BERWICK BANK WIND FARM
ONSHORE ENVIRONMENTAL IMPACT ASSESSMENT REPORT ADDENDUM

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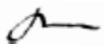
James Wheater		01/08/2023

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1. INTRODUCTION AND SUMMARY

1.1. BACKGROUND

1. Berwick Bank Wind Farm Limited (the 'Applicant') submitted an application for planning permission in principle (PPP) for Berwick Bank Wind Farm onshore transmission works (OnTW) (the 'Proposed Development') in March 2023, supported by an Environmental Impact Assessment which was reported in an EIA Report (the 'Onshore EIA Report').

2. Following the submission of the PPP application, the Applicant has been notified of the submission of a Section 36 (S36) application for the proposed Branxton Energy Storage System (the 'Branxton BESS Project') to the Scottish Government's Energy Consents Unit (ECU00004659) on land in the vicinity of the Proposed Development.

3. Following consultation with ELC it was agreed that an additional cumulative effects assessment (CEA) would be provided in support of the Proposed Development's PPP application to account for potential cumulative effects with the Branxton BESS Project. This EIA Report Addendum incorporates the requested additional CEA and should be read in conjunction with the cumulative effects sections of the technical chapters (Chapters 6 to 14) within Volume 1 of the Onshore EIA Report.

4. The Applicant has also undertaken further work to address consultation responses following the submission of the PPP application. As some of this work necessitates the updating of Environmental Information pertinent to the EIA, the information has been provided in the EIA Report Addendum alongside the CEA in support of the application. A summary of the additional information provided alongside the CEA, as well as reason for its inclusion and an overview of outcomes, is provided in Table 1.1 below.

Table 1.1 Summary of Updated Sections

Updated Sections	Reason for Update	Summary of Outcome
Flood Risk Assessment	An updated Flood Risk Assessment has been provided as an appendix to this EIA Report Addendum to address comments made by the East Lothian Council (ELC) Flood Risk Officer.	The outcome of the Flood Risk Assessment reported in the EIA Report has not been affected by the updates.
Ecology	Following the consultation responses received from ELC Council Officers, habitats under the footprint of the cable bridge crossing at Braidwood Burn have been mapped in detail to assist with discussions regarding the potential impacts of the crossing on Dunglass Burn Local Nature Conservation Site (LNCS) and assist with the Biodiversity Net Gain assessment. In addition, the habitat loss calculations have been amended to assess the footprint of the Braidwood Burn crossing and the Skateraw Burn crossing as permanent habitat loss. Amendments to habitats area values are provided in this Addendum.	These amendments have not altered the conclusions of the impact assessment reported in the EIA Report.
Initial Biodiversity Net Gain Assessment	This EIA Report Addendum provides an Initial Biodiversity Net Gain Assessment of the Development in order to address the consultation response received from the ELC Landscape Officer regarding the scale of the landscaping and enhancement opportunities.	Based on a worst-case scenario this assessment has suggested that further habitat creation beyond that indicated in Figure 6.12 of Chapter 6 of the EIA Report would be required to deliver a net gain in biodiversity.

Updated Sections	Reason for Update	Summary of Outcome
Landscape Mitigation Plan	In response to the findings of the Initial Biodiversity Net Gain Assessment an updated Outline Landscape Mitigation Plan was requested to demonstrate sufficient opportunity to deliver a significant enhancement in biodiversity value.	The updates made to the Outline Landscape Mitigation Plan complement the existing outline enhancement and landscaping proposals set out in Figure 6.12 of the EIA Report. The landscape and enhancement proposals remain at an outline stage and will be refined through further detailed design following the granting of planning permission in principle.

5. It should be noted that there are no changes to the Proposed Development as outlined within the application. The information set out below is intended to be read in conjunction with the Onshore EIA Report. Reference will be made to EIA Report chapters, associated technical appendices and figures where the originals remain applicable. Where any information in the Onshore EIA Report is superseded by the information presented in this EIA Addendum, this is made clear.

6. Section 2 provides the additional CEA. Section 3 updates made to the Environmental Information pertinent to the EIA assessment incorporating Flood Risk, Ecology, Biodiversity Net Gain and Landscape Mitigation.

