VOLUME 2: CHAPTER 11 – HYDROLOGY AND HYDROGEOLOGY

11. HYDROLOGY AND HYDROGEOLOGY

11.1 Introduction

11.1.1 This chapter considers the potential effects of the Proposed Development on hydrology and hydrogeology. The assessment includes potential effects on water quality, flood risk and drainage, groundwater abstractions, private water supplies (PWS) and groundwater dependent terrestrial ecosystems (GWDTE). Evaluation of the existing baseline environment has been made through a combination of desk-based study, field surveys, 1D-2D modelling of the nearby watercourses and consultation.

11.1.2 The chapter objectives with regards to the Proposed Development are as follows:

- describe the baseline environmental conditions (including desk-based and field surveys);
- describe how consultation has informed the scope of the assessment;
- describe the assessment methodology and significance criteria used in completing the assessment;
- describe the mitigation measures proposed to address likely significant effects (if required); and
- assess the residual effects remaining following implementation of mitigation.

11.1.3 This chapter presents information relevant to the Proposed Development. It should be read in conjunction with **Chapter 3: Description of the Proposed Development** of the EIA Report for full details of the Proposed Development.

11.1.4 The chapter should be read alongside **Chapter 9: Ecology** of the EIA Report due to interactions between both chapters in terms of the potential for effects on water quality (and indirectly aquatic ecology) and GWDTE).

11.1.5 The assessment was undertaken by Kaya Consulting Limited. It has been prepared and overseen by experienced hydrologists, engineers and geologists, with appropriate memberships of the Chartered Institution of Water and Environmental Management (CIWEM) and the Institute of Civil Engineers (ICE) and considerable experience of Flood Risk Assessments (FRA) and EIA in the context of wind farm, grid and mixed use developments in Scotland. Field surveys and data collection were undertaken by hydrologists with extensive experience in FRA and hydrology assessments. Further details can be found in **Chapter 2: EIA Report**.

11.1.6 The following terminology will be referred to throughout this chapter:

- Site: all land within the planning application (red line) boundary (**Figure 1.1: Site Location**);
- Proposed Development: The infrastructure including the platform, bays, control buildings, access tracks, drainage and landscape features and temporary construction compounds (see Paragraph 3.3.4 in **Chapter 3: Description of the Proposed Development**);
- Study Area: As defined in Paragraph 11.2.6, the study area comprises the Proposed Development and watercourses and catchments upstream and downstream of the Proposed Development;
- Private Water Supply: In Scotland, private water supplies (PWS) are defined as those that are not provided by Scottish Water. It is the owner's responsibility to manage the supply and keep it safe. Private water supplies are regulated by local authorities. There are two types of private water supply (PWS), and the legislation relating to each is different. Larger PWS or those with a commercial activity are defined as 'regulated supplies'. Smaller PWS that only serve domestic properties are classified as 'exempt supplies'.

11.2 Scope of the Assessment

Effects Assessed in Full

11.2.1 This assessment presents the likely effects of construction and operation of the Proposed Development upon hydrological and hydrogeological receptors as identified in the EIA Scoping Report (**Appendix 6.1: Scoping Report**) and informed by review of desk-based information and field surveys, project design and embedded and applied mitigation.

11.2.2 The EIA Scoping process, baseline conditions and professional judgement have identified the following direct and cumulative effects for detailed assessment:

- Flood risk during construction and operation at locations where relevant buffers cannot be achieved (e.g. the site access).
- Water quality (surface and groundwater) where relevant buffers cannot be met;
- Effects during construction on quality and quantity of PWS abstractions reliant upon groundwater resources that have subsurface flows or hydraulic connectivity impacted adversely by construction; and
- Cumulative effects during operation and construction.

11.2.3 With Embedded and Applied Mitigation many potential significant direct and cumulative effects on the water environment can be avoided or reduced, including effects on water quality, run-off rates and flood risk to the downstream water environment. However potential significant effects could occur locally at areas where watercourse buffers have not been achieved (i.e. watercourse crossing of the site access track) or at local PWS/groundwater abstractions where buffers cannot be achieved.

11.2.4 The assessment will be in line with Policy 22 of the NPF4 and the requirements of Scottish Environment Protection Agency (SEPA), set out in its scoping response dated 31st July 2024 (see **Table 11.1: Summary of Consultation** below). With reference to flood risk, the 200-year plus climate change return period event is considered when assessing and modelling flood risk areas.

Effects Scoped Out

11.2.5 On the basis of the desk based and field survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects, policy guidance or standards and feedback received from consultees, the following effects have been 'scoped out' of detailed assessment, as proposed in the EIA Scoping Report (see **Appendix 6.1: Scoping Report** and **Appendix 6.2: Scoping Opinion**):

- Potential adverse effects on water quality, flood risk, PWS and groundwater abstractions during construction and operation if appropriate buffers from watercourses and sensitive receptors have been achieved. Embedded and Applied mitigation (described below) will mitigate potential effects on the water environment and reduce run-off from the Proposed Development to greenfield rates.
- Potential effects on GWDTE, as no GWDTE were identified in the ecology study area (refer to **Chapter 9: Ecology, Paragraph 9.3.13**).

Study Area

11.2.6 The study area for hydrology and hydrogeology comprises the Proposed Development and watercourses and catchments upstream and downstream of the Proposed Development, see **Figure 11.1: Hydrology Study Area**. The search area for private water supplies and groundwater abstractions comprises a 1 km buffer from the Site. Existing conditions of the study area are detailed in **Section 11.4: Baseline Conditions**.

11.3 Assessment Methodology

Legislation, Policy and Guidance

Legislation

11.3.1 This assessment is carried out in accordance with the principles contained within the following legislation:

- The Flood Risk Management (Scotland) Act 2009;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR);
- The Water Framework Directive (2000/60/EC) (WFD), and Water Environment and Water (Scotland) Act (WEWS Act) 2003;
- The Pollution Prevention and Control (Scotland) Regulations 2012;

- The Town and Country Planning Act (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations');
- The Control of Pollution Act 1974 (as amended) Part II: Pollution of Water;
- The Scotland River Basin District (Standards) Directions 2014;
- The Scotland River Basin District (Status) Directions 2014
- The Public Water Supplies (Scotland) Regulations 2014;
- Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the Quality of Water Intended for Human Consumption (recast);
- The Private Water Supplies (Scotland) Regulations 2006;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017;
- The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013; and
- The Waste Management Licensing (Scotland) Regulations 2011.

Policies and Guidance

11.3.2 The following policies and guidance have been considered:

- Scottish Government (2024) National Planning Framework (NPF) 4: Policy 22 (Flood Risk Management);
- Angus Council Local Development Plan – Policy PV12: Managing Flood Risk (adopted September 2016);
- Angus Council Local Development Plan Supplementary Guidance (adopted September 2016);
- Angus Council: Technical Guidance for Developers and Regulators: Flood Risk and Surface Water Drainage Requirements, September 2023;
- SEPA: Policy No. 19, Groundwater protection policy for Scotland, 2009
- SEPA's Guidance for Pollution Prevention (GPPs), including:
  - GPP1: Understanding your environmental responsibilities – good environmental practices;
  - GPP2: Above ground oil storage tanks;
  - GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;
  - GPP5: Works and maintenance in or near water;
  - GPP6: Working at construction and demolition Sites;
  - GPP8: Safe storage and disposal of used oils;
  - GPP21: Pollution incident response planning;
  - GPP22: Dealing with spills; and
  - GPP26: Safe storage – drums and intermediate bulk containers.
- Scottish Government Planning Advice Notes (PANs) and Guidance (including PAN 51 Planning, Environmental Protection and Regulation; PAN 1/2013 Environmental Impact Assessment, as amended; and PAN 79 Water and Drainage);
- Scottish Executive: River crossings & migratory fish: Design guidance, 2012;
- Scottish Water standards and policies, including Sewers for Scotland 3rd edition, 2015 and Water for Scotland 3rd edition, 2015;
- SEPA: Technical Flood Risk Guidance for Stakeholders, version 13 (SEPA, June 2022);
- SEPA: The Water Environment (Controlled Activities) (Scotland) Regulations. A Practical Guide v9.4, July 2024;
- SEPA: Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2011, WAT-PS-06-02: Culverting of Watercourses - Position Statement and Supporting Guidance, Version 2, June 2015.
- SEPA: Engineering in the Water Environment Good Practice Guide – River Crossings, WAT-SG-25, 2010;

- SEPA: Engineering in the Water Environment Good Practice Guide – Temporary Construction Methods, WAT-SG-29, 2009;
- SEPA: Controlled Activities Regulations (CAR) Flood Risk Standing Advice for Engineering, Discharge and Impoundment Activities
- SEPA: Flood Risk Standing Advice, July 2024
- SEPA: Sector Specific Guidance: Construction Sites, WAT-SG-75, 2021;
- SEPA: Special requirements for civil engineering contracts for the prevention of pollution, WAT-SG-31, 2006;
- SEPA: Land Use Planning System, SEPA Guidance Note 31 (LUPS-31): Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, 2017;
- SEPA: Flood Risk and Land Use Vulnerability Guidance, July 2024;
- SEPA: Climate change allowances for flood risk assessment in land use planning, version 5, August 2024;
- SEPA: Recommended Riparian Corridor Layer for use in Land Use Planning, July 2024;
- SEPA: SEPA's Triage Framework. Guidance for Planning Authorities and SEPA. December 2022
- CIRIA: The SuDS Manual (C753) 2015;
- CIRIA: Control of water pollution from construction Sites: Guidance for consultants and contractors (C532) 2001;
- CIRIA: Groundwater Control – design and practice (C515) 2016;

