/60/EC) established a framework for the protection, improvement and sustainable use of the water environment. It is transposed to Scottish law through The Water Environment and Water Services (Scotland) Act 2003 and subsidiary Regulations.

9.2.2.4 Other relevant legislation includes:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended 2013 and 2017);
- Pollution Prevention and Control (Scotland) Regulations 2012;
- The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017;
- The Water Environment (Miscellaneous) (Scotland) Regulations 2017;
- The Flood Risk Management (Scotland) Act 2009;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017; and

- The Public and Private Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2015.

National Policy

- National Planning Framework 4.

Local Policy

- Scottish Borders Council Local Development Plan 2024[1]; and
- Scottish Borders Council Strategic Flood Risk Assessment 2020[2].

Guidance and Advice

- Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems[3];
- Construction Industry Research and Information Association (CIRIA) Control of Water Pollution from Construction Sites (C532)[4];
- CIRIA Development and flood risk: guidance to the construction industry, C624D[5];
- Planning Advice Note 79: Water and Drainage[6];
- SEPA Engineering in the Water Environment Good Practice Guide: River Crossings[7];
- SEPA Controlled Activities Regulations (CAR) – A Practice Guide, Version 9.4[8];

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[1] Scottish Borders Council (2024). Local Development Plan. Adopted 2024. Available online at: adopted-ldp2-volume-2 Accessed February 2025.
[2] Scottish Borders Council (2020). Strategic Flood Risk Assessment. Available online at: Microsoft Word - LDP2 SFRA Final Draft Mar2020 Accessed March 2025.
[3] Scottish Government (2001). Planning Advice Note 61: Sustainable urban drainage systems. Available online at: https://www.gov.scot/publications/pan-61-sustainable-urban-drainage-systems/ Accessed February 2025.
[4] CIRIA (2001). Control of water pollution from construction sites. Guidance for consultants and contractors (C532). Available online at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C532&Category=BOOK
[5] CIRIA (2004). Development and flood risk – guidance for the construction industry (C624D). Available online at: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C624&Category=BOOK
[6] Scottish Government (2006). Planning Advice Note 79: Water and Drainage. Available online at: https://www.gov.scot/publications/planning-advice-note-pan-79-water-drainage/ Accessed February 2025.
[7] SEPA and Natural Scotland (2010). Engineering in the Water Environment Good Practice Guide: River Crossings, Second edition. Available online at: https://www.sepa.org.uk/media/151036/wat-sg-25.pdf Accessed February 2025.
[8] SEPA (2024). The Water Environment (Controlled Activities) (Scotland) Regulations. A Practical Guide v9.4. Available online at: car-a-practical-guide.docx Accessed February 2025.

- SEPA Guidance on assessing the impacts of development on groundwater abstractions[9];
- CIRIA The SuDS Manual (C753)[10];
- CIRIA Environmental Good Practice on Site (C741)[11];
- Highways Agency's Design Manual for Roads and Bridges (DMRB) LA 113 – Road drainage and the water environment, Revision 1, 2020[12];
- SEPA Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Runoff from Construction Sites[13];
- SEPA Guidance for Pollution Prevention[14];
- SEPA Engineering guidance - SEPA supporting guidance: good practice guides[15] including WAT-SG-25: River Crossings and WAT-SG-26: Sediment Management;
- SEPA Planning Background Paper. Flood Risk[16];
- SEPA Development Management Guidance: Flood Risk[17]; and
- SEPA Recommended Riparian Corridor Layer for use in Land Use Planning[18].

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[9] SEPA (2024) Guidance on assessing the impacts of development on groundwater abstractions. Available online at: guidance-on-assessing-the-impacts-of-developments-on-groundwater-abstractions.docx Accessed March 2025.
[10] CIRIA (2015). The SuDS Manual (C753). Available online at: https://www.susdrain.org/resources/SuDS_Manual.html
[11] CIRIA (2015). C741 Environmental good practice on site guide. 4th edition. Available online: https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductcode=C741&Category=BOOK
[12] Highways Agency (2020). Design Manual for Roads and Bridges (DMRB) LA 113 – Road drainage and the water environment, formerly HD45/09, Revision 1. Available online at: https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727. Accessed February 2025.
[13] SEPA (2021). Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Runoff from Construction Sites. Available online at: https://www.sepa.org.uk/media/340359/wat-sg-75.pdf Accessed February 2025.
[14] Guidance for Pollution Prevention (various). Available online at: Guidance for Pollution Prevention (GPP) documents | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland Accessed February 2025.
[15] SEPA supporting guidance: Good practice guides (various). Available online at: Engineering guidance | Scottish Environment Protection Agency (SEPA) Accessed February 2025.
[16] SEPA Planning Background Paper. Flood Risk. 2018. Available online at: FR Background Paper Accessed March 2025.
[17] SEPA Development Management Guidance: Flood Risk. Land use planning system (LUPS) SEPA Development Plan Guidance Note 2a. Available at: Development management guidance on flood risk Accessed March 2025.
[18] SEPA Recommended Riparian Corridor Layer for use in Land Use Planning (2024). Available at: recommended-riparian-corridor-note.docx Accessed March 2025.

9.2.3 Study Area

9.2.3.1 The Study Area is based on professional judgement and comprises the Site plus a 1 km buffer around it. Watercourses or water resources outside the 1 km buffer but, which are considered to be in hydrological connectivity to the Site and therefore, have the potential to be impacted by the Proposed Development are also included. The Study Area is shown on **Figure 9.1**.

9.2.4 Baseline Characterisation

Desk Study

9.2.4.1 The methodology for the desktop baseline characterisation of the Site is as follows:

- Identify and describe the surface water hydrology including watercourses, waterbodies, and other hydrological features within the Study Area;
- Describe the geomorphology of the watercourses and their conditions;
- Identify the nature of the hydrogeology of the Study Area and any groundwater protected areas;
- Identify flood risks;
- Identify water resources within the Study Area including drinking water protected areas (DWPA), PWS, public water assets, and protected bathing water areas in the Study Area;
- Identify any designated conservation areas within the Study Area;
- Hydrologically analyse ecological survey data which indicates the presence of groundwater dependent terrestrial ecosystems to determine if these habitats are groundwater or ombrotrophic (rainwater) fed; and
- Identify all existing and proposed watercourse crossings that will form part of the Proposed Development.

9.2.4.2 Data sources used for the assessment are outlined in **Table 9.1**.

TABLE 9.1 DATA SOURCES

TOPIC	SOURCE OF INFORMATION
Surface Water Hydrology	OS Open Rivers Vector data[19] OS Mapping 1:25,000 scale

[19] Ordnance Survey. OS Open Rivers Dataset (2024). Available at: OS Open Rivers | Vector Map Data for GIS | Free OS Data downloads

TOPIC	SOURCE OF INFORMATION
	Aerial Imagery[20]
Water Quality	SEPA Water Environment Hub[21]
Designated Conservation Sites	NatureScot SiteLink[22]
Water Resources	Private Water Supply data supplied directly by Scottish Borders Council and from surveys to local residents. Scottish Government Drinking Water Protected Areas – Scotland river basin district: Maps[23] SEPA Drinking Water protected areas (catchments)[24] Scottish Water asset maps[25]
Flood Risk	SEPA Flood Maps (river, coastal, and surface)[24,26]

Field Survey

9.2.4.3 A Site walkover was conducted by ERM in March 2025. The purpose of the walkover was to:

- Ground truth the desktop data;
- Check the condition and geomorphology of watercourses on-site;
- Identify any additional hydrological features to the desktop data; and
- Characterise watercourses at the proposed crossing locations.

9.2.5 Criteria for the Assessment of Effects

Receptor Sensitivity

9.2.5.1 The sensitivity of receptors is defined per the criteria set out in **Table 9.2.**

[20] Google Earth. Available online at: earth.google.com/static/multi-threaded/versions/10.73.0.1/index.html? Accessed February 2025.
[21] SEPA. Water Environment Hub. Available online at: RBMP3 Accessed February 2025.
[22] NatureScot. Map Search. Available online at: SiteLink - Map Search Accessed February 2025.
[23] Scottish Government (2014). Drinking water protected areas – Scotland river basin district: maps. Available online at: Drinking water protected areas - Scotland river basin district: maps - gov.scot Accessed February 2025.
[24] SEPA Data publication. Drinking water protected areas (catchments). Available at: Environmental data | Scottish Environment Protection Agency (SEPA) Accessed February 2025.
[25] PDF asset maps supplied directly to ERM by Scottish Water.
[26] SEPA Flood Maps. Available online at: SEPA Flood Maps Accessed February 2025.