2. CUMULATIVE EFFECTS ASSESSMENT

2.1. METHODOLOGY

7. The CEA reported in this Addendum takes into account the potential cumulative impacts of the Proposed Development together with the Branxton BESS Project. Cumulative effects are therefore the combined effect of the Proposed Development in combination with the effects from the Branxton BESS Project, on the same receptor or resource. Refer to Volume 1, Chapter 2 of the Onshore EIA Report for detail on CEA methodology.

8. The Branxton BESS Project has been screened in for cumulative effects assessment in relation to landscape and visual, ecology, ornithology, cultural heritage, socio-economics and land use, tourism and recreation based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved. Those topics screened out of the CEA, together with justification, are presented in Table 2.1.

Table 2.1 Topics Screened in and out of the Cumulative Effects Assessment with the Branxton BESS Project

Technical Topic	Justification
Topics Screened in	
Landscape and Visual	Included in cumulative LVIA due to proximity of Branxton BESS Project to the onshore cable corridor for the Proposed Development, resulting in potential for significant cumulative effects on landscape and visual receptors.

Technical Topic	Justification
Ecology	Due to the potential for overlap in ecology receptors in relation to the Branxton BESS Project and the Proposed Developments, ecology has been screened into the CEA with the Branxton BESS Project.
Ornithology	Due to potential for cumulative loss of habitat for wintering birds, ornithology has been screened into the CEA with the Branxton BESS Project.
Cultural Heritage	Due to proximity of the Branxton BESS Project to the Proposed Development there is potential for cumulative impacts on the setting of designated cultural heritage assets.
Socio-economics	Due to potential socio-economics cumulative impacts of the Branxton BESS Project during the construction phase, socio-economics has been screened into the CEA with the Branxton BESS Project.
Land Use, Tourism and Recreation	Due to the proximity of Branxton BESS to the Proposed Development and potential for overlap in land use, tourism and recreation receptors, land use tourism and recreation has been screened into the CEA with the Branxton BESS Project.
Topics Screened Out	
Geology, Hydrology, Soils and Flood Risk	Given the proposed location of the Branxton BESS Project, it is assumed that construction and operational drainage shall discharge to the adjacent unnamed watercourse. With respect to the Proposed Development, no permanent infrastructure is to be located within the same surface water catchment as the Branxton BESS Project. Some temporary infrastructure will be located within the same surface water catchment in the form of an access track and construction compound. With reference to Temporary Drainage Works Outline Design Drawing TDW-008, drainage from these temporary areas will be collected and discharged to the headwaters of the unnamed watercourse. The drainage measures propose suitable treatment will be provided prior to discharge to the water environment (e.g., oil interceptor and settlement pond) to ensure no significant adverse impacts to the watercourse due to the Proposed Development. Any cumulative impact on the watercourse would only occur if the Branxton BESS Project construction / operational phase aligns with the Proposed Development construction phase. It is assumed the Branxton BESS Project will implement similar drainage measures and thus there shall be no significant cumulative adverse impact to the watercourse.
Noise	No potential impacts to Thorntonloch Holdings and Lawfield Cottage (the receptors nearest to the Branxton BESS Project) are expected during construction as construction activities are concentrated further north. The Branxton BESS Noise Impact Assessment did not assess impacts of construction noise. Predicted noise levels for Thorntonloch Holdings and Lawfield Cottage (which were assessed in the Branxton BESS Noise Impact Assessment) are more than 10dB below the predicted levels from the BESS. Therefore, no cumulative impacts during operation are expected.
Traffic and Transport	A review of cumulative traffic impacts is only undertaken for projects that have been determined. The nearby Branxton BESS Project has yet to be determined and as such would not normally be included in a cumulative assessment. A review of the planning submission for the Branxton BESS Project has however been undertaken. The traffic data provided in the submission is insufficient to determine the peak traffic flows during the construction phase and provides no information on construction staff

Technical Topic	Justification
	movement to and from that site. Due to these limitations, it would not be possible to fully assess the development on a cumulative basis. Notwithstanding those limitations the likelihood of cumulative traffic effects would only occur on the A1, as the route from the A1 to the respective application construction sites are different. The potential for a significant cumulative impact during construction on a high-capacity trunk road is highly limited. Nevertheless, should the construction phases of the Proposed Development and the Branxton BESS Project overlap, it is reasonable to expect that the respective Traffic Management Plans would ensure that unacceptable adverse effects from construction traffic on nearby sensitive receptors and traffic routes would be avoided. This could be achieved, for example, by careful scheduling to avoid particularly transport-intensive activities or abnormal load deliveries overlapping.