Consultation

In undertaking the assessment, consideration has been given to the consultation responses which have been received as detailed in **Table 11.1: Summary of Consultation.**

Table 11.1 Summary of Consultation

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
SEPA 31 July 2024	Formal Scoping consultation	SEPA note that to avoid delay and potential objection the EIA submission must contain a series of scale drawings of sensitivities, for example peat depth, peat condition, GWDTE, proximity to watercourses, overlain with Proposed Development. This is necessary to ensure the EIA process has informed the layout of the development to firstly avoid, then reduce and then mitigate significant impacts on the environment. SEPA request that the issues covered in their Appendix 1 (summarised below) be addressed to SEPA's satisfaction in the EIA process.	**Figure 11.1: Hydrology Study Area** shows the sensitive receptors (watercourses, PWS and groundwater abstractions) within and close to the Proposed Development.
		Appendix 1 – SEPA's detailed scoping requirements **1. Site Layout** – All figures must detail all proposed upgraded, temporary and permanent infrastructure. This includes all tracks, excavations, buildings, borrow pits, pipelines, cabling, site compounds, laydown areas, storage areas and any other built elements.	**Figure 11.1: Hydrology Study Area** and **Figure 11.2: Flood Risk Areas within Study area** show the Proposed Development, as requested, with respect to sensitive receptors. There are no borrow pits included in the Proposed Development.
		2. Water Environment - The proposals should demonstrate how impacts on local hydrology have been minimised and the site layout designed to minimise watercourse crossings and avoid other direct impacts on water features. Measures	**Figure 11.2: Flood Risk Areas within Study area** shows how the Proposed Development has avoided direct impact on watercourses. Watercourses have been buffered according to SEPA recommended riparian

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		should be put in place to protect any downstream sensitive receptors. Figures should be included with the submission which show all proposed temporary or permanent infrastructure overlain with all lochs and watercourses and a minimum buffer of 50 m around each loch or watercourse should be shown. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works. A figure showing the location, size, depths and dimensions of all borrow pits overlain with all lochs and watercourses within 250 m and showing a site-specific buffer around each loch or watercourse proportionate to the depth of excavations. The information provided needs to demonstrate that a site specific proportionate buffer can be achieved. Guidance on the design of water crossings can be found in SEPA (2010) Engineering in the water environment: good practice guide – River Crossings.	corridors where a 50 m buffer could not be achieved. There are no borrow pits included in the Proposed Development. Watercourse crossings were avoided as much as possible during initial design. The main access track crosses a small, unnamed tributary of the Fithie Burn and the crossing has been designed following SEPA (2010) guidance.
		3. Flood Risk - SEPA note that advice on flood risk is available on their website in the Flood Risk Standing Advice and reference should also be made to CAR Flood Risk Standing Advice for Engineering, Discharge and Impoundment Activities. SEPA note that watercourse crossings must be designed to accommodate the 0.5% annual exceedance probability flows (with an appropriate allowance for climate change), or information provided to justify smaller structures. If it is considered the development could result in an increased risk of flooding to a nearby receptor, then a flood risk FRA must be submitted.	A flood risk assessment has been prepared and is included as **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy.** There is no Proposed Development in the flood risk area with the exception of the soft landscaping and the watercourse crossing of the access track has been designed to accommodate the 0.5% annual exceedance probability flows (with an appropriate allowance for climate change)
		4. Peat and Peatland – SEPA request additional information to be submitted where proposals are on peatland or carbon rich soils (CRS).	There is no peat or carbon rich soils (CRS) within the Site; it is classed as Mineral Soils (Class 0), based on the NatureScot Carbon and Peatland (2016) map. Effects on Geology, Soils and Peat were scoped out of the EIA (refer to the Scoping report in **Appendix 6.1: Scoping Report** for further information) and will not be assessed further.
		5. Groundwater Dependent Terrestrial Ecosystems (GWDTE) and existing groundwater abstractions – SEPA request that a National Vegetation Classification (NVC) survey should be submitted, which includes figures showing that all GWDTE and existing groundwater	**Chapter 9: Ecology** presents the findings of the habitat surveys. The UKHabs methodology was used as the initial, broad system for characterising habitat types. Consideration was given to the potential for habitats to be of

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		abstractions are outwith a 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m. If the minimum buffers cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required.	conservation concern (for example, potential GWDTEs) and therefore requiring detailed NVC survey. Due to the intensively-managed, lowland nature of the habitats, no potential GWDTEs or other habitats of conservation concern were recorded within the Site or a 250m buffer, and therefore the NVC methodology was not applied. Groundwater abstractions and PWS sources within 250 m of the Site are shown in **Figure 11.1: Hydrology Study Area**.
		6. Pollution prevention and environmental management – SEPA note that 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. Please refer to SEPA's Guidance for Pollution Prevention (GPPs) and SEPA's water run-off from construction sites webpage for more information.	A schedule of mitigation is included in **Chapter 16**. The Applicant will adhere to best practise pollution prevention and construction techniques and follow SEPAs GPPs and manage run-off from construction sites according to SEPA best practice and in-line SSEN Transmission's General Environmental Management Plans (GEMP) and SPPs
		Site Specific comments: SEPA note that the case officer has confirmed that this is essential infrastructure where there is a specific locational need and/or the location is required for operational reasons. As such it is an exception under Policy 22 part a) it is permissible that the Proposed Development is located within the flood risk area subject to the relevant criteria in the policy being met.	The flood risk area of the Fithie Burn and unnamed tributary from the north have been predicted based on detailed 1D-2D modelling (see **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). The Proposed Development is not located within the flood risk area of any watercourse, with the exception of the access track crossing and mitigation planting.
		SEPA note that a FRA will be submitted a part of the overall site assessment / EIA Report. We recommend that the consultant involved to make sure that what is submitted is in accordance with our requirements (see Section 3.3 below) and that the FRA addresses the first three bullet points in NPF4 Policy 22 part a), these relate to issues that fall within SEPA's remit.	The FRA (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**) meets SEPA requirements and addresses the first three bullet points of NPF4 Policy 22 part a) as below: • All risks of flooding are understood and addressed. • There is no reduction in floodplain capacity, increased risk for others, or a need for future flood prevention schemes • The development remains safe and operational during floods
		SEPA note that the application to be supported by a comprehensive site specific Peat Management Plan (PMP)	This is assumed to be an error. The Site is not on peat or carbon rich soils and a PMP is not

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
			required and will not be included in the application.
		SEPA will not accept the use of the UKHab survey methodology instead of the NVC method, therefore the proposed approach set out in the EIA Scoping report where UKHab outputs will be converted to standard NVC terminology will not be acceptable to SEPA.	**Chapter 9: Ecology** presents the findings of the habitat surveys. The UKHabs methodology was used as the initial, broad system for characterising habitat types. Consideration was given to the potential for habitats to be of conservation concern (for example, potential GWDTEs) and therefore requiring detailed NVC survey. Due to the intensively-managed, lowland nature of the habitats, no potential GWDTEs or other habitats of conservation concern were recorded within the Site or a 250 m buffer, and therefore the NVC methodology was not applied.
		SEPA note that no GWDTE were identified on site. If this substantiated by NVC survey outputs this issue can be scoped out of the final EIA Report	As above. Full results of the habitats surveys are provided in **Chapter 9**. No GWDTEs were identified and this topic has been scoped out.
		SEPA note that council records of Private Water Supplies can be incomplete, and verification is required to identify source locations.	A PWS survey and questionnaire was sent out to all remote properties within 1 km of the Site and SEPA provided information on licenced abstractions to identify source locations. The results are presented in the baseline assessment in this chapter.
		SEPA note that details of regulatory requirements and good practice advice, for example in relation to engineering works in the water environment and waste management, can be found on the regulations section of our website. If you are unable to find the advice you need for a specific regulatory matter, please contact a member of the local compliance team at: FAD@sepa.org.uk	The Applicant is aware of the regulatory framework relating to the water environment and waste management. The Applicant will continue to consult and liaise with SEPA throughout the consenting process for the Proposed Development.
SEPA 16 June 2023	Response to Consultation Document	SEPA stated that they would welcome further investigation into whether there were opportunities to realign the straightened watercourse, the Fithie Burn, immediately to the south of the Proposed Development to contribute towards biodiversity enhancement. Within the same consultation response SEPA also provided an Appendix with general scoping guidance for large infrastructure projects.	The Applicant investigated opportunities to realign the Fithie Burn. However, due to land constraints realignment of the burn could not be taken forward.
SEPA 12 October 2024	Response to Data Request	SEPA provided a list of licensed abstractions within a 1 km buffer of the Proposed Development. SEPA note that the National Grid References relate to the site location and not the actual abstraction location. SEPA also provided a link to	The abstraction data was used to inform the baseline assessment presented in this chapter.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		download an Excel file with the licensed abstraction locations in latitude / longitude.	
Scottish Water 17 July 2024	Formal Scoping consultation	Scottish Water has no objection to this proposal. Scottish Water note that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity. Scottish Water will not accept any surface water connections into our combined sewer system. Scottish Water note that all developments that propose a connection to the public water or waste water infrastructure are required to submit a Pre-Development Enquiry (PDE) Form.	The Proposed Development does not require a surface water connection into Scottish Water's combined sewer system. The Proposed Development does not propose a connection to public water or waste water infrastructure and a PDE Form is not required.
Scottish Water 30 May 2023	Response to Consultation Document	Scottish Water note that there are no Scottish Water assets (including water supply and sewer pipes, water and waste water treatment works, reservoirs, etc.) in the areas concerned. This should be confirmed however through obtaining plans from our Asset Plan Providers	Scottish Water Asset plans were not obtained by the Applicant but can be viewed online
NatureScot 12 July 2024	Formal Scoping consultation	NatureScot are content with the proposed scope of the survey and assessment. NatureScot agree with the issues to be scoped out that are relevant to their remit.	N/A.
NatureScot 30 May 2023	Response to Consultation Document	NatureScot noted that the Proposed Development is approximately 8 km from the Firth of Tay and Eden Estuary Special Protection Area (SPA) and Ramsar site. They also noted the nearby The Outer Firth of Forth and St Andrews Bay Complex SPA	This has been used to inform baseline assessment.
Angus Council 12 March 2024	Report to Development Standards Committee following publication by Applicant of the Proposal of Application Notice	Angus Council noted the need to address effects on the water environment and flood risk. Angus Council were contacted by the Applicant in November and December 2023 regarding storage requirements for drainage design and historical flooding, but no response was received at the time of writing..	In the absence of site specific guidance, the Applicant referred to technical guidance within Angus Council (2023) "Flood Risk and Surface Water Drainage Requirements" September 2023, which provides guidance to inform the preparation of flood risk assessments and design of surface water drainage.
Angus Council 11 November 2023	Response to Data Request	The council provided a list of PWS that they have record of within 1 km from the Proposed Development. They provided NGR coordinates of the PWS properties and details of the source type (e.g. spring, borehole, well)	The data was used to inform the PWS baseline assessment presented in this chapter.
Public consultation March 2024 PAC Event	Public Consultation	There were multiple concerns about flooding in the vicinity of the Proposed Development. It was noted that there was considerable flooding in the area, particularly over the winter of 2023/24 and based on this several commented that the	A flood risk assessment has been prepared (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). The Proposed Development is outwith the flood risk areas and has been