TABLE 9.2 DERIVATION OF SENSITIVITY OF RECEPTOR

SENSITIVITY OF RECEPTOR	CRITERIA	EXAMPLE
High	International or national level importance. Receptor with a high quality or rarity, has very limited capacity to tolerate changes to hydrology, water quality, or flood risk, and has limited potential for substitution or replacement.	Surface water bodies with a High overall status as defined by the WFD. There is a high likelihood (1 in 10 year probability) of flooding in the catchment. Active floodplain. Waterbody or associated defences which serve a defined flood risk function. Scottish Government Drinking Water Protected Area (DWPA). Regulated Private Water Supplies (PWS) (serving >50 people or are commercial use) Sites of Special Scientific Interest (SSSI) Ramsar sites, Special Areas of Conservation (SAC), and Special Protection Areas (SPA). Principal aquifers within groundwater protection zones. Protected Bathing Water Area. High Groundwater Dependent Terrestrial Ecosystems (GWDTE).
Medium	Receptor with a high quality or rarity at a local scale, or medium quality or rarity at a regional scale. Receptor has limited capacity to tolerate changes to hydrology, water quality, or flood risk.	Surface water bodies with a Good or Moderate overall status as defined by the WFD. There is a medium likelihood (1 in 200 year probability) of flooding in the catchment. Some flood alleviation features. Aquifer providing water for agriculture or industrial use. Type B PWS (<50 people served and domestic use only). Locally or regionally important status or designation. Moderate GWDTE.
Low	Receptor of local important with a low quality or rarity. Receptor has a moderate capacity to tolerate changes to hydrology, water quality, or flood risk.	Surface water bodies with a Poor overall status as defined by the WFD. There is a low likelihood (1 in 1000 year probability) of flooding in the catchment. Waterbody serves a limited flood risk function.

SENSITIVITY OF RECEPTOR	CRITERIA	EXAMPLE
		Aquifer defined by the British Geological Survey (BGS) as being of low productivity. GWDTE which is not groundwater dependent.

Magnitude of Impact

9.2.5.2 The magnitude of impact is the predicted change and associated deviation from baseline conditions of receptors as defined in **Table 9.3** .

TABLE 9.3 DERIVATION OF MAGNITUDE OF IMPACT

IMPORTANCE	CRITERIA	EXAMPLE
High	Results in substantial impact on water resources.	Increases flood risk to highly vulnerable receptors or nationally important infrastructure. Impacts that would cause a change in the WFD status of a waterbody. Impacts that would impact water quality or quantity in a DWPA or Bathing Water Protected Area.
Medium	Results in impacts on water resources.	Increases flood risk to vulnerable receptors or locally important infrastructure. Impacts that may cause a change to a WFD category of a waterbody. Impacts which could impact water quality or quantity to a PWS.
Low	Results in minor effects on water resources.	Limited impact to flood risk. Impacts which are not likely to effect WFD status.
Negligible	Impacts on water resources are insufficient to affect their integrity or use.	Almost imperceptible changes to water quality, quantity, and flood risk.

Significance of Effect

9.2.5.3 **Table 9.4** illustrates how residual effects are determined by comparison of the sensitivity of receptors with the magnitude of impact. For the purposes of this assessment significant effects are **Major** or **Moderate**.

TABLE 9.4 SIGNIFICANCE OF EFFECT

		MAGNITUDE OF IMPACT			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of Receptor	**High**	None	Minor	Major	Major
	Medium	None	Minor	Moderate	Moderate
	Low	None	Negligible	Minor	Minor

9.2.6 Cumulative Effects

9.2.6.1 The potential for cumulative effects to occur during the construction and operational phases of the Proposed Development in combination with other developments is assessed based on:

- the potential hydrological connectivity of the Proposed Development to other developments which are the subject of a valid consented planning application;
- development that are subject to planning conditions related to the water environment and are in hydrological connectivity to the Site; or
- there is the potential for concurrent phases of construction between the Proposed Development and others in the same hydrological catchment.

9.2.6.2 The assessment includes consented developments not yet under construction and developments in planning. Current operational sites and those under development are considered part of the baseline.

Limitations and Assumptions

9.2.6.3 This assessment refers to, and uses publicly available data sources, and relies upon the accuracy of the data.

9.2.6.4 Scottish Borders Council was contacted to confirm any known PWS within the Study Area. Their dataset has been used to inform this EIA but it should be noted council datasets are often incomplete in rural areas and identify the property rather than the water supply source. At the time of writing this report, a limited number of PWS questionnaires have been returned. The PWS details provided by residents or landowners may also not define the exact location of abstractions. The Applicant will therefore be required to conduct a further PWS screening assessment to identify PWSs in possibly hydrological connectivity to the Site and implement appropriate mitigation measures where required as detailed throughout this Chapter. The need for further assessment will be secured through a planning condition to the deemed planning permission.

9.2.6.5 An Outline Surface Water Drainage Strategy has been completed as part of this assessment, the assumptions and limitations of which are discussed in further detail in **Technical Appendix 9.1: Outline Surface Water Drainage Strategy**. The design principles for Site

drainage are discussed at a high level within this Chapter and is based on attenuation, volume, and runoff calculations.

9.3 Consultation

9.3.1.1 **Table 9.5** summarises the consultation responses received regarding Hydrology and Hydrogeology and provides information on where and / or how they have been addressed in this assessment.

TABLE 9.5 CONSULTATION RESPONSES

CONSULTEE AND DATE	SCOPING / OTHER CONSULTATION	CONSULTEE RESPONSE	RESPONSE / ACTION TAKEN
Energy Consents Unit (ECU) 29 January 2025	Scoping	Scottish Water did not provide information on whether there are any drinking water protected areas or Scottish Water assets on which the development could have any significant effect. Scottish Ministers request that the Company contacts Scottish Water and makes further enquires to confirm whether there are any Scottish Water assets, which may be affected by the development and includes details in the EIA report of any relevant mitigation measures to be provided.	Scottish Water datasets were requested and are discussed in **Section 9.4.4** of this Chapter.
		Scottish Ministers request that the Company investigates the presence of any private water supplies which may be impacted by the development. The EIA report should include details of any supplies identified by this investigation, and if any supplies are identified, the company should provide an assessment of the potential impacts, risks, and any mitigation which would be provided.	PWS data was requested from Scottish Borders Council (SBC) and surveys were issued to local residents. The baseline PWS conditions are discussed in **Section 9.4.4** of this Chapter, and an assessment of potential impacts and mitigation required are addressed throughout the remainder of this Chapter.
		The Scottish Ministers request that the company assess the impact of the Proposed Development on existing and/or planned infrastructure. In particular, the company should carry out the necessary assessments to confirm if any part of the Proposed Development is within the consultation zone of any of the following: water pipes.	Scottish Water datasets were requested and are discussed in **Section 9.4.4** of this Chapter.
SEPA	Scoping	To avoid delay and potential objection the EIA submission must contain a series of scale drawings of	Supporting figures have been included with this Chapter.

CONSULTEE AND DATE	SCOPING / OTHER CONSULTATION	CONSULTEE RESPONSE	RESPONSE / ACTION TAKEN
10 December 2024		sensitivities, for example, Groundwater Dependent Terrestrial Ecosystems (GWDTE), and proximity to watercourses, overlain with Proposed Development.	
		Groundwater Dependent Terrestrial Ecosystems – we note that a Phase 1 habitat survey will be carried out. We have no specific view on the conversion to UkHab, however, please note that if the Phase 1 habitat survey results indicate that there may be relevant habitats present, a National Vegetation Classification (NVC) survey should be provided as part of the EIAR.	The UKHab Survey identified that the Site was largely arable land, with some small areas of broadleaved woodland, none of these habitats are likely to be of moderate or high potential as GWTDEs, and so an NVC Survey was not considered necessary. A GWDTE assessment is not therefore required.
		Private Water Supplies (PWS) - We agree that impacts on PWS should be assessed further.	PWS data was requested from SBC and surveys were issued to local residents. The baseline PWS conditions are discussed in **Section 9.4.4** of this Chapter, and an assessment of potential impacts and mitigation required are addressed throughout the remainder of this Chapter.
		Flood risk - We agree there is no obvious need for a standalone FRA. We hold no records of flooding at the Site.	Noted.
		We would recommend that any new watercourse crossing is designed in accordance with the principles of National Planning Framework 4, will have a better or neutral effect on flood risk and should be properly maintained to reduce the potential risk from structure blockage. The crossing should therefore be designed so that it can convey the 0.5% annual probability flood plus an appropriate allowance for climate change and	The final design of watercourse crossings will adhere to this policy and guidance. Details of watercourse crossings would usually be provided as part of Construction Method Statement secured through the final CEMP.