9. An assessment of the likely significance of the cumulative effects of the Proposed Development upon receptors arising from each identified impact is given below.

2.2. LANDSCAPE AND VISUAL

10. The landscape and visual effects of the Proposed Development are included in Volume 1, Chapter 6 of the Onshore EIA Report which includes a cumulative effects assessment. The purpose of this Addendum section is to update the cumulative effects assessment to include the Branxton BESS Project within the assessment of cumulative effects.

11. The CEA reported in the Onshore EIA Report was split into Tier 1 and Tier 2 assessments. The Tier 1 assessment considered the cumulative effects of the Proposed Development with the offshore elements of the Berwick Bank Wind Farm. There is therefore no need to update the Tier 1 assessment in this Addendum.

12. This section of the Addendum replaces the Tier 2 cumulative assessment found within Volume 1, Chapter 6 of the Onshore EIA Report. Figure 6.13, Volume 2 of the Onshore EIA Report has also been updated as part of this Addendum which illustrates the locations of cumulative developments included within the Tier 2 cumulative assessment (Figure A6.13).

2.2.2. Updated Tier 2 Cumulative Assessment

13. As described in the cumulative methodology, within Section 6.9.2 of Chapter 6, Volume 1 of the EIA Report a preliminary assessment has been undertaken of the shortlisted Tier 2 cumulative projects based on professional judgement, assessment rationale and guidance relevant to landscape and visual impacts. The preliminary cumulative assessment in Table 2.2 below has determined that the application stage SPEN Eastern Link Project, SPEN Branxton Grid Substation and SPEN Branxton BESS Project developments have the potential to give rise to significant cumulative effects as a result of the addition of the Proposed Development and consequently require detailed assessment.

14. The cumulative effects presented and assessed in this Addendum have been selected from the details provided in Volume 1, Chapter 2 of the Onshore EIA Report as well as the information available on other projects and plans, to inform a ‘maximum design scenario’. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope, to that assessed here, be taken forward in the final design scheme.

Table 2.2 Updated Shortlist of Tier 2 Cumulative Projects

Project Name	Application Ref	Description	Status	Location	Construction Timescale	Preliminary Assessment
Tier 2						
SPEN Eastern Link Project – Converter Station & Cable Route	22/00852/PPM	Planning permission in principle for a converter station and associated development including a landfall at Thorntonloch and connecting buried cabling, all in association with the Scottish Power Eastern Link 1 project, for a new subsea High Voltage Direct Current (HVDC) link	Application	Land Adjacent to Dunbar Landfill Site Oxwell Mains Dunbar East Lothian EH42 1SW	2024-2027	Assessed in detail. Included in cumulative LVIA due to proximity of development to the onshore substation and cable corridor, resulting in potential for significant cumulative effects.
SPEN Eastern Link Project - Branxton Grid Substation	21/01569/PM & 22/00002/SGC	Construction of a 400 kilovolt (kV) gas insulated switchgear (GIS) substation and associated works. Also includes S37 application to install and keep a new 265m section of 400 kV overhead line east of the proposed Branxton Grid substation	Application (Application Withdrawn but expected to be submitted again in near future)	Fields To the South of Thornton Bridge Sealing End Compound Branxton	2023-2026	Assessed in detail. Included in cumulative LVIA due to proximity of development to the onshore cable corridor, resulting in potential for significant cumulative effects.
Crystal Rig IV Wind Farm	18/00004/SGC	Construction and operation of crystal rig wind farm (phase iv) – 11 turbines	Consented	4.5 km north of Cranshaw village	Unknown. Assumed to be overlapping.	This onshore windfarm is located outside the LVIA study area and is located within a larger array of existing wind turbine development. In itself, the influence of this development on receptors in the study area is limited by distance and topography and cumulative interaction with the onshore elements of the Proposed Development is minimal. No potential for significant cumulative effects and not considered in the CEA.