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		proposed location would not be suitable for development. Local roads are known to flood each winter (particularly evident in 2023).	designed such that it will not increase flood risk elsewhere. The findings of the flood risk assessment and drainage strategy is summarised in this chapter.
Public consultation May 2024 PAC Event	Public Consultation	There were several concerns about flooding in the vicinity of the Site. Concerns were also raised regarding the risk of water contamination affecting local watercourses. Concerns related to toxic chemicals used in battery storage and disturbance to the water table were also noted.	A flood risk assessment has been prepared (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). The Proposed Development is outwith the flood risk areas (with the exception of previously stated elements) and has been designed such that it will not increase flood risk elsewhere. Sustainable Drainage Systems (SUDS) will treat surface water runoff from the Proposed Development prior to discharge to the water environment and appropriate buffers from watercourses are in place, minimising the risk of contamination. Effects of nearby groundwater abstractions are assessed in this chapter and there is not expected to be a significant effect on the water table. There is no battery storage proposed.
Tealing Community Council (TCC)	June 2024 Public Consultation Feedback	TCC note that the Tealing aerodrome site had been ruled out partly due to existing flood risk. TCC requested sight of any further data which leads SSEN Transmission to believe that the flood risk there is unacceptable.	The Tealing aerodrome site, which lies to the east of the existing substation, is within SEPA's predicted future flood risk area (for river and surface water flooding). Development in the flood risk area is not likely to be acceptable given current planning policy.

Desk Based Research and Data Sources

11.3.3 The following data sources have informed the assessment:

- Ordnance Survey mapping at 1:10,000 and 1:25,000 scales;
- Aerial imagery of the Proposed Development location and surrounding area;
- The Flood Estimation Handbook (FEH) Web-service[1];
- SEPA future flood maps[2];
- SEPA water classification hub[3];
- Phase 1 DTM 1 m resolution topographic LiDAR data, downloaded from the Scottish Remote Sensing portal;
- 5 m Photogrammetry DTM data for the area to the north purchased from BlueSky, where there was no LiDAR coverage;
- Cross-section and additional topographic survey of nearby watercourses and structures (the Fithie Burn and its tributary) to inform flood modelling;
- Scotland's Environment website and interactive map[4];

[1] https://fehweb.ceh.ac.uk/Map
[2] https://scottishepa.maps.arcgis.com/
[3] https://www.sepa.org.uk/data-visualisation/water-classification-hub/
[4] https://map.environment.gov.scot/sewebmap/

- Scottish Water asset plans[5];
- Private Water Supply data provided by Angus Council; and
- Licensed abstraction data provided by SEPA.

Field Survey

11.3.4 The following field surveys were carried out to inform the assessment:

- 22 November 2022 - Hydrology walkover survey to review alternative substation options. This survey covered a number of options, including Emmock and was a high level review of hydrology constraints. Weather conditions were sunny and dry.
- 22 November 2023 – Detailed hydrology walkover survey of watercourses, existing drainage and flood risk in the study area. The weather was cold and dry but followed a period of extreme heavy rainfall in the area associated with Storm Babet (late October 2023) which was useful to observe evidence of previous flood in the area.
- 8 February 2024 - Hydrology walkover survey to ground truth the catchment of the tributary to the Fithie Burn to inform the flood risk assessment (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). Weather conditions were cold and dry.
- 21 and 25 March 2024 – Topographic survey of cross-sections of the Fithie Burn and the tributary to inform the flood risk assessment. Weather conditions were dry.
- 10 July 2024 - Hydrology walkover survey to survey watercourse crossings along the principal construction haul route to the Proposed Development. The weather was cool and overcast.

Assessing Significance

11.3.5 The predicted significance of effect was determined through a standard method of assessment outlined in **Chapter 5: EIA Process and Methodology** and based on professional judgement, considering both sensitivity of receptor and magnitude of change as detailed in **Table 11.2: Matrix for Determination of Significance of Effects**. Major and moderate effects are considered significant in the context of the EIA Regulations.

Table 11.2 Matrix for Determination of Significance of Effects

Magnitude of Change	Sensitivity of Receptor / Receiving Environment to change				
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity

11.3.6 Sensitivity has been determined on the basis of the following criteria outlined in **Table 11.3: Criteria to Assess the Sensitivity of Receptor**:

Table 11.3: Criteria to Assess the Sensitivity of Receptor

Sensitivity of Receptor	Typical Indicators
High	Receptor is of national or international value (i.e., Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Area (SPA), and RAMSAR). Overall water quality classified by SEPA as high and salmonid spawning grounds present. Abstractions for public water supply. Groundwater classified under the WFD as 'good' or groundwater resource with numerous sensitive users/receptors.

[5] Scottish Water GIS Extranet, viewed online

Sensitivity of Receptor	Typical Indicators
	The flooding of property (or public roads) that has been susceptible to flooding in the past. Watercourse floodplain/hydrological feature that provides critical flood alleviation benefits. Natural channel and of high morphological diversity. Receptor supports GWTDE confirmed as highly groundwater dependent.
Medium	Receptor is of regional or local value (e.g. Local Nature Reserve). Overall water quality classified by SEPA as good or moderate, salmonid species may be present, and may be locally important for fisheries. Smaller watercourse lying upstream of larger river that is an SSSI, SAC SPA or RAMSAR. May be subject to improvement plans by SEPA. Abstractions for private water supplies. Groundwater resource with sensitive users/receptors. Environmental equilibrium copes well with natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. The flooding of property (or land use of great value) that may be susceptible to flooding. Watercourse/floodplain/hydrological feature that provide some flood alleviation benefits. Semi-natural channel, with morphological diversity. May have some minor morphological constraints. Receptor supports GWTDE confirmed as moderately groundwater dependent.
Low	Receptor is of low environmental importance (e.g., water quality classified by SEPA as bad or poor, fish sporadically present or restricted). Not subject to water quality improvement plans by SEPA. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. No significant groundwater resource and no identified sensitive users/receptors. No flooding of property or land use of great value. Watercourse/floodplain/hydrological feature that provides minimal flood alleviation benefits. Heavily engineered or artificially modified and may dry up during summer months. No GWDTE confirmed as either moderately or highly groundwater dependent.
Negligible	Receptor is of low environmental importance (e.g., water quality classified by SEPA as bad or poor, fish sporadically present or restricted). Not subject to water quality improvement plans by SEPA. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. No groundwater resource and no identified sensitive users/receptors. No flooding of property or land use of great value. Watercourse/floodplain/hydrological feature that provides minimal flood alleviation benefits. Heavily engineered or artificially modified and may dry up during summer months. No GWDTE.

Magnitude

11.3.7 The magnitude of change has been assessed based on the criteria outlined in **Table 11.4: Criteria for Estimating the Magnitude of Effect**. These criteria are based on professional judgement and experience of other similar studies.

Table 11.4: Criteria for Estimating the Magnitude of Effect

Magnitude	Description/ Typical Example
High	Fundamental changes to the hydrology, water quality or hydrogeology (in terms of quantity, quality, and morphology). A >10% change in average or >5% change in flood flows. The extent of flood risk areas (as classified by NPF4 – i.e. land or built form with an annual probability of being flooded of greater than 0.5% including an appropriate allowance for future climate change) will be significantly increased. Change that would render water supply unusable for longer than month.
Medium	Material but non-fundamental changes to the hydrology, water quality or hydrogeology (in terms of quantity, quality, and morphology). A >5% change in average and minimal change in flood flows. Extent of flood high risk areas will be moderately increased/or decreased. Change that would render water supply unusable for days or weeks with no alternative.
Low	Detectable but non-material changes to the hydrology, water quality or hydrogeology (in terms of quantity, quality, and morphology). A >1% change in average flows and no increase in flood flows. Change that would render water supply unusable for short period (days) or for longer period if alternative supply put in place.
Negligible	No perceptible changes to the hydrology, water quality or hydrogeology (in terms of quantity, quality, and morphology). A <1% change in average and no change in flood flows. No change in water supply or minor change (days) where alternative is put in place.