CONSULTEE AND DATE	SCOPING / OTHER CONSULTATION	CONSULTEE RESPONSE	RESPONSE / ACTION TAKEN
		freeboard, should have a minimal afflux (backwater effect) and a clear span structure where possible. We would strongly advise that any water course crossings follow good practice guidelines without causing constriction of flow or exacerbation to flood risk elsewhere.	
		We also recommend adoption of appropriate buffer strip distances between the Proposed Development and the open channel in order to allow for access and maintenance. Recommended widths can be found in SEPA's Recommended riparian corridor note.	SEPA's Riparian Corridor dataset has been consulted (as shown in **Figure 9.2**) and is discussed in **Section 9.7.1** of this chapter.
		Pollution prevention and environmental management - the submission must include a schedule of mitigation, which includes reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils and peat at any one time) and regulatory requirements.	Mitigation is discussed in **Section 9.6** of this Chapter, and the regulatory guidance outlined in **Section 9.2.2.**

9.4 Baseline Conditions

9.4.1 Surface Water

9.4.1.1 The Site is gently sloping with elevations ranging from 230 m AOD to 160 m AOD, and surface water flow is predominantly north to south. The south of the Site is drained by two unnamed tributaries of the Pease Burn (**Figure 9.2**). One burn originates by the farmhouse and discharges into the Pease Burn which flows east along the southern boundary of the Site, discharging into the main stem of the Pease Burn approximately 300 m southeast of the Site. The second burn originates in the centre of the field approximately 300 m south of the farmhouse and also flows south and into the Pease Burn.

9.4.1.2 The main stem of the Pease Burn flows north along the eastern boundary of the Site where it ultimately discharges into the Firth of Forth approximately 2.5 km downstream of the Site.

9.4.1.3 Another small unnamed burn flows north from the Site. It discharges into another unnamed burn before linking with the main stem of the Pease Burn.

9.4.1.4 The length of the watercourse originating at the farmhouse was traversed during the Site survey. The burn originates from a large surface water pond and flows east to west in a highly straightened, incised channel between two agricultural fields. The burn then makes a sharp turn to flow south towards the Pease Burn.

9.4.1.5 As it flows south the burn flows in a less well-defined channel. One branch of the watercourse continues to follow the field boundary, and the other deviates into the centre of the field meandering downslope in the topographic low of the field. The two flow paths meet towards the southern boundary of the Site where they flow in a more defined channel through a steep gorse covered valley. As the burn approaches the Pease Burn and exits the steep valley, it once again leaves a defined channel and runoff discharges across the field and into the Pease Burn.

9.4.1.6 The Pease Burn at the southern boundary of the Site flows in a well-defined channel west to east.

9.4.1.7 The watercourses within the Site and the tributary which flows to the south of the Site are not classified under the WFD.

9.4.1.8 The Tower Burn is located on the northern fringes of the Study Area but is not hydrologically connected to the Site.

9.4.1.9 The Pease Burn which flows parallel to the eastern boundary of the Site is a designated watercourse under the WFD (ID: 5001 also known as Tower Burn) and has an overall 2023 status of Poor[21].

9.4.1.10 The Pease Burn discharges into the Barns Nest to Wheat Stack coastal waterbody (ID: 200038) which is classified as being in overall Good condition under the WFD.

9.4.1.11 SEPA have created a recommended riparian corridor GIS layer for use in land use planning. The dataset indicates the minimum space needed along rivers to give them space to adapt to changes in flood frequency and magnitude, and which has other environmental

benefits[27]. The dataset indicates all watercourses within the Site should have a 10 m riparian corridor in which no development should take place (**Figure 9.2**). The Pease Burn riparian corridor width is 15 m.

9.4.2 Hydrogeology

9.4.2.1 The Site is underlain by the Gala Group, a low productivity aquifer where flow is virtually all through fractures and other discontinuities (**Figure 9.3**).

9.4.2.2 Under the WFD the Site is underlain by the St Abbs groundwater body (ID: 150597) which is classified as being in overall Good condition.

9.4.3 Flood Risk

9.4.3.1 According to the SEPA Flood Maps[26] the Site is not at risk of fluvial (river) flooding (**Figure 9.4**). However, the SEPA flood maps only model watercourses with catchment areas over 3 km^2 and therefore, there could still be the potential for fluvial flooding to occur on-Site. The Pease Burn to the south and east of the Site are both modelled to have a High likelihood of flooding (1 in 10 year, or 10% annual probability) but the indicative flood extents are outwith the Site boundary and / or no infrastructure is proposed in those areas.

9.4.3.2 A small, localised area of surface water flooding is indicated within the Site boundary where the pond next to Bowshiel Farm is located. The pond is an area of surface water retention and does not overlap with any Proposed Development infrastructure.

9.4.3.3 The Site is located approximately 2.5 km inland and upslope of the coast and is therefore not at risk of coastal flooding.

9.4.4 Water Resources

Drinking Water Protected Areas

9.4.4.1 The Site is not located within a Scottish Government surface water DWPA[28].

9.4.4.2 The Site is however, located within a groundwater protected area[29]. The groundwater body is Torness (ID: 150568) which is classified as having an overall Good status under the WFD[21].

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[27] SEPA (2024). Recommended riparian corridor layer for use in land use planning. July 2024. Available online at: recommended-riparian-corridor-note.docx Accessed February 2025.
[28] Scottish Government. Drinking Water Protected Areas (Surface Water) in the Scotland River Basin District. Map 10 of 11. Available online at: DWPA+-+Scotland+RBD+-+surface+water+-+map+10+of+22.pdf Accessed February 2025.
[29] Scottish Government Drinking Water Protected Areas (Groundwater) in the Scotland River Basin District. Map 21 of 22. Available online at: DWPA+-+Scotland+RBD+-+groundwater+-+map+21+of+22.pdf Accessed February 2025.

Private Water Supplies

9.4.4.3 A list of PWSs within the Study Area was requested from the Scottish Borders Council (SBC). The council records are often incomplete in rural areas and often identify the property rather than the source and / or collection tank associated with the PWS. Therefore, ERM also contacted properties within the Study Area to confirm the location and details of their supplies.

9.4.4.4 The SBC dataset identified two PWSs within250 m of the Study Area as shown on **Figure 9.5** (PWS 1 and PWS 4). Of the survey responses received, two properties identified themselves as being reliant on a PWS as shown on **Figure 9.5** (PWS 2 and PWS 3)**.**

9.4.4.5 One additional PWS survey was received but the exact property of interest and the location of the PWS source could not be determined. No further information was supplied by the resident at the time of writing.

9.4.4.6 All three PWSs are located south of the Site, more than 250 m from the Proposed Development, and are not hydrologically connected to the Proposed Development. Therefore, the PWSs are not considered at risk from the Proposed Development.

9.4.4.7 As a number of PWS surveys weren't returned, there is still the potential for there to be PWSs within the Study Area which may be at risk form the Proposed Development.

9.4.4.8 Table 9.6 details the PWSs of interest at the time of writing.

9.4.4.9 All three PWSs are located south of the Site, more than 250 m from the Proposed Development, and are not hydrologically connected to the Proposed Development. Therefore, the PWSs are not considered at risk from the Proposed Development.

9.4.4.10 As a number of PWS surveys weren't returned, there is still the potential for there to be PWSs within the Study Area which may be at risk form the Proposed Development.

TABLE 9.6 KNOWN PWSS WITHIN THE STUDY AREA

PWS ID	PWS TYPE	SOURCE TYPE	EASTING	NORTHING	APPROXIMATE DISTANCE FROM INFRASTRUCTURE (m)
1	Type B	Well	379140	666182	1,000
2	Domestic	Borehole	378979	666072	1,100
3	Livestock	Spring	378808	666428	800
4	Domestic and Livestock	Borehole	Unknown	Unknown	Unknown

Public Water Assets

9.4.4.11 Scottish Water data was supplied to ERM to inform this EIA.

9.4.4.12 A Scottish Water mains water distribution travels along the northeast of the Site and runs along the western side of the A1 Road. The access road into the Site crosses the main distribution pipe at the entrance to the Site from the A1.

Protected Bathing Waters

9.4.4.13 Pease Bay approximately 2.5 km to the north of the Site is a designated bathing water area[30] used by swimmers and surfers (**Figure 9.6**). The bathing water is at risk of short-term pollution following heavy rainfall which has the potential to wash pollution into the coastal waters[31]. The catchment area of the bathing water is 27 km^2, and the main rivers within the catchment are the Pease Burn and Cockburnspath Burn. SEPA's Environmental Monitoring dataset ranks the bathing water condition as Excellent.