Assessment Limitations

11.3.8 It is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on hydrology and hydrogeology.

11.4 Baseline Conditions

Summary of Baseline Conditions

Climate

11.4.1 The average annual temperature in this part of northeastern Scotland is between 6.8°C and 12.7°C (Met Office Website[6]). The average rainfall on the Site is approximately 839 mm (FEH Web Service[7])

Topography

11.4.2 The topography of the Site is shown in **Figure 11.1.3: Site and Surrounding Topography, Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**, based on the 1 m LiDAR data, 5 m photogrammetry DTM data and spot level topographic survey carried out for the project. Ground levels fall from the north to south, as the Site slopes down towards the Fithie Burn which forms part of the southern boundary of the Site. The highest ground levels are in the northwest corner of the Site at approximately 173 m Above Ordnance Datum (AOD). The Site falls to the south and the lowest ground levels are located in the south of the Site adjacent to the Fithie Burn at approximately 130 m AOD.

Watercourses and Surface Water

11.4.3 The Proposed Development is within the catchment of the Fithie Burn, which flows in an easterly direction south of the Site (**Photo 11.1: Fithie Burn just downstream of the Site)**. An unnamed tributary to the Fithie Burn (**Photo 11.2**) flows south through the eastern extent of the Site and reaches its confluence with the Fithie Burn downstream

[6] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gfjc4jejv
[7] https://fehweb.ceh.ac.uk/Map

of the Site. The unnamed tributary watercourse is culverted through the Site. The culvert outflow is immediately downstream of the Site boundary and it flows as an open channel adjacent to the U322 (Emmock Road) immediately east of the Site. The Fithie Burn is a tributary of the Dighty Water; the confluence with the Dighty Water is approximately 8.5 km downstream of the Site. Key watercourses and waterbodies within and downstream of the Site are shown in **Figure 11.1: Hydrology Study Area**.

11.4.4 The Fithie Burn rises in farmland to the west of the Site and flows in an easterly direction along the southern boundary of the Site. At the eastern bounds of the Site, the burn passes under Emmock Road flowing south east away from the Site. Approximately 75 m upstream of Emmock Road the unnamed tributary enters the Fithie Burn from the north. The tributary discharges from a culvert under the fields approximately 560 m north of the Fithie Burn; at this location the culvert outlet discharges to an open channel (see **Figure 11.1.1: Hydrology Site Location** in **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). Based on a site walkover on 22November 2023 following Storm Babet, there was evidence of significant flooding occurring in this field close to the eastern Site boundary. There was evidence of ponding in the south eastern corner of the field (immediately north of the tributary culvert outlet).

11.4.5 As the tributary channel continues south parallel to the road just south of the Site, significant erosion to the channel banks was observed (see **Photo 3.2** in **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**), which presumably occurred during the Storm Babet event.

11.4.6 A walkover assessment was undertaken on 8th February 2024 to delineate the upstream catchment of the tributary to inform the flood risk assessment. A watercourse / drain was noted to flow from west to east along the base of Craigowl Hill; this is noted on Ordnance Survey maps to be the upper reaches of Tealing Burn. During normal flow conditions, the watercourse enters a culvert under agricultural fields towards Prieston Farm and then discharges into an open channel to flow eastwards towards Tealing (as Tealing Burn), away from the Site (see **Figure 11.1.2: Tributary Watercourse Features** in **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). However, during high flows, the watercourse has been recorded overtopping its banks and flowing southward, overland across the fields to join an open watercourse section which flows south from Prieston Farm. This open channel is then culverted under the public road (a short distance east of Balkemback Farm) and under the field until it forms the tributary watercourse as it exits from the culvert just south of the eastern Site boundary.

11.4.7 Following periods of heavy rainfall, flood water flows overland in the field north of the open channel, creating an ephemeral flood flow in the depression in the topography (see **Photo 3.3** in **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). From the aforementioned site visits, there was evidence of flooding in the area during Storm Babet. Discussions with local farmers also corroborated this flood flow path. The flood flow path is broadly similar to that shown in the indicative SEPA pluvial flood risk mapping and flooding of the local roads was commented on during the public consultation events (see **Table 11.1: Summary of Consultation**)

11.4.8 Proposed access downstream of the Proposed Development to the east is within the catchment of the Tealing Burn, which flows south to its confluence with the Fithie Burn.

11.4.9 There are no surface water bodies within the Site. However, there is a small, unnamed pond adjacent to the principal construction haul route east of the Site beside the existing Tealing Substation.

11.4.10 A flow pathway analysis was undertaken using LiDAR DTM topographic data. The analysis was supplemented by 5 m photogrammetry DTM data, topography data collected for the flood risk assessment and observations in the field to assess potential flow routes within the Site. The entirety of the Site drains towards the Fithie Burn, with flow pathways orientated to the south and east. Catchment areas of the main watercourses are shown in **Figure 11.1.4: Catchment Area Delineation, Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**. Further details of the two watercourses are provided in the flood risk assessment (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**).

Photo 11.1: Fithie Burn just downstream of the Site

Photo 11.2: Unnamed tributary, which flows to the south close to the eastern Site boundary (photo taken in a northerly direction looking upstream)

Watercourse Crossings

11.4.11 There is one new watercourse crossing required for access track to the Proposed Development. The unnamed tributary to the Fithie Burn is crossed in the northeast of the Site at a location where the small watercourse is within

a culvert beneath the field The proposed access will cross the culverted watercourse and an overland flood flow path, which is discussed in detail in **Appendix 11.1**: **Flood Risk Assessment and Outline Drainage Strategy**.

Hydrology and Flood Risk

11.4.12 The SEPA flood maps show the likely extent of high, medium and low likelihood for fluvial (river), pluvial (surface water) and tidal flows. The SEPA Future Flood maps provide an indication of flood risk during the 200-year plus climate change event and are shown in **Figure 11.2: Flood Risk Areas within Study area**.

11.4.13 The Proposed Development is not at risk of coastal flooding. The SEPA Future Flood maps indicate that there are some areas of the Site at risk of fluvial and surface water flooding. Fluvial flood risk is indicated along the Fithie Burn in the southeast of the Site. Surface water flood risk is indicated further west up the course of the Fithie Burn and also along the line of the unnamed culverted tributary to the Fithie Burn along the northeast of the Site. The principal construction haul route to the east is indicated to be at fluvial and surface water flood risk along the Fithie Burn and the Tealing Burn. It is noted that SEPA maps are indicative only and a detailed assessment of flood risk is required where sites are close to or within the indicative flood extents. Therefore a detailed flood risk assessment (FRA) was carried out for the Proposed Development to further understand the flood risk at and close to the Site (see **Appendix 11.1**: **Flood Risk Assessment and Outline Drainage Strategy** and summary below).

Empirical Site Specific Flood Modelling

11.4.14 A detailed assessment of hydrology and flood risk, with 1D-2D hydraulic modelling of the Fithie Burn and the unnamed tributary, has been carried out to understand the extent of flood risk at and close to the Site to inform the layout of the Proposed Development and feed into the design of the access track. A detailed topographic survey of both watercourses was undertaken to inform the modelling. A flood risk assessment has been submitted with the EIA Report (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**) and the main findings are summarised below:

- The Fithie Burn drains a catchment to the west of the Site before entering an open channel and running along the southern boundary of the Site. Close to the eastern boundary of the Site, a tributary drains a similar sized catchment (during flood events due to an overland flow path) before flowing south, through the Site, and enters the Fithie Burn south of the Site. To assess flood risk at the Site, a Flood Modeller Pro 1D/2D linked mathematical model of the two watercourses was developed and the model was adapted to predict the 200-year + climate change floodplain close to the Site.
- A hydrological assessment was undertaken to estimate the design flows for the Fithie Burn and the tributary channel; the design flows used in the model are shown in **Table 11.5: Design Flow Estimates for the Fithie Burn and the unnamed tributary at the Site**, with an appropriate allowance for climate change (see **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy** for details).

Table 11.5: Design Flow Estimates for the Fithie Burn and the unnamed tributary at the Site

Parameter	200 Year + Climate Change (m^3/s)	
	Fithie Burn	Tributary
FEH Rainfall-Runoff Design Flow Estimate	10.3	9.9

- **Figure 11.2: Flood Risk Areas within Study area** shows the predicted 200-year plus climate change flood extent based on the 1D-2D model. The results show the main channel of the Fithie Burn is predicted to overtop, leading to inundation of the surrounding low-lying areas both north and south of the channel. The twin culvert road crossing (under Emmock Road) is predicted to be under capacity which results in backing up and flooding downstream of the Site. Flood waters are predicted to continue eastwards, without returning to the channel so large areas of land downstream of the Site are predicted to be at risk of flooding. This is generally consistent with the SEPA future flood maps and local observations.

- In addition to the main channel, the tributary of the Fithie Burn is also predicted to overflow. Within the Site, the flood channel is largely contained within a small valley in the topographic low of the field, before floodwaters are predicted to overtop a field boundary and re-enter the open channel downstream of the Site. At this location, flood waters are predicted to overtop the left bank and flood Emmock Road. Flows leaving the channel at this location are not able to return to the tributary. As the channel continues south, the flooding pattern for the tributary is distinct; with flood waters primarily concentrated to the east of the channel. The channel enters a sharp meander and flows west, at this location overtopping of the western and southern bank is also predicted. The overflow from the tributary spreads more diffusely over the land, predominantly in a southerly direction. This diffuse flooding pattern suggests that wider areas to the south of the tributary (outwith the Site) are at risk of flooding.
- **Figure 11.2: Flood Risk Areas within Study area** shows that the higher ground to the north and west within the Site boundary is not within the predicted flood extent. Based on NPF4 land outwith the 200-year + climate change flood extent is suitable for most types of development including for a substation. A substation and associated works would be classed as a “essential infrastructure” land use and development could take place within the 200-year plus climate change flood extent.
- There is high ground to the north and north west of the Site, therefore there is potential for surface water to drain to the Site enroute to the Fithie Burn and/or the tributaries. **Figure 11.1.7: Surface Water Flow Pathways** in **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy** shows the indicative surface water flow pathways within and close to the Site based on GIS analysis of LiDAR DTM and Photogrammetry DTM topographic data. The only catchment area able to drain to the Site is limited to the small area to the north; this is an ~47.5 ha catchment that currently flows through the Site to the main channel of the Fithie Burn.
- As described above and shown in **Figure 11.2: Flood Risk Areas within Study area**, a small part of the Site (close to the Fithie Burn and its tributary) is predicted to be at flood risk. The FRA has been used to inform the development design and the Proposed Development is sited outwith (with the exception of landscaping and the site access) the predicted 200-year plus climate change flood risk area.