9.4.4.14 SEPA have delineated two buffer zone areas around the bathing water, an Inner Zone of 100 m and an Outer Zone of 1,500 m. The Outer Buffer Zone extends up the Pease Burn into the 1 km Study Area. Therefore, water quality impacts to the tributaries of, and therefore the Pease Burn itself, have the potential to impact water quality in the bathing water protected area.

9.4.5 Designated Sites

9.4.5.1 There are no designated Special Protected Areas (SPA), Special Area of Conservation (SAC), or Ramsar sites within the Study Area. However, the Pease Bridge Glen (Sites of Special Scientific Interest (SSSI) crosses into the boundary of the Study Area approximately 900 m north of the Site. In addition, the coastline into which the Pease Burn discharges is designated as a Special Protected Areas (SPA) (Outer Firth of Forth and St Andrews Bay Complex), and the Pease Bay Coast SSSI is located approximately 2.4 km north and downstream of the Site, and is approximately 400 m east of where the Pease Burn discharges into coastal waters. Designations are shown in **Figure 9.8**.

9.4.6 Groundwater Dependent Terrestrial Ecosystems

9.4.6.1 The results of the UKHab Survey identified no habitats that are associated with National Vegetation Classification (NVC) communities that are indicative of potential GWDTEs; therefore, an NVC Survey was not considered necessary. A GWDTE assessment is not therefore required.

9.4.7 Watercourse Crossings

9.4.7.1 One existing watercourse crossing will be used as part of the Proposed Development (**Figure 9.7**). The existing crossing point appeared to be un-culverted, with the burn flowing

[30] SEPA. Scotland's Bathing Waters. Available online at: Bathing Waters | Profiles | Scottish Environment Protection Agency (SEPA) Accessed February 2025.
[31] SEPA Bathing water profile – Pease Bay. Available online at: pease-bay-bathing-water-profile.docx Accessed February 2025.

underground beneath the access track and re-emerging through soil and into the downstream channel (**Table 9.7**). Photos of the existing crossing are shown in **Table 9.7.**

9.4.7.2 The upstream channel was partially obscured at the time of the visit but was approximately 0.5 m in width with low bank heights of approximately 0.2 m. The downstream channel was approximately 1.5 m in width with bank heights of 1.2 m and 1.5 m. The dominant substrate in the downstream channel was cobble.

9.4.7.3 It is anticipated a circular culvert may need to be installed at this location as part of the Proposed Development. As discussed in **Section 9.5.1** below, the detailed design of the watercourse crossing will be the responsibility of the Applicant during the final design phase of the Proposed Development. The details of watercourse crossings will be provided as part of the Construction Method Statement secured through the final CEMP.

TABLE 9.7 EXISTING WATERCOURSE CROSSING

	
Obscured upstream channel.	Downstream channel. Flow emerges through the cobbles shown in the foreground.
	
Crossing. The upstream channel is to the right of the image behind the gate. Flow is beneath the track and emerges to the left of the image near the pipe. Surface water runoff from the adjacent fields flows across the crossing point as seen by the surface water ponding in the image.	

9.5 Summary of Sensitive Receptors

9.5.1 Scoped Out Receptors

9.5.1.1 Watercourse crossing locations are shown in **Figure 9.7**. A detailed assessment of watercourse crossings are scoped out, as an assessment of flow rates and crossing size and type will be carried out by the Applicant at the detailed design stage. The crossings would be designed in compliance with SEPA[32,33] and CIRIA guidance. The crossings would be designed to covey the 0.5% AEP (1 in 200 year) probability flood event plus an appropriate allowance for climate change[34] and freeboard. Any new watercourse crossing would also be subject to registration and authorisation under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)[35] (CAR) and Water Environment (Miscellaneous) (Scotland) Regulations 2017[36].

9.5.1.2 As detailed in **Section 9.4.4** of this Chapter, there are no surface water DWPA in the Study Area. Therefore, potential impacts to these are scoped out of further assessment.

9.5.1.3 There are no GWDTE within the Site or a 100 m buffer of the Site as set out in **Section 9.4.6** of this Chapter. Therefore, no further assessment of these habitats is required.

9.5.1.4 The Site is not considered at risk of flooding based on the SEPA Flood Maps. In addition, as detailed above, the detailed design will ensure watercourse crossings are designed to accommodate the 0.5% annual probability event plus freeboard and climate change allowance. The final detailed design will also incorporate the use of SuDS (**Section 9.6** of this Chapter) which will control runoff and therefore, flood risk as a result of the Proposed Development. Therefore, a detailed Flood Risk Assessment has been scoped out.

9.5.2 Scoped In Receptors

Table 9.8 provides the list of receptors scoped into the remainder of this impact assessment.

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[32] SEPA. Engineering in the water environment: good practice guide. River crossings. Second edition, November 2010. Available online at: River crossings - good practice guide Accessed February 2025.
[33] SEPA WAT-PS-06-02: Culverting of watercourses – Position statement and supporting guidance. Available at: WAT-PS-06-02 Accessed February 2025.
[34] SEPA. Climate change allowances for flood risk assessment in land use planning. Version 5. August 2024. Available online at: climate-change-allowances-guidance.docx Accessed February 2025.
[35] Scottish Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made Accessed February 2025
[36] Scottish Government (2017) Water Environment (Miscellaneous) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/389/contents/made Accessed February 2025

TABLE 9.8 SCOPED IN RECEPTORS

RECEPTOR	SENSITIVITY	JUSTIFICATION
Watercourses and surface water features	Medium	The watercourses within the Site are not classified under the WFD. However, they are hydrologically linked to the Pease Burn which has a Good status and discharges into the Pease Bay protected bathing water area.
Groundwater protected areas (hydrogeology)	Medium	The Site is within a groundwater protection zone which is classified as being in Good overall condition.
PWS	Medium	Due to the limited number of PWS surveys returned there is the potential for unidentified PWS's to be within the Study Area, hydrologically connected to the Site, and therefore at risk from the Proposed Development.
Public water assets	High	The access track into the Site crosses the Scottish Water Mains pipe and therefore any access track works may impact the asset.
Protected Bathing Water Areas	Medium	The watercourses on-site do not directly discharge into the Pease Bay bathing water protected area. However, they are hydrologically connected to the Pease Burn which does discharge into the bathing area and the Outer Buffer Zone of the bathing water protected area extends into the 1 km Study Area.
Designated Sites	High	The Pease Bridge Glen SSSI is located right on the boundary of the Study Area, and the Pease Burn discharges into the Outer Firth of Forth and St Andrews Bay Complex SPA, and the Pease Bay Coast SSSI is located approximately 400 m west of where the Pease Burn discharges.

9.6 Embedded Mitigation

9.6.1 Mitigation by Design

9.6.1.1 The following measures have already, or will be, embedded into the final detailed design to reduce the impacts to hydrological resources and are therefore considered mitigation by design:

- The final detailed design will take into account hydrological constraints identified in this EIA. This will include ensuring solar panels, fence lines, tracks (with the exception of watercourse crossing locations), and BESS infrastructure are positioned outside the SEPA Riparian Corridor buffer zones. The current design breaches these corridors and is discussed in further detail in **Section 9.7.1** and **Table 9.10**.

- The solar panels themselves will be the most significant infrastructure on the Site. They will be constructed by piling the stanchions into the ground without the need for significant earthworks beneath the panels. This avoids soil compaction and removal of vegetation thus allowing the continued movement and infiltration of surface water across the Site.

- The solar PV modules will be designed to include regular gaps to enable rainwater to drip along the face of the panel rather than concentrating along a single drip line.

- The Site will be re-vegetated post-construction to ensure the maintenance of good infiltration and to help absorb sediment and / or pollutants in the unlikely event of an erosion or spillage event.

- The final detailed design of the BESS, substation, and construction compound will incorporate sustainable drainage systems (SuDS) to control runoff rates and provide pollution control measures. The drainage design will establish surface water interception and discharge measures for hardstanding areas in accordance with local and national best practice SuDS guidance and policy which will prevent an increase in surface water runoff and provide protection to the receiving water environment.

- All drainage features will be maintained so that they operate effectively. Maintenance activities may include: regular inspection of gravel bases and buffer strips; removal of sediment; and repairing damaged membranes.

- The construction of new access routes will use existing watercourse crossings where possible. Where new watercourse crossings are required, these will be designed in line with SEPA and CIRIA guidance (as set out in **Section 9.5.1** of this Chapter) and will be of sufficient size to convey to convey the 0.5% annual probability (1 in 200 year) event plus freeboard and climate change allowance.

9.6.2 Mitigation Pre-Construction

9.6.2.1 Due to the limited number of survey responses received, it is considered there is the potential for unidentified PWSs to be within the Study Area and be hydrologically connected to the Proposed Development. As such, pre-construction mitigation is required for PWSs. The Applicant will be responsible for conducting a further PWS screening assessment prior to construction which will be secured through a planning condition to the deemed planning permission. The screening would involve:

- Identifying PWSs not previously located as part of this EIA assessment;

- Confirming the type of supply source (e.g., borehole, spring, surface water);

- Identifying the infrastructure associated with the supply, this may include pipeline surveys;

- Outlining the baseline condition of the PWS source, infrastructure, and water quality;

- Defining the contributing catchment area of the PWS;

- Determining if the PWS is hydrologically connected to the Proposed Development; and

- The depth and extent of any proposed excavations within the vicinity of the supply.

9.6.2.2 Should the results of the screening assessment identify any risks to PWSs, such as potential impacts to water quantity and quality, Site specific mitigation will be developed and incorporated into a Site specific PWS Protection Plan (or similar), which will be produced by the Principal Contractor in consultation with the PWS owner and in accordance with SEPA guidelines. This guidance includes the requirement of twelve months of pre-construction monitoring of the PWS prior to construction starting, thus the screening assessment should be completed with enough time to undertake this monitoring. The PWS Protection Plan would also detail any mitigation required to protect the supply including contingency plans to provide alternative water supplies in the event of an unforeseen impact to an existing supply.

9.6.2.3 Should pre-construction water quality monitoring of the PWS be required to establish the baseline water quantity and quality, the frequency of sampling and parameters to be monitored will be agreed with SEPA prior to the commencement of sampling and will be documented within a PWS Protection Plan.

9.6.2.4 As there are public water assets adjacent to the Site and crossing the access track into the Site, the Principal Contractor will be responsible for engaging with Scottish Water prior to construction to determine the mitigation measures needed to protect Scottish Water assets from damage and to comply with Scottish Water's current process, guidance, standards and policies relating to such matters, as per the Scottish Water List of Precautions for Drinking Water and Assets guidance[37]. This will require submission of Risk Assessment Method Statements (RAMS) and Safe Systems of Work (SSoW) to be prepared and submitted in advance to Scottish Water for formal review. These documents will detail and outline in detail how existing Scottish Water assets are to be protected and / or managed for the duration of the construction works and operation of the Proposed Development. These documents will form part of the final CEMP.

9.6.2.5 For any areas where the SEPA Riparian Corridor is still breached, there may be a requirement for pre-construction monitoring to determine the baseline water quality conditions. The duration for which this would be required, the frequency of sampling, and parameters to be monitored would be agreed with SEPA in advance of construction.

9.6.3 Mitigation During Construction

9.6.3.1 A contractual requirement of the Principal Contractor will be the development and implementation of a comprehensive site-specific Construction Environment Management Plan (CEMP). This document will detail how the Principal Contractor will manage works in accordance with all commitments and mitigation detailed in this EIA Report, statutory consents and authorisations, and industry best practice and guidance, including pollution prevention.

9.6.3.2 The CEMP will include construction methods, specific environmental protection measures, and other supporting environmental management plans e.g. a Pollution Prevention Plan and

[37] List of Precautions for Drinking Water and Assets – Hydro EdE. Annex 1: Precautions to protect drinking water and Scottish Water assets during hydro development construction and operational activities. Available at: 091120SWListOfPrecautionsForDrinkingWaterAndAssetsHydroEdE.pdf Accessed March 2025.

Drainage Management Plan. The CEMP and all other relevant plans will apply the best practice guidance as set out in the applicable SEPA Guidance for Pollution Prevention (GPP) documents[14], SEPA supporting guidance[13], and CIRIA guidance[4]. Implementation of these measures during construction will ensure construction activities will not cause adverse effects to sensitive hydrological receptors.

9.6.3.3 The CEMP will also outline measures to ensure that the works minimise the risk to groundwater, surface water, PWSs, and public water assets. This will include ground investigations by the Principal Contractor to identify groundwater levels within areas of excavation e.g. the substation.

9.6.3.4 The construction activities proposed are anticipated to be permissible under the CAR Regulations[38]. Therefore, the Proposed Development will be subject to a construction site licence (under the CAR Regulations). As such detailed design of proposed drainage works, and watercourse crossings, will be subject to licensing requirements set out under CAR, and compliance with regulations would be agreed in consultation Scottish Borders Council and SEPA and set out in the Construction Site License application.

9.6.3.5 A breakdown of the embedded mitigation which will form part of the CEMP and relevant supporting environmental plans are outlined in **Table 9.9**.

TABLE 9.9 MITIGATION

SENSITIVE RECEPTOR	POTENTIAL IMPACT	MITIGATION DESCRIPTION
Surface Water Features	Breach of Watercourse Buffers	Where the SEPA Riparian Corridor buffers cannot be achieved, the final preferred location of infrastructure will be determine on-Site in consultation with the project ECoW. At such locations the following mitigation measures will be in place and outlined in the CEMP: • Location specific drainage, pollution, and incident response plans; • A wet weather / flood risk protocol with works to cease during prolonged rainfall or where flood risk is high; • Reduction in the extent of the working area to minimize the area of ground disturbance; • Water quality control measures such as water diversion ditches, silt fences, or silt traps to control and treat runoff; • Daily inspection of works and watercourses and full-time supervision of construction and restoration works; • Where there is no construction in the Riaparian Corridor, a vegetation strip will be maintained along all watercourses; and • There may be a requirement for water quality monitoring during construction. Any requirements for water quality

[38]Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available online at: https://www.legislation.gov.uk/ssi/2011/209/contents/made Accessed February 2025.

SENSITIVE RECEPTOR	POTENTIAL IMPACT	MITIGATION DESCRIPTION
		monitoring will be agreed with SEPA and East Lothian Council in advance of construction commencing. The duration for which this would be required, the frequency of sampling, and parameters to be monitored would be agreed with SEPA and outlined in the CEMP.
Surface Water Features and Designated Sites	Erosion and Sedimentation	Sediment capture methods appropriate to the Site will be developed through the detailed design. They will be detailed in and implemented through the CEMP, Sediment and Erosion Control Plan (SECP), Pollution Prevention Plan (PPP), and DMP. The measures will ensure that sediment laden runoff from disturbed or excavated ground is directed to the appropriate treatment trains. A vegetation strip will be maintained along all watercourses within the SEPA Riparian Corridors. Construction activities will be overseen by an ECoW who will carry out inspections of watercourses and sediment control measures to ensure there are no impacts to surface waterbodies.
	Chemical Pollution	The potential for impacts on the water environment through the release of pollutants during the construction phase would be managed through the CEMP and PPP to be developed by the Principal Contractor during the detailed design phase. This would follow measures outlined in GPP5: Works and maintenance in or near water and may include for example siting cement mixing areas on impermeable membranes, considering where to store chemicals in relation to on-Site surface water flowpaths, and how waste water will be disposed of. The storage of potentially contaminated materials shall be at least 50 m from surface waterbodies. Fuels, oils, or chemicals stored on-Site shall be over an impervious base and in accordance with CAR Regulations. An ECoW will be on-Site to monitor the storage and potential leakage of chemicals on-Site. The CEMP will set out procedures that would be followed in the event of an accidental release of pollutants from the Site or on-Site machinery / vehicles in proximity to a surface waterbody. Immediately following a pollution incident, SEPA would be notified and consulted on the appropriate clean up or remediation were such measures required.
Surface Water Features	Abstractions	Any requirements for surface water abstraction will be completed in accordance with the CAR Regulations.
Surface Water Features	Site Drainage	Site drainage will be detailed in a Drainage Management Plan (DMP) which will be developed by the Principal Contractor. It will be based on SuDS design principles as set out in **Technical Appendix 9.1: Outline Surface Water Drainage Strategy**. Through the use of drainage management measures and