Water Supplies, Discharges, Abstractions and Services

11.4.15 Angus Council was consulted in July 2023 and provided their database of private water supplies (PWS) within 1 km of the Site boundary (**Table 11.5: Design Flow Estimates for the Fithie Burn and the unnamed tributary at the Site**). This data from the Council indicates two properties known to be supplied by PWS within 1 km of the Site. One PWS property lies adjacent to the northern Site boundary at Balkemback Farm (**Figure 11.1: Hydrology Study Area**). However, Angus Council notes that their PWS records can be incomplete and require verification. Angus Council also note that the data provides property locations and not locations of the spring sources.

11.4.16 Therefore, PWS questionnaires were sent to 59 properties within 1 km of the Site , including the properties identified by Angus Council shown in **Table 11.6: Private Water Supplies within 1 km of the Site**. Neither Balkemback Farm nor North Balluderon have responded to the questionnaire at the time of writing. However, many of the responses from nearby properties confirm that they are on a mains supply and are not served by a PWS (**Figure 11.1: Hydrology Study Area**); this includes No. 5 Balkemback Farm Cottages. From this it can be inferred that the Balkemback Farm is likely also to have a mains connection. It may be that the spring supply (if still in use) is utilised for agriculture purposes.

11.4.17 Data from Angus Council and questionnaires has indicated there are no PWS supplied properties within the Site itself, and possibly two within 1 km of the Site boundary (**Table 11.6: Private Water Supplies within 1 km of the Site**). The locations of PWS with respect to the Proposed Development are shown in **Figure 11.1: Hydrology Study Area**, which also indicates properties that are known to be served by Scottish Water mains.

Table 11.6: Private Water Supplies within 1 km of the Site[1]

PWS Name	Property Easting	Property Northing	Source Type	Supplied Property Name	Distance of Property from Proposed infrastructure
Balkemback Farm	339175	738095	Spring	Balkemback Farm	The property is ~150 m north of northern limit of the proposed earthworks. The spring supply is located at NGR 338550 738750, which is over 920 m north and upgradient of the Site.
Balluderon	337601	738637	Spring	Balluderon	~1,250 m north west of substation platform earthworks.

[1] – Data provided by Angus Council, Environmental Protection Department

11.4.18 SEPA provided data on licensed abstractions within 1 km of the Site. SEPA note that the National Grid References (NGR) provided are for the site/property and not the point of abstraction. A second GIS file was provided by SEPA, which provides the point of abstraction for some licences. Based on SEPA records, there are two licenced abstractions within 1 km of the Site boundary and the details are summarised in **Table 11.7: SEPA CAR Licensed Abstractions within 1km of the Site Boundary**.

Table 11.7: SEPA CAR Licensed Abstractions within 1 km of the Site Boundary

Name and Date	Property Easting	Property Northing	Type	Abstraction Volume	Comment and Distance from Proposed Infrastructure
Balkemback Farm September 18th 2006	339130	738180	Agricultural (other than irrigation)	Unknown	Licensed abstraction is for Balkemback Farm, which is just north of the Site. The abstraction is for agricultural use and is likely the same as the PWS (likely for agriculture) noted in **Table 11.6: Private Water Supplies within 1 km of the Site**. SEPA provided further details of the CAR license, which noted the abstraction is from a spring source located northwest of the property at NGR 338550 738750. As noted in **Table 11.6: Private Water Supplies within 1 km of the Site**, this is upgradient and over 920 m north of the Proposed Development.
Myreton of Cleaverton January 26th 2023	339690	736755	Water resources-Crops	Unknown	Licensed abstraction is for Myreton of Cleaverton, which is ~900 m south east of the substation platform. SEPA data indicates that there are two source locations; one is a groundwater abstraction from a borehole and the other an abstraction from the Fithie Burn, both abstractions are close to the Burn (**Figure 11.1: Hydrology Study Area)** and are over 900 m away from the proposed infrastructure and will not be impacted by the Proposed Development.

11.4.19 A review of the Scottish Water asset plans online does not show any pipework or infrastructure within the Site.

11.4.20 There are no Drinking Water Protected Areas (Surface) within the Site but is within a Drinking Water Protected Area (DWPA) for groundwater (as is the whole of Scotland).

Water Quality and Protected Areas

SEPA has characterised surface water quality status under the terms of the Water Framework Directive. Classification by SEPA considers water quality, hydromorphology, biological elements including fish, plant life and invertebrates, and specific pollutants known to be problematic. The classification grades through High, Good, Moderate, Poor, and Bad status. This provides a holistic assessment of ecological health. There is one waterbody within the Site which is large enough to be classified by SEPA: The Fithie Burn (Waterbody ID 6004) was classified as Poor in 2022 and has been designated by SEPA as a "heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on the drainage of agricultural land and from an increased risk of subsidence or flooding" (https://informatics.sepa.org.uk/WaterClassificationHub/).

11.4.21 The Dighty Water (ID 6000), of which the Fithie Burn forms a sub-catchment, was classified as Moderate in 2022. The Dighty Water flows into the Firth of Tay and Eden Estuary SPA and SAC and the Monifieth Bay SSSI. The SPA, SAC and SSSI are approximately 12.5 km downstream from the Site.

Groundwater

11.4.22 The groundwater body underlying the Site is the Sidlaw Hill (Waterbody ID 150601) in the Tay Sub Basin District, which was classified by SEPA as overall 'Good' in 2022.

11.4.23 The Site is underlain by the Arbuthnott-Garvock Group sandstones, siltstone and mudstones which are classified by British Geological Survey (BGS) as a moderately productive aquifer. As a Class 2B aquifer, flow is virtually all through fractures and other discontinuities

11.4.24 SEPA groundwater flood maps indicate that the Site is not at risk from groundwater flooding.

11.4.25 A review of Ordnance Survey 1:10K and 1:25K mapping indicates that there are no wells and groundwater springs located within the Site.

Groundwater Dependent Terrestrial Ecosystems

11.4.26 Ecology surveys confirmed that no GWDTEs were identified in the ecology study area (see **Chapter 7: Ecology**); effects on GWDTE are scoped out of the assessment.

Future Baseline in the Absence of the Proposed Development

11.4.27 Without the Proposed Development, the main change to the future baseline would be as a result of climate change. It is anticipated that the Site would remain as farmland without the Proposed Development.

11.4.28 The national Planning Framework 4 (NPF4) notes *"Development proposals will be sited and designed to adapt to current and future risks from climate change"*.

Implications of Climate Change for Baseline Conditions

11.4.29 In summary, the projections highlight that in the 2060's summer and winter temperatures are likely to be greater than the current baseline, with winter rainfall increasing and summer rainfall decreasing. Increased rainfall will result in higher peak flows in the watercourses impacting the Site in future. In addition, there may be more drought periods in future summer months, with warmer, drier conditions predicted resulting in lower flows during summer and more sporadic, intense summer storm events.

11.4.30 SEPA (2024[8]) published guidance on climate change in Scotland which provides a regional based approach to estimate uplift in future river flows in Scotland. For large river catchments (over 50 km^2), the peak (200-year) design flow should be increased by 53% in the Tay River Basin to account for projected climate change increases to the year 2100. In addition, the peak rainfall intensity allowance for the Tay region of Scotland is 39% to the year 2100.

[8] SEPA (2024) Climate change allowances for flood risk assessment in land use planning, version 5, July 2024

Thus, this part of Scotland, which includes the Site, is likely to get wetter with higher peak flows in the watercourses in the future.

11.4.31 Site drainage and watercourse crossing designs will consider future estimates of increased precipitation and flows and will follow an adaptive approach, as per relevant guidance documents from SEPA and Angus Council. The climate change uplifts recommend by SEPA (2023) were applied to hydrology predictions in the flood risk assessment (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**) to model the 0.5% annual exceedance flows (200-year return period) + climate change floodplain. Based on consultation with SEPA (see **Table 11.1: Summary of Consultation**), the new crossing will be designed to accommodate the 0.5% annual exceedance probability flows (with an appropriate allowance for climate change).

Sensitivity of Receptors

11.4.32 The sensitivity of receptors has been assessed in **Table 11.8: Sensitivity of Receptors** using the criteria in **Table 11.3: Criteria to Assess the Sensitivity of Receptor.**

Table 11.8: Sensitivity of Receptors

Receptor	Sensitivity	Comment
Surface watercourses	Water quality – Medium Flood Risk - High	The Proposed Development drains to the Fithie Burn, which is considered a sensitive riverine receptor, as it drains towards the Firth of Tay and Eden Estuary SAC and the Monifieth Bay SSSI (both coastal SSSIs). The Fithie Burn was classified by SEPA as Poor in 2022 and is designated by SEPA as a heavily modified water body. There are areas of fluvial and pluvial flood risk associated with the Fithie Burn and the unnamed tributary. There are areas of floodplain/ flood storage within the Site boundary
PWS and groundwater abstractions	Low	There are no PWS or groundwater abstractions within the Site. There is one property that is supplied by a PWS within 250 m of the Site boundary. However, the PWS source is over 920 m north and is upgradient of the Site.
Groundwater	Medium	The Site is located within a DWPA for Groundwater (as is the whole of Scotland). The groundwater body underlying the Site is classified by SEPA as Good in 2021. The receptor supports one groundwater abstraction.