SENSITIVE RECEPTOR	POTENTIAL IMPACT	MITIGATION DESCRIPTION
		implementation of a DMP adverse impacts to water quality, quantity, and flood risk will be mitigated. Implementation of onsite drainage will be supervised by an Ecological Clerk of Works (ECoW).
Hydrogeology	Groundwater Discharge	Following the pre-construction ground investigations, where groundwater is identified dewatering or groundwater diversion will be conducted with mitigation and control measures in accordance with best practice guidance (e.g., CIRIA Groundwater Control). Measures relating to the identification and protection of groundwater will be detailed and secured within the CEMP. The Principal Contractor will be required to meet regulatory requirements and implement best practice measures. Measures will include ensuring potential groundwater pollutants are stored in appropriate areas of the Site, use of protective geomembranes, and sediment and pollution capture measures are in place.
	Abstractions	Any requirements for surface water abstraction will be completed in accordance with the CAR Regulations.
Public Water Assets	Water Quality or direct impact to infrastructure	The Principal Contractor will follow the RAMS and SSoW submitted to Scottish Water which will detail how Scottish Water assets will be protected during construction. Measures may include activities such as pegging out the course of the water distribution main and having appropriate buffer distances to the pipeline, monitoring water quality, and visual inspections of assets.
Private Water Supplies	Water Quality or direct impact to PWS infrastructure	The pre-construction PWS screening to be carried out by the Principal Contractor will identify any PWSs at risk from construction. Mitigation measures will be identified in the PWS Protection Plan and will be adhered to. This may include measures such as: • Fencing off the PWS source and intake (to avoid accidental damage) and identify relevant buffer distances; • Pegging out the route of distribution pipes and appropriate buffer zones in the vicinity of the construction works and avoiding activity in these areas; • Regular, recorded checks on any pipework (visible signs of cracking or other damage); • Checks on PWS infrastructure to assess for damage; • Avoid undertaking works within PWS catchments during wet weather or when wet weather is forecast as there will be increased surface water flows and therefore higher potential for impacts to PWSs; • Use low impact access methodologies including the use of track panels where access to works are within the PWS catchment; and • Ensure all Site operatives working in the area are made aware of the location of any PWSs, catchment areas, and mitigation measures. Signage should be considered to remind workers when works take place in these areas; and

SENSITIVE RECEPTOR	POTENTIAL IMPACT	MITIGATION DESCRIPTION
		• Provision of an alternative water supply should the PWS be impacted during construction. A water quality and quantity monitoring programme may be required during construction to ensure there are no impacts to PWSs. The frequency of sampling and parameters to be monitored will be agreed with SEPA prior to the commencement of sampling and will be documented within the PWS Protection Plan. Regular reporting of the monitoring will also be kept.
Bathing Waters	Water quality	Implementation of the measures set out in the CEMP, SECP, and PPP will prevent water quality impacts that may extend to the protected bathing water area. Bathing waters are monitored by SEPA from 15 May to 15 September. This would indicate if pollution is a problem and SEPA would work with stakeholders to identify the source of pollution and resolve the issue. The Principal Contractor will work with SEPA if a pollution incident is highlighted. Any surface water quality monitoring needed during the construction of the Proposed Development would also indicate if there were likely to be potential impacts to the bathing water area. The Principal Contractor would notify SEPA in the event of a water quality issue.

9.6.4 Mitigation During Operation

9.6.4.1 An operational management plan and / or site maintenance programme will be in place for the lifetime of the Proposed Development outlining the mitigation measures needed during operation.

9.6.4.2 As discussed in **Section 9.6.1** the final design will incorporate SuDS to manage surface water runoff rates and volumes to ensure that pre-development runoff rates are maintained and the rate of runoff to watercourses are not increased. The SuDS will also provide the appropriate treatment trains to mitigate against potential adverse impacts to water quality. A full SuDS solution will be developed during the detailed design phase of the project prior to construction. During operation a maintenance schedule for on-Site SuDS will be developed and implemented to ensure they function properly and benefit the water environment for the lifetime of the Proposed Development as stated in **Technical Appendix 9.1: Outline Surface Water Drainage Strategy**.

9.6.4.3 An operational management plan including an Emergency response Plan (ERP) and PPP will be developed covering the steps to be taken in the event of thermal runaway.

9.6.4.4 For any areas where the SEPA Riparian Corridor is still breached, there may be a requirement for post-construction monitoring to ensure the water quality and quantity is per the baseline conditions. The duration for which this would be required, the frequency of sampling, and parameters to be monitored would be agreed with SEPA.

9.6.4.5 Similarly, there may be a requirement for post-construction water quality monitoring of PWSs that were identified as being at risk from the Proposed Development to ensure the PWS water quality and quantity is per the baseline conditions. The duration for which this would be required, the frequency of sampling, and parameters to be monitored would be agreed with SEPA and the results detailed in regular progress reports.

9.6.4.6 The final BESS area drainage design will consider the management of fire water, and the likely contaminants potentially associated with a thermal runaway event / fire incident. Potential fire management will include firefighting that involves spraying around any on-fire BESS units in order to cool and wet the ground, rather than directly onto the units, to stop any spread and then let the on-fire units burn out. Therefore, any fire suppressant water would not contain any water that has directly interacted with the fire and anything within the unit. The drainage infrastructure will contain an isolation system where the fire suppressant water is isolated via a penstock system (infiltration through gravelled sections of the drainage system or gravel basins being underlain with an impermeable liner), then tested and tankered. This allows the stored water to be tested before release or, if necessary, removed by tanker and treated offsite. **Technical Appendix 9.1: Outline Surface Water Drainage Strategy** also discusses the commitment to incorporate an approach to fire management into the detailed surface water drainage design.

9.7 Assessment of Potential Effects

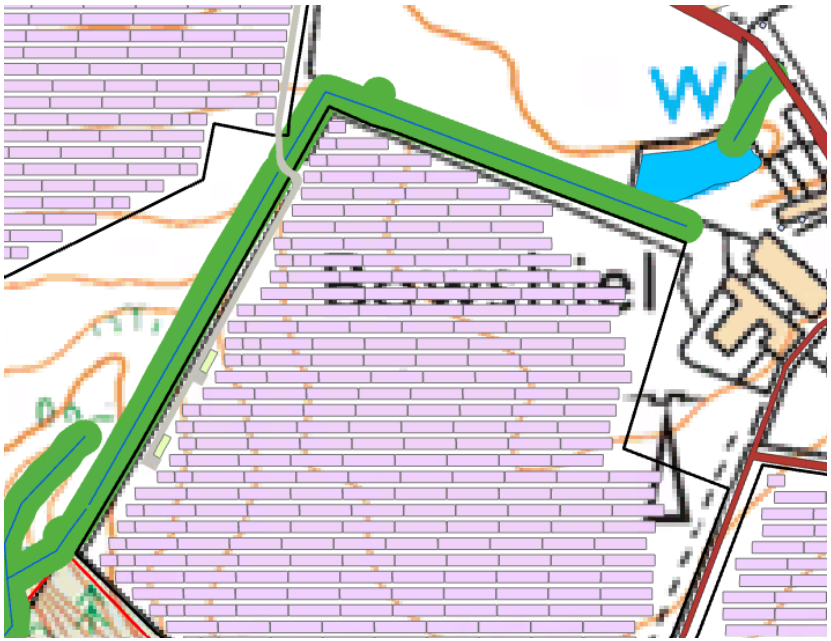
9.7.1 SEPA Riparian Corridors

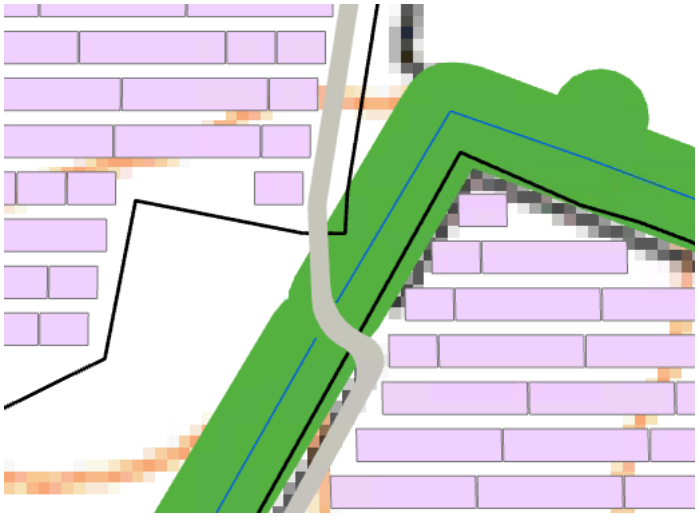
9.7.1.1 The SEPA Riparian Corridor dataset indicates all watercourses within the Site should have a 15 m buffer where no development take place. **Table 9.10** shows the areas where the Proposed Development is currently located within the riparian corridors and where infrastructure should be micro-sited during the detailed design.

9.7.1.2 Due to the small footprint of fence stakes and solar stands, it is not anticipated these will significantly alter the functionality of the floodplain. However, micro-siting to remove infrastructure from these areas to comply with SEPA guidance will be implemented where possible during the detailed design.

9.7.1.3 Should the detailed design still breach the riparian corridors, the Principal Contractor will be responsible for ensuring additional mitigation measures to protect water quality (from sedimentation and chemical pollution) during the construction and operation of the Proposed Development are implemented and are in line with SEPA guidance as set out in **Section 9.6** of this Chapter.

TABLE 9.10 RIPARIAN CORRIDOR BREACHES

LOCATION	COMMENTS	DISTANCE OF INSTRUCTURE FROM WATERCOURSE CENTRELINE
	Fence line (black) breaches the riparian corridor (green) adjacent to Bowshiel Farm in the centre of the Site. No panels (pink) are within the riparian corridor.	7 m at closest point

LOCATION	COMMENTS	DISTANCE OF INSTRUCTURE FROM WATERCOURSE CENTRELINE
	A proposed access track (grey) breaches the riparian corridor (green) to cross the watercourse. **Section 9.4.7** and **Section 9.5.1** of this Chapter discusses watercourse crossings in more detail.	0 m

9.7.2 Potential Construction Effects

Changes to Hydrology and Surface Water Features

9.7.2.1 During construction the introduction of temporary access tracks and laydown areas, impermeable surfaces, soil compaction, and removal of vegetation can alter overland flow regimes increasing runoff rates and volumes from the Site through reduced infiltration. Trenching for cables can also increase runoff from the Site. This in turn can increase peak flows in hydrologically connected watercourses to the Site which has the potential to increase flood risk downstream of the Site as well as alter the aquatic ecology and fluvial geomorphology of watercourses.

9.7.2.2 Changes to overland flows as a result of soil compaction and removal of vegetation during construction may increase the rate and volume of runoff.

9.7.2.3 Surface waters are assessed to be of medium sensitivity and construction could result in high magnitude impacts. However, with embedded mitigation the impacts are reduced to low magnitude and therefore of minor effect and **Not Significant**.

Hydrogeology

9.7.2.4 The installation of on-Site infrastructure does not include the construction of continuous foundations however the solar standings, electrical infrastructure, and tracks could lead to alterations in groundwater flows should the groundwater table be at superficial levels.

9.7.2.5 There is potential for construction activities to pollute (through sedimentation and chemical pollution) groundwater and thus reduce groundwater quality.

9.7.2.6 Groundwater is assessed to be of medium sensitivity. As there are no continuous foundations proposed as part of the Proposed Development and based on the evenly spaced nature of PV arrays and ancillary infrastructure, the impact on groundwater flows are assessed to be negligible. The impacts to water quality with implementation of embedded mitigation is negligible. Therefore, the effect on groundwater resources is none and **Not Significant**.

Sedimentation and Increased Erosion Rates

9.7.2.7 There is the potential to increase erosion and transportation of sediment to watercourses as a result of construction activities including excavations, land compaction, removal of vegetation and soil stripping, use of vehicles and machinery, and watercourse crossing construction. This impacts water quality as well as the geomorphology of watercourses. Changes to water quality will also impact the SSSI and SPA coastal waters.

9.7.2.8 Construction could result in high magnitude impacts to surface waters assessed to be of medium sensitivity, and designated sites assessed to be of high sensitivity. However, with embedded mitigation there is a low magnitude of impact and therefore minor effect on receiving surface waters and designated sites which is **Not Significant**.

Chemical Pollution

9.7.2.9 Water quality of surface waters within and downstream of the Site could be impacted by the accidental release of contaminated water, foul water, stored chemicals, oils, and materials, or vehicle fluids. This would also impact aquatic ecology as well as downstream designated sites.

9.7.2.10 Construction could result in high magnitude impacts to surface waters assessed to be of medium sensitivity, and designated sites assessed to be of high sensitivity. With embedded mitigation the magnitude of impact would be low and therefore of minor effect and **Not Significant**.

Effects on Private Water Supplies and Public Water Assets

9.7.2.11 Changes to the quality e.g. through chemical pollution and / or sedimentation, or changes to the quantity of water on-site as a result construction activities has the potential to impact PWSs and public water assets through a reduction in water supply, reduction in water quality, and complete loss of water supply through damage to, for example, a supply pipeline.

9.7.2.12 Based on the information held at the time of writing, no PWSs are hydrologically connected to the Proposed Development. However, it is considered that there is the potential for other PWSs to be within the Study Area as several PWS questionnaire were not responded to, and are therefore at risk of impacts from the Proposed Development. With the embedded mitigation that the Principal Contractor will identify all PWSs within the Study Area and identify all PWS sources, pipe networks, and properties supplied, and have the relevant mitigation in place during construction, the potential for impacts to PWS is considered low magnitude and as such minor effect which is **Not Significant**.

9.7.2.13 Public water assets are assessed to be of high sensitivity and construction could result in high magnitude impacts. However, with the embedded mitigation in place which includes consultation with Scottish Water and the production of a RAMS and SSoW the magnitude of impact is low and therefore the effect minor and **Not Significant**.

Effects on Bathing Waters

9.7.2.14 Impacts to water quality as a result of sedimentation and / or chemical pollution entering on-Site watercourses could extend downstream to the protected bathing water buffer zone, thus impacting the quality of coastal bathing waters.

9.7.2.15 Bathing waters are assessed to be of high sensitivity but with embedded mitigation is place construction will have a negligible magnitude impact and therefore no effect to receiving waters which is **Not Significant**.

Effects on Designated Sites

9.7.2.16 Impacts to water quality as a result of sedimentation and / or chemical pollution entering on-Site watercourses could extend downstream to designated sites.

9.7.2.17 With implementation of embedded mitigation, the potential impacts on designated sites assessed to be of high sensitivity as a result of changes to water quality (sedimentation and

chemical pollution) are assessed to be of low magnitude and therefore of minor effect and **Not Significant**.

9.7.3 Potential Operational Effects

Changes to Hydrology and Surface Water Features

9.7.3.1 The panels sit on stilts so that the ground beneath remains uncompacted and vegetated. The panels therefore do not constitute a large impermeable area on-Site, or increase the rate of run-off, as surface water can still infiltrate into the soil beneath the panels. In addition, the panels are spaced in such a way that runoff will be spatially spread across the Site. Research completed by Cook and McCuen[39] has shown that the installation of PV arrays does not result in a significant increase in runoff volumes or peak flows, however where ground beneath panels is left bare there is potential for an increase in peak discharge. Studies have quantified the increase ranging from 1.5% to 8.6% depending on specific parameters.

9.7.3.2 There is potential for rainwater to run along the face of PV arrays and concentrate beneath driplines, leading to channelisation and compaction of soils which can lead to flow routes for surface water during extreme rainfall. The solar PV modules will be designed to include regulator gaps to enable rainwater to drip along the face of the panel rather than concentrating along a single drip line. The ground beneath and in between panels will remain uncompacted and vegetated, allowing rainwater to disperse through the vegetation and preventing concentrated build of rainwater runoff beneath and between panels.

9.7.3.3 The Proposed Development will introduce areas of impermeable surface on-Site (at the BESS and substation) which may result in increased runoff rates and volumes, which could increase flows in hydrologically connected watercourses, increasing flood risk and altering the aquatic ecology and fluvial geomorphology of watercourses. As noted in **Section 9.6.1** of this Chapter, embedded mitigation will include the use of SuDS in the final design to control runoff rates from these areas such that flows will not be impacted during the operational phase.

9.7.3.4 The SEPA Riparian Corridors are in place to manage flood risk through maintenance of a floodplain and these areas also act as buffer strips for sediment and / or other pollutants washed towards watercourses, and are zones of biodiversity. As discussed in **Section 9.7.1** fence lines forming part of the Proposed Development are within the 10 m designated buffer zone of the watercourse near Bowshiel Farm in the centre of the Site. Due to the small footprint and minimal foundation depths of the fence posts these are unlikely to impact the floodplain capacity and function. The access track may impact floodplain functionality. However, it is assumed the internal access tracks will consist of permeable aggregate which would disperse flood waters as it currently does. The track is also proportionally a small area of the total floodplain.

[39] Lauren M. Cookand Richard H. McCuen (2013). Hydrologic Response of Solar Farms. Available online at: https://www.researchgate.net/publication/276982541_Hydrologic_Response_of_Solar_Farms

9.7.3.5 Surface waters are assessed to be of medium sensitivity. With mitigation the magnitude of impact during operation would be low and therefore of minor effect which is **Not Significant**.

Hydrogeology

9.7.3.6 The solar standings do not present a significant barrier to near surface and / or groundwater flows across the Site during the operational phase. Therefore, operation of the Proposed Development would result in a low magnitude impact on hydrogeology which is assessed to be of medium sensitivity which is a minor effect and **Not Significant**.

Sedimentation and Increased Erosion Rates

9.7.3.7 The potential release of sediments during the operational phase of the Proposed Development is considerably lower than during the construction phase as there will be very minimal ground disturbance. As noted in **Section 9.6.1** the use of SuDS, re-vegetation of the Site, and regular maintenance of drainage systems will control potential sedimentation of watercourses.