11.5 Mitigation and Monitoring

Embedded Mitigation

11.5.1 Topic specific embedded mitigation (mitigation achieved through design) is outlined below.

- HG1 –The layout of the Proposed Development has been carefully considered to avoid any development in the 200-year + climate change floodplain of the Fithie Burn and tributary. There is no Proposed Development, including SuDS within the 200-year + climate change floodplain, with the exception of landscape planting and the access track crossing (**Figure 11.2: Flood Risk Areas within Study area**).
- HG2 - Watercourses and waterbodies have been buffered by 50 m (where possible) as per SEPA's Scoping response (**Table 11.1: Summary of Consultation**) to minimise any potential adverse effect on surface water quality and flood risk. Locations where the 50 m buffer could not be met are assessed in **Appendix 11.2: Watercourse Crossing Assessment** (including the proposed SuDS discharge to the Fithie Burn) and summarised in the assessment within this chapter.
- HG3 – The proposed access track crosses the unnamed tributary to the Fithie burn, which is culverted under the field at the crossing location. In order to maintain safe access to the Proposed Development during extreme events

and to comply with SEPA guidance the crossing has been designed to pass the 200-year plus climate change overland flood flow. The crossing will follow SEPA guidance on watercourse crossing design[9].

- HG4 – The Proposed Developments' drainage design follows SuDS and the drainage channels, and swale have been designed such that local hydrological patterns and surface water run-off flow rates will be attenuated to existing 'greenfield' rates. The permanent drainage of the Proposed Development has been designed in accordance with Angus Council and SEPA requirements, with the SuDS designed to provide the appropriate attenuation and treatment of surface water runoff. An outline drainage strategy is provided in **Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy** and further details and drawing of the permanent drainage design are provided in **Figure 11.3: Drainage Design**. The SuDS will drain to the Fithie Burn via an outfall pipe restricted to the 2-year greenfield runoff rate.
- HG5 - Surface water runoff from the catchment which drains towards the Proposed Development from the north will be captured and routed round the Proposed Development to the Fithie Burn into the SuDS without flooding the Proposed Development. This interception drainage will be part of the construction and permanent drainage design.
- HG6 - All excavations less than 1 m deep will be located over 100 m away from groundwater abstractions or PWS sources as per SEPA guidance[10]. Excavations greater than 1 m in depth will be located at least 250 m away from these receptors.
- HG7 – All laybys to be constructed on the principal construction haul route will be constructed at ground level and surface water runoff will be treated and attenuated as per Angus Council guidance.

Applied Mitigation

11.5.2 In addition to the Embedded mitigation, inherent in the design of the Proposed Development, the Applicant is committed to implementation of Applied Mitigation Measures which are an integral part of the project development and reflect best practice guidance and recognised industry standards, as well as the Applicant's experience of constructing substations. They would comprise a Construction Environmental Management Plan (CEMP) which would comprise, among other requirements, a suite of SSEN Transmission standard management plans and contractor authored documentation, which details general and site-specific measures which will be implemented to avoid or mitigate likely significant effects and which will be effected through planning conditions, construction contract wording or both. These plans and documentation will incorporate best practice guidance and recognised industry standards (e.g. SEPA guidance, including their Guidance for Pollution Prevention (GPPs), CIRIA SUDS Manual and control of water pollution guidance.

11.5.3 In addition, SSEN Transmission's GEMP, will capture all mitigation measures required in respect of hydrology and water quality, as identified in the EIA Report and in order to comply with relevant legislation, which will be implemented during construction and operation of the Proposed Development. The Applied Mitigation will include SSEN Transmission's GEMP TG-NET-ENV-512 (Working in or Near Water), TG-NET-ENV-515 (Watercourse Crossings) and TG-NET-ENV-518 (Private Water Supplies), TG-NET-ENV-523 (Bad Weather) and TG-NET-ENV-520 (Dust Management). The implementation and audit of the measures in the CEMP and GEMP will be overseen by an Environmental Clerk of Works (ECoW).

11.5.4 The contractor will be required, through contract conditions, to follow the SEPA's general binding rules (GBR) under the Water Environment (Controlled Activities) (Scotland) Regulations 2011, as amended (CAR Regulations). With respect to the current regulatory context, since the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) came into force, CAR authorisation will be required in relation to a number of activities e.g. engineering works in inland waters for the proposed access track watercourse crossing and the SuDS discharge to the Fithie Burn. A Construction Site Licence (CSL) will also be required for the works under the CAR Regulations. The CSL will be obtained from SEPA in advance of the construction work to cover water run-off from construction

[9] SEPA (2010) Engineering in the Water Environment Good Practice Guide – River Crossings, WAT-SG-25.

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

sites. This will include a detailed Pollution Prevention Plan (PPP) to ensure that any discharges of water runoff from the Site to the water environment do not cause pollution. The PPP will be included in the CEMP.

11.5.5 The detailed CEMP will be developed and agreed with Angus Council and SEPA as a pre-commencement condition. The contractors will also be required to prepare a Site Water Management and Pollution Prevention Plan, which will be prepared and agreed in advance of construction. This will contain a suite of water management and pollution prevention measures and will include the specific Applied Mitigation measures outlined in **Table 11.9**.

Table 11.9: Applied Mitigation

Mitigation Measure	Project Stage/Timing	Responsibility
HG8 – Construction of SuDS to treat and attenuate surface runoff from new hardstanding and tracks; reduce sedimentation and erosion and reduce the risk of pollution and accidental spillage	Construction	Principal Contractor
HG9 - Construction SuDS and Pollution Control measures to be put in place during construction of the watercourse crossing of the access road	Construction	Principal Contractor
HG10 - Appropriately sized culverts passing under the access track that do not restrict flow and allow intercepted field drains and ephemeral streams/surface water flow pathways to pass under the tracks	Construction	Principal Contractor
HG11 - Interceptor drainage ditches on the upgradient side of all proposed infrastructure to intercept and divert 'clean' surface water runoff draining towards the construction areas. These will be treated and attenuated prior to discharge to the water environment.	Construction	Principal Contractor
HG12- Installation and maintenance of swales and track drains to intercept, collect and treat runoff from access tracks and hardstanding areas of the Site during construction and channel runoff to stilling ponds for sediment settling prior to discharge.	Construction	The Applicant and Principal Contractor
HG13 – The above measures will be included in the CEMP. The CEMP will also include a plan to monitor and plan the timing of works to avoid construction during periods of heavy rainfall and a plan to detail emergency procedures in the event of spillages or any other breach.	Construction	The Applicant and Principal Contractor

Further Survey Requirements and Monitoring

11.5.6 No further survey or monitoring is proposed by the Applicant.

11.6 Assessment of Likely Residual Significant Effects - Construction

11.6.1 The assessment of effects identified above is based on the project description as outlined in **Chapter 3: Description of the Proposed Development**. Unless otherwise stated, potential effects identified are considered to be adverse.

Predicted Construction Effects

11.6.2 Activities that will occur during construction that can have an impact on the water environment include site clearance; use of heavy plant machinery; increase of hardstanding areas; construction of access track and watercourse crossing; associated earthworks/excavation/re-profiling and construction traffic on the access track.

11.6.3 During the initial design stage, elements of the Proposed Development have been located to be at least 50 m from the Fithie Burn. The exceptions to this are the following buffer encroachments:

- Buffer Encroachment A – The access track crosses a tributary of the Fithie Burn in the northeast part of the Site, where the channel is culverted beneath the field; it is not a surface water feature at the crossing location during normal flow conditions. The topography through the field is lower in the centre and shaped like a natural valley

(see **Photo X** in **Appendix 11.2: Watercourse Crossing Assessment**). During floods, this becomes an overland flow path, as flood water overtops from the upper reaches of the Tealing Burn in the north and flows southwards in this direction. The flood flow-path and 200-year plus climate change floodplain in this location is documented in SEPA Future Flood Maps and predicted in more detail by 1D-2D modelling for this Application (**Appendix 11.1: Flood Risk Assessment and Outline Drainage Strategy**). There is no infrastructure in the floodplain, apart from the access track, which will be raised above the flood level and has by-pass culverts within the track, which have been sized to pass the 200 year plus climate change flow. The crossing will require authorisation under the CAR Regulations.

- Buffer Encroachment B – There is a raised bund (for landscaping) which is within 23 m of a small drain that is mapped on the Ordnance Survey 1:10K mapping. The access track and temporary construction compound are 25 m and 37 m north of the upstream extent of the mapped drain. The small drain runs adjacent to a field boundary and is not a watercourse. The drain issues from a field drain pipe (of 250 mm diameter) and enters the unnamed tributary downstream of the Site.
- Buffer Encroachment C – The southwest corner of the substation platform is 44 m from the Fithie Burn. The proposed earthworks will extend to 32 m from the Burn. It is noted that none of the substation infrastructure, including earthworks, is within the future floodplain of the Fithie Burn and tributary channel.
- Buffer Encroachment D – The discharge from the swale SuDS attenuation and drainage will enter the Fithie Burn at the southern extent of the Site. The discharge will pass through the floodplain and 50 m buffer of the Fithie Burn to enter the channel via a piped culvert set in a headwall of ~ 3 m wide (see **Chapter 3: Project Description**). The discharge will require authorisation under the CAR Regulations prior to construction. It is noted that there is no SuDS (for attenuation or treatment) within the floodplain; the part within the floodplain is for conveyance only to the discharge point.

Effects during construction on surface and ground water quality and quantity (and private water supplies)

11.6.4 The Embedded and Applied Mitigation described above will reduce adverse effects on the water environment. However, localised effects at locations where relevant buffers cannot be met are assessed in detail in **Appendix 11.2**: **Watercourse Crossing Assessment** and summarised below:

- Buffer Encroachment A – The access track crossing has been designed to pass the 200-year plus climate change flood flow in accordance with SEPA guidance and a relevant CAR licence will be sought in advance of construction. During normal flows the watercourse passes within a culvert beneath the field, so there is limited risk of sediment/ pollution entering the watercourse during construction. However during flood events there is a risk of overland flow within the ~20 m wide floodplain. Additional mitigation will be put in place to reduce the risk of sediment/silt runoff during construction at this location, especially in the event of a flood event. This is described in the Additional Mitigation section below.
- Buffer Encroachment B –The small drain is an agricultural ditch to convey field drainage to the Fithie Burn tributary and is not a watercourse. However, as the drain is connected to the downstream water environment appropriate buffers should be considered. Based on SEPA's updated recommended riparian corridors, a drain of this dimension should be buffered by 10 m either side. This has been achieved for the Proposed Development. However, additional mitigation will be put in place to reduce the risk of sediment/silt runoff during construction. This is described in the Additional Mitigation section below.
- Buffer Encroachment C – The proposed earthworks are ~32 m from the Fithie Burn. This is considered a suitable buffer, given the width of the watercourse (~ 1.1 m wide). However, additional mitigation will be put in place to reduce the risk of sediment/silt runoff during construction. This is described in the Additional mitigation section below.
- Buffer Encroachment D – Relevant Applied Mitigation will be in place during the construction of the discharge from the swale to the Fithie Burn. However, there is a risk of sediment entering the watercourse during construction of the headwall structure on the bank and additional mitigation will be put in place during construction. This is described in the Additional Mitigation section below.

11.6.5 With the Embedded and Applied Mitigation measures described above in place, the magnitude of the effect of increased sediment/silt runoff causing a deterioration in surface water quality in watercourses within and downstream of the Site during construction is considered to be **low**, temporary and of short duration. The sensitivity of downstream receptors is **medium**, with respect to water quality, and the significance of the effect is considered to be **minor**.

11.6.6 Embedded and Applied Mitigation measures to minimise the risk of pollution and accidental spillage will minimise the likelihood and severity of such incidents happening, however, there is still a residual risk. The magnitude of effect of pollution of surface water and groundwater caused by the release of hydrocarbon pollution resulting from accidental oil or fuel leaks or spillages is considered to be unlikely, short duration and **low**. The sensitivity of the downstream water environment is **medium**; hence the significance of the effect is considered to be **minor**.

11.6.7 An assessment of PWS and groundwater abstractions was carried out based on SEPA Guidance[11] and professional experience. The SEPA guidance recommends all groundwater abstractions within a 250 m buffer zone of excavations deeper than 1 m and a 100 m buffer of excavations less than 1 m be identified and assessed in detail. Excavations deeper than 1 m will be required during construction of the substation platform, with excavations for the track and construction compounds typically less than 1 m. The relevant 100 m and 250 m buffers from proposed infrastructure are shown on **Figure 11.1: Hydrology Study Area**. There are no PWS sources or groundwater abstractions within 250 m of the Proposed Development and the effect on PWS and groundwater abstractions is **negligible**.

Effects during construction on runoff rates and flood risk

11.6.8 In accordance with NPF4, there should be no new development in flood risk areas. NPF4 defines a flood risk area as one that lies within the 200-year floodplain, including an appropriate allowance for future climate change. There is no proposed infrastructure within flood risk areas, with the exception of the access track crossing. A 50 m buffer from watercourses and surface water bodies has been achieved for most of the proposed infrastructure, apart from the exceptions described above and in **Appendix 11.2: Watercourse Crossing Assessment**.

11.6.9 The Embedded and Applied Mitigation described above includes construction SuDS, which will attenuate all construction runoff to existing greenfield rates. The access track crossing has been designed to pass the 200-year plus climate change flows. With Embedded and Applied Mitigation the magnitude of effect on runoff rates and flood risk during construction will be **negligible** resulting in an effect of **negligible** significance.

Additional Mitigation

11.6.10 Additional Mitigation measures are outlined in **Table 11.10: Committed Additional Mitigation Construction**.

Table 11.10: Committed Additional Mitigation Construction

Mitigation Measure	Rationale	Project Stage/Timing	Responsibility
HG13 - Additional mitigation and SuDS (e.g. silt fences, settlement ponds) will be installed around the following working areas, crossings and access tracks during construction to reduce the risk of sediment/silt runoff to the water environment during construction: • Buffer encroachment A – access track watercourse crossing; • Buffer encroachment B – access track, construction compound and landscape bund • Buffer encroachment C – substation platform where it is within 50 m of Fithie Burn	Within watercourse buffers.	Construction	Principal Contractor. The site specific additional mitigation will be detailed within the CEMP and monitored by the ECoW during construction. It is noted that the access track crossing (A) and the SuDS discharge into the Fithie Burn (D) will require a CAR licence. Liaison with SEPA will be undertaken by the

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

Mitigation Measure	Rationale	Project Stage/Timing	Responsibility
• Buffer encroachment D – installation of headwall and discharge pipe from SuDS into the Fithie Burn			Principal Contractor to obtain the CAR licence in advance of construction.
HG14 – No construction materials will be placed within the flood risk area of the tributary of the Fithie Burn during construction of the access track.	The crossing location is at risk of overland flooding during extreme flood events.	Construction	Principal Contractor
HG15 – The Principal Contractor will sign up to SEPA's flood warning service and follow weather forecasts and warnings in order to receive advance warning of flood events. Construction work of the access track crossing will cease during flood events.	The crossing location is at risk of overland flooding during extreme flood events.	Construction	Principal Contractor

Residual Construction Effects

11.6.11 With the Additional Mitigation described in **Table 11.10: Committed Additional Mitigation Construction** the magnitude of the effect on water quality to downstream watercourses and receptors is **negligible** resulting in a residual effect of **negligible** significance. The residual effect on runoff rates and flood risk is **negligible**.

11.7 Assessment of Likely Residual Significant Effects - Operation

Predicted Operational Effects

11.7.1 The potential operational impacts of the Proposed Development are associated with the permanent infrastructure, including the substation platform and access track and any required maintenance work during operation.

11.7.2 The assessment of operational effects considers that the pollution prevention controls, and permanent drainage installed during construction (i.e. Embedded and Applied Mitigation) will remain in place during operation.

11.7.3 During operation, the permanent SuDS will attenuate surface water runoff from the platform and access track to existing greenfield rates and hence there will be no increase in surface water runoff rates. The Proposed Development is outwith the predicted 200-year + climate change flood risk area and the access track crossing has been designed to pass the 200-year plus climate change flow. Therefore, there is not anticipated to be any increase in flood risk as a result of the Proposed Development and the magnitude of the effect on flood risk is considered to be **negligible** and thus is assessed to have an effect of **negligible** significance.

11.7.4 The permanent drainage system will also provide the appropriate levels of treatment during operation and with the buffers achieved from watercourses the magnitude of effect on water quality is considered to be **negligible**, resulting in an effect of **negligible** significance.

Additional Mitigation

11.7.5 There is no additional mitigation proposed during operation.

11.8 Assessment of Likely Residual Significant Effects - Decommissioning

11.8.1 Decommissioning effects are considered to be of a similar extent, duration and significance as construction effects. However, given the uncertainty around the future conditions at the Site, and exact methods that will be employed at the time, a detailed assessment has not been undertaken of the effects associated with decommissioning of the Proposed Development and this has been scoped out. Notwithstanding this uncertainty, on the basis that effects will be no greater than construction effects, it is considered that the effect of decommissioning will be of no more than **negligible** significance. Decommissioning is not considered further in the assessment.

11.9 Assessment of Likely Residual Cumulative Effects

Introduction

11.9.1 Predicted adverse effects on hydrology arising from the construction and operation of the Proposed Development have the potential to contribute to cumulative effects and the EIA Regulations require that in-isolation effects are considered alongside predicted effects from other plans or projects.

11.9.2 **Table 10.11: Cumulative Assessment: Associated SSEN Transmission Developments** provides a cumulative assessment of the Proposed Development with the Associated SSEN Transmission Developments defined in **Chapter 1: Introduction** and detailed in **Appendix 5.1: Cumulative Developments**.

11.9.3 **Table 10.12: Cumulative Assessment: Other Projects** provides a cumulative assessment of the Proposed Development with other reasonable foreseeable developments detailed in **Appendix 5.1: Cumulative Developments**.