9.7.3.8 The velocity of water falling from the panels would be significantly less than the velocity of unimpeded rainfall such that soils will be less susceptible to erosion. Furthermore, the approach of allowing underlying surfaces to remain vegetated will reduce sediment loadings when compared to worked agriculture land during rainfall events.

9.7.3.9 Surface waters are assessed to be of medium sensitivity and designated sites are assessed to be of high sensitivity. Operation could result in low magnitude impacts. This would be a a minor effect and **Not Significant**.

Chemical Pollution

9.7.3.10 The potential release of chemicals during the operational phase of the Proposed Development is also considerably lower than during the construction phase as there will be fewer chemicals and vehicles on-Site. Thermal runaway of the solar panels are the highest risk of potential chemical leaks to waterbodies.

9.7.3.11 Surface waters are assessed to be of medium sensitivity and designated sites of high sensitivity. Operation could result in a high magnitude impact but with the embedded mitigation of an Emergency Response Plan, the magnitude of impact is reduced to low and therefore minor effect and **Not Significant**.

Effects on Private Water Supplies and Public Water Assets

9.7.3.12 Changes to water quantity may occur during the operational phase as a result of changes to overland surface water flow. However, operational effects on PWSs and public water assets as a result of changes to water quantity are not considered as high as during the construction phase.

9.7.3.13 Changes to water quality to PWSs and public water assets are also less likely than during the construction phase, but chemical pollution may occur in the event of regular site maintenance or thermal runaway.

9.7.3.14 PWSs are assessed to be of medium sensitivity and public water assets to be of high sensitivity. Operation will result in negligible magnitude impacts which is of no effect and **Not Significant**.

Effects on Bathing Waters

9.7.3.15 As stated on the above sections, the impacts to water quality as a result of sedimentation and / or chemical pollution are considered to be lower during the operational phase of the Proposed Development. They are also anticipated not to extend as far downstream due to the mitigation by design measures outlined in **Section 9.6.1** of the Chapter which includes the use of SuDS.

9.7.3.16 Bathing waters are assessed to be of medium sensitivity. Operation of the Proposed Development could result in a low magnitude impact which is a minor effect and **Not Significant**.

9.8 Mitigation

9.8.1.1 The assessment of potential effects (**Section 9.7** of this Chapter) has concluded there are no predicted likely significant effects with implementation of the embedded mitigation set out in **Section 9.6**. As such, no specific additional mitigation is required.

9.9 Residual Effects

9.9.1 Residual Construction Effects

9.9.1.1 As discussed in **Section 9.7.2**, with the embedded mitigation in place the potential for significant effects to all hydrological receptors and water resources during construction of the Proposed Development is **Not Significant**. The residual effects are summarised in **Table 9.11**.

9.9.2 Residual Operational Effects

9.9.2.1 As discussed in **Section 9.7.3**, with the embedded mitigation in place the potential for significant effects to all hydrological receptors and water resources during the operation of the Proposed Development is **Not Significant**. The residual effects are summarised in **Table 9.11**.

9.10 Cumulative Effects

9.10.1.1 The cumulative developments are show in **Figure 4.1.**

9.10.1.2 The Proposed Development is located within the Pease Burn hydrological catchment. There is the potential for cumulative and in-combination hydrological effects on the Pease Burn and its tributaries if construction of other developments were to take place at the same time as the Proposed Development within this catchment.

9.10.1.3 A list of cumulative developments within 5 km of the Site were reviewed and showed there are no other proposed developments within the Pease Burn catchment. As such, it is not considered there is the potential for cumulative effects on hydrological receptors.

9.11 Summary

9.11.1.1 **Table 9.11** provides a summary of the potential effects of the Proposed Development, proposed mitigation and commitments, and the likely residual effects (Significant or Not Significant).

TABLE 9.11 SUMMARY OF RESIDUAL EFFECTS

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
Construction					
Changes in water quantity including increased runoff and peak flows in rivers as a result of an increase in impermeable surfaces, removal of vegetation, changes to overland flowpaths, soil compaction, and damage to pipelines.	Watercourses PWS Public water assets	Medium Medium High	CEMP including a DMP. Detailed design to ensure the SEPA Riparian Corridors are not breached. If the SEPA Riparian Corridors are still breached, a water monitoring programme may be required to assess potential impacts to water quantity. Pre-construction PWS screening assessment to be carried out by the Applicant. Where PWSs are identified to be at risk from the Proposed Development, a PWS Protection Plan will be	N/A	Low magnitude of impact to receptors. Residual effect: Minor, Not Significant.

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
			developed. A water monitoring programme may be required to gather baseline water quantity data. Engagement with Scottish Water and development of RAMS and SSoW to protect public water assets.		
Changes to water quality as a result of sedimentation and chemical pollution.	Watercourses Designated sites (SSSI and SPA) PWS Public water assets Protected Bathing Waters Area	Medium High High High Medium	CEMP including a DMP, SECP, and PPP. Final detailed design will remove infrastructure from the SEPA Riparian Corridors. If the SEPA Riparian Corridors are still breached a water monitoring programme may be required to assess potential impacts to water quality. Mitigation measures to prevent sedimentation and	N/A	Low magnitude of impact to watercourses, designated sites, PWS, and public water assets. Residual effect: Minor, Not Significant. Negligible magnitude of impact to bathing waters. Residual effect: Negligible, Not Significant.

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
			chemical pollution of watercourses will be in place, the specific measures will be developed through the detailed design and preparation of the final CEMP. PWS Protection Plan. Water monitoring programme may be required to check water quality. Engagement with Scottish Water and development of RAMS and SSoW. Works to be overseen by an ECoW.		
Pollution of groundwater as a result of chemical pollution.	Groundwater protected area (hydrogeology)	Medium	CEMP including a PPP. Works to be overseen by an ECoW.	N/A	Negligible magnitude of impact. Residual effect: Negligible, Not Significant.

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
Changes to the quantity of sub-surface water as a result of excavations.	Groundwater protected area (hydrogeology)	Medium	The solar panels will be mounted on stands and not have deep, extensive concrete bases. Groundwater flows are unlikely to be impacted due to the superficial depths of excavations. The Applicant will conducted a Site investigation to determine groundwater levels prior to construction. No dewatering activities are anticipated.	N/A	Negligible magnitude of impact. Residual effect: Negligible, Not Significant.
Operational					
Changes in water quantity including increased runoff and peak flows in rivers as a result of an increase in impermeable surfaces, removal of vegetation,	Watercourses PWS	Medium High	The Site will be re-vegetated post construction to maintain pre-construction	N/A	Low magnitude of impact. Residual effect: Minor, Not Significant

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
changes to overland flowpaths.			infiltration rates and conveyance. The final design will also incorporate SuDS to control runoff rates. Final detailed design will remove infrastructure from the SEPA Riparian Corridors. The final detailed design will incorporate the results of **Technical Appendix 9.1: Outline Surface Water Drainage Strategy** to manage flood risk and surface water drainage. Regular inspection of the Site to ensure vegetation growth beneath the solar panels in maintained, and that the SuDS are functioning as intended.		

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
			Where the SEPA riparian corridors are still breached a water monitoring programme to determine post-construction water quantity may be required.		
Changes to water quality as a result of chemical pollution through thermal runaway of solar panels.	Watercourses Designated sites (SSSI and SPA) PWS Public water assets Protected Bathing Waters Area	Medium High High High Medium	Final detailed design will remove infrastructure from the SEPA Riparian Corridors. An Operational Management Plan including an ERP and operational PPP will be in place for the lifetime of the proposed development. It will outline the measures to be taken in the event of thermal runaway to protect hydrological resources.	N/A	Low magnitude of impact. Residual effect: Minor, Not Significant
Reduction in groundwater flows.	Groundwater protected area (hydrogeology)	Medium	The solar panels will be mounted on stands	N/A	Negligible magnitude of impact.

POTENTIAL EFFECT	RECEPTOR(S)	RECEPTOR(S) SENSITIVITY	EMBEDDED MITIGATION	ADDITIONAL MITIGATION	MAGNITUDE OF IMPACT (POST-MITIGATION) AND RESULTING RESIDUAL EFFECT
			and not have deep, extensive concrete bases. Groundwater flows are unlikely to be impacted due to the superficial depths of permanent infrastructure.		Residual effect: Negligible, Not Significant.
Potential chemical pollution of groundwater in the event of thermal runaway.	Groundwater protected area (hydrogeology)	Medium	An Operational Management Plan including an ERP and operational PPP will be in place for the lifetime of the proposed development. It will outline the measures to be taken in the event of thermal runaway to protect hydrological resources.	N/A	Low magnitude of impact. Residual effect: Minor, Not Significant