Table 11.11: Cumulative Assessment: Associated SSEN Transmission Developments

	Construction		Operation
Project	**Effects during construction on surface and ground water quality and quantity (and private water supplies)**	**Effect on runoff rates and flood risk**	**Effect on runoff rates and flood risk**
Kintore to Tealing 400 kV OHL	The Proposed Development does not have a significant effect upon water quality during the construction phase with the application of mitigation measures (See **Table 11.9: Applied Mitigation** and **Table 11.10: Committed Additional Mitigation Construction**). The nature of the Kintore to Tealing 400 kV OHL project is such that only a small percentage of the project takes place within the catchment of the Fithie Burn. Within this catchment area, construction work will be of a much shorter duration than for the Proposed Development and require a much smaller degree of earth works. Assuming that SSEN Transmission procedures, including the adoption of all management plans referenced in Paragraph 11.5.3, are employed for the construction of the Kintore to Tealing 400 kV, then with the information available at this stage, there is no likely significant cumulative effect.	The Proposed Development does not have a significant effect upon runoff rates and flood risk during the construction (**Paragraph 11.6.9**). The nature of the Kintore to Tealing 400 kV OHL project is such that negligible hardstanding areas are required during the construction phase. There is therefore no likely cumulative significant effect.	The Proposed Development does not have a significant effect upon runoff rates and flood risk in the operational phase (**Paragraph 11.7.3**). The nature of the Kintore to Tealing 400 kV OHL project within the catchment of the Fithie Burn is not likely to cause significant effects upon runoff and flood risk due to the likely negligible additional hardstanding areas that are required. There is therefore no likely cumulative significant effect.
Alyth to Tealing 275 kV OHL tie-in	As above.	As above	As above
Westfield to Tealing 275 kV OHL tie-in	As above	As above	As above

	Construction		Operation
2 x 275 kV OHL tie-backs between Emmock and Tealing	As above	As above	As above
Summary	The nature of these transmission projects is such that they are unlikely to have significant effects upon hydrology and hydrogeology and given the information that is available at this stage, it is unlikely that there will be significant cumulative effects in the construction phase.		The nature of these transmission projects is such that they are unlikely to have significant effects upon hydrology and hydrogeology and given the information that is available at this stage, it is unlikely that there will be significant cumulative effects in the operational phase.

Table 11.12: Cumulative Assessment: Other Projects

	Construction		Operation
Project	**Effects during construction on surface and ground water quality and quantity (and private water supplies)**	**Effect on runoff rates and flood risk**	**Effect on runoff rates and flood risk**

	Construction		Operation
Tealing to Westfield 275 kV OHL Upgrade to 400 kV	The Proposed Development is not predicted to have a significant effect on water quality during the construction phase with the application of mitigation measures (See **Table 11.9: Applied Mitigation** and **Table 11.10: Committed Additional Mitigation Construction**). The nature of the Tealing to Westfield 275 kV OHL upgrade to 400 kV project is such that there is no additional ground works and therefore on the assumption that SSEN Transmission procedures, including the adoption of all management plans referenced in Paragraph 11.5.3, are employed for the construction of the Kintore to Tealing 400 kV, then with the information available at this stage, there is no likely significant cumulative effect.	The Proposed Development does not have a significant effect upon runoff rates and flood risk during the construction (**Paragraph 11.6.9**). The nature of the Tealing to Westfield 275 kV OHL upgrade to 400 kV project is such that there is no additional runoff and therefore there is no significant cumulative effect.	The Proposed Development does not have a significant effect upon runoff rates and flood risk during the construction (**Paragraph 11.7.3**). The nature of the Tealing to Westfield 275 kV OHL upgrade to 400 kV project is such that there is no additional runoff and therefore there is no significant cumulative effect.
Alyth to Tealing 275 kV OHL Upgrade to 400 kV	As above	As above	As above
Fithie Energy Park	The Proposed Development is not predicted to have a significant effect on water quality during the construction phase with the application of mitigation measures (See **Table 11.9: Applied Mitigation** and **Table 11.10: Committed Additional Mitigation Construction**). There is limited information available on the impacts of the Fithie Energy Park upon hydrology and hydrogeology and as it will not be constructed at the same time as the Proposed Development, any significant cumulative effect is likely to be no greater than this other project in isolation.	The Proposed Development does not have a significant effect upon runoff rates and flood risk during the construction (**Paragraph 11.6.9**). There is limited information available on the impacts of the Fithie Energy Park upon hydrology and hydrogeology and as it will not be constructed at the same time as the Proposed Development, any significant cumulative effect is likely to be no greater than this other project in isolation.	The Proposed Development does not have a significant effect upon runoff rates and flood risk (Paragraph 11.7.3). It is noted that part of the site boundary for the Fithie Energy Park lies within an area that has been modelled as within the flood risk area associated with the unnamed tributary (see Figure 11.2: Flood Risk Areas within Study Area). Any significant cumulative effect of the Proposed Development with the Fithie Energy Park is therefore likely to be no greater than this other project in isolation and it is therefore concluded that there is not likely to be a significant cumulative effect from this other project.

	Construction		Operation
Balnuith BESS	The Proposed Development is not predicted to have a significant effect on water quality during the construction phase with the application of mitigation measures (See **Table 11.9: Applied Mitigation** and **Table 11.10: Committed Additional Mitigation Construction**). The flood risk assessment submitted in support of the planning application for the Balnuith BESS states in chapter 5 that surface water management measures will be in place during the construction phase and that any temporary measures will need to be agreed with SEPA and Angus Council.	The Proposed Development does not have a significant effect upon runoff rates and flood risk during the construction (**Paragraph 11.6.9**). The flood risk assessment submitted for the Balnuith BESS does not specifically address flood risk in the construction phase and there is no information in the application documents to suggest when construction is due to start and hence whether its construction will coincide with the Proposed Development. However, given that the Proposed Development does not have a significant effect upon runoff rates and flood risk it is accordingly concluded that any impact will be no greater than the impact of this other project in isolation.	The Proposed Development does not have a significant effect upon runoff rates and flood risk (**Paragraph 11.7.3**). The flood risk assessment submitted in support of the planning application for the Balnuith BESS concludes that "*The proposed Development is not predicted to increase surface water runoff or flooding to the surrounding catchment.*" It is therefore concluded that there is not likely to be a significant cumulative effect from this other project.
Myreton BESS	The Proposed Development is not predicted to have a significant effect on water quality during the construction phase with the application of mitigation measures (See **Table 11.9: Applied Mitigation** and **Table 11.10: Committed Additional Mitigation Construction**). The screening request for the Myrton BESS concludes that the "development will have extremely limited effects on hydrology" and therefore with the limited information available it is accordingly concluded that there is no likely significant effect upon hydrology and hydrogeology.	The Proposed Development does not have a significant effect upon runoff rates and flood risk during the construction (**Paragraph 11.6.9**). The screening request for the Myrton BESS concludes that the "development will have extremely limited effects on hydrology" and therefore with the limited information available it is accordingly concluded that there is no likely significant effect upon hydrology and hydrogeology.	The Proposed Development does not have a significant effect upon runoff rates and flood risk (**Paragraph 11.7.3**). The screening request for the Myrton BESS concludes that the "development will have extremely limited effects on hydrology" and therefore with the limited information available it is accordingly concluded that there is no likely significant effect upon hydrology and hydrogeology.
Summary	The information available on these other projects does not identify any likely significant effects in isolation and it is therefore accordingly concluded that there is no likely significant cumulative effect.		The information available on these other projects does not identify any likely significant effects in isolation and it is therefore accordingly concluded that there is no likely significant cumulative effect.

11.9.4 The Overall Project comprises the Proposed Development and the Kintore to Tealing 400 kV OHL. The Kintore to Tealing OHL will be designed and constructed in line with NPF4 and national guidelines with respect to flood risk, drainage and pollution prevention. The residual effects of the Proposed Development during construction are negligible and are not anticipated to contribute to a significant cumulative effect on the water environment.

Operation

11.9.5 There are no predicted cumulative effects during operation.

Predicted Cumulative Effects with Other Reasonably Foreseeable Developments

Construction

11.9.6 There are a number of proposed and completed developments within the surrounding area, the majority of which are in different catchments than the Site, meaning that there is less chance of a cumulative effect occurring. Assuming that nearby developments are designed and constructed in line with NPF4 and national guidelines with respect to SuDS and GPPs, there should be no cumulative effect on the downstream catchments.

Operation

11.9.7 There are no predicted cumulative effects during operation.

11.10 Summary of Significant Effects

11.10.1 There are no predicted significant (moderate or major) effects of the Emmock 400 kV substation project on hydrology and hydrogeology.

11.10.2 Prior to additional mitigation, the effects during construction on hydrology and hydrogeology were assessed to be **minor**. With site-specific additional mitigation, the residual construction effects were assessed to be **negligible.**

11.10.3 During operation, the effects were assessed to be **negligible**. No additional mitigation during operation was required. Cumulative effects were assessed to be **negligible**.

Table 11.13: Summary of Significant Effects

Predicted Effects	Significance Prior to Additional Mitigation	Mitigation	Significance of Residual Effects Following Additional Mitigation
Construction			
Effect on water quality to downstream watercourses and receptors	Minor	Additional mitigation and SuDS (e.g. silt fences, settlement ponds) will be installed around the following working areas, crossings and access tracks during construction to reduce the risk of sediment/silt runoff to the water environment during construction: Buffer encroachment A – access track watercourse crossing; Buffer encroachment B – access track, construction compound and landscape bund Buffer encroachment C – substation platform where it is within 50 m of Fithie Burn Buffer encroachment D – installation of headwall and discharge pipe from SuDS into the Fithie Burn No construction materials will be placed within the flood risk area of the tributary of the Fithie Burn during construction of the access track. The contractor will sign up to SEPA's flood warning service and follow weather forecasts and warning in order to	Negligible

Predicted Effects	Significance Prior to Additional Mitigation	Mitigation	Significance of Residual Effects Following Additional Mitigation
		receive advance warning of flood events. Construction work of the access track crossing will cease during flood events	
Effect on runoff rates and flood risk	Negligible	No construction materials will be placed within the flood risk area of the tributary of the Fithie Burn during construction of the access track.	Negligible
Operation			
Effect on runoff rates and flood risk	Negligible	None	Negligible
Cumulative			
None	N/A	N/A	N/A