Project Name	Application Ref	Description	Status	Location	Construction Timescale	Preliminary Assessment
Tier 2						
Branxton BESS Project	ECU00004659	Construction and operation of a Grid Services Facility comprising battery storage modules and other associated ancillary electrical infrastructure. The electrical export capacity is yet to be confirmed but is expected to exceed 50 MW.	Application	Approximately 2.5 km east of Innerwick, near Thornton.	Unknown. Assumed to be overlapping.	Assessed in detail. Included in cumulative LVIA due to proximity of development to the onshore cable corridor, resulting in potential for significant cumulative effects.

2.2.3. Cumulative Development Description

Branxton Grid Substation

15. The proposal for the Branxton Grid Substation incorporates a 400kV gas insulated switchgear (GIS) building in close proximity to the existing cable sealing end compounds at Branxton and Thornton Bridge. The Proposed Development onshore cable corridor would join this substation, as would the Eastern Link project. The Branxton Grid Substation proposal whilst close to the existing cable sealing end compounds at Branxton and Thornton Bridge would increase the influence of electricity infrastructure to neighbouring fields at a higher elevation and would involve large scale earthworks in its creation. Should it be consented, it is anticipated that the Branxton Grid Substation construction would take place over 2 years (2023 to 2025) and begin operation by the end of 2026.

Eastern Link

16. The proposal for the Eastern Link project includes 176 km of marine cabling to link East Lothian with County Durham to aid the distribution of green energy between Scotland and England. The Eastern Link marine cable would make landfall south of Torness Power Station, on the coast east of Linkshead. The onshore cable corridor would then travel east to Old Branxton, joining the Branxton Grid Substation south of Thornton Law. From this point the Eastern Link cable corridor would follow broadly the same route as the onshore cable corridor of the Proposed Development before branching north-east to the proposed converter station, close to the Dunbar ERF on the northern side of the A1 trunk road. The proposed converter station would constitute two, large-scale buildings enclosing the necessary 'stepping down' electrical infrastructure. The site has been selected due to its existing industrial environment. Should it be consented, the Eastern Link project is anticipated to start construction during 2024 and begin operation during 2027. The Proposed Development is expected to begin construction during 2025 and begin operation 40 months later, meaning there is the potential for both cable corridors to be under construction within the LVIA study area at the same time.

Branxton BESS Project

17. The proposed Branxton BESS Project comprises a grid services complex of battery storage modules, other associated ancillary electrical infrastructure, access roads, sympathetically coloured security fencing and security gates (both 3 m in height). Groundworks to create a completely flat and levelled surface are not anticipated, and the facility, particularly the battery storage modules, will accord with the changing level of the existing local topography. The development will include planting that will provide screening from key visual receptors and enhance biodiversity. The electrical export capacity of the facility is expected to be exceed 50 MW but is to be confirmed. Should it be consented, construction of the Branxton BESS Project is anticipated to occur over a 12-month period, with an operational lifespan of 40 years.

2.2.4. Receptors Considered in Detail within the Tier 2 Cumulative Assessment

18. An assessment description of the likely significance of cumulative effects of the Proposed Development upon landscape and visual receptors is given below. In order to establish which landscape and visual receptors have the potential for significant cumulative effects, each of the receptors considered to have potential for significant effects against the existing baseline are reconsidered in the preliminary assessment in Table 2.3 below to establish which require a detailed cumulative assessment (highlighted grey).

Table 2.3 LVIA Receptors in Relation to Tier 2 Cumulative Assessment

Receptor	Influence of Cumulative Developments	Potential for significant cumulative effects
Physical landscape elements	The Branxton Grid Substation and Branxton BESS Project are located in agricultural land (localised influence) and the Eastern Link cabling is also located in agricultural land (temporary influence). Trees and hedgerows are found throughout the study area and within the current site boundaries of these cumulative developments. The Branxton Grid Substation is not located within the Coastal Landscape. The Branxton BESS Project is entirely located within the coastal landscape (localised influence) and Eastern Link cabling is partly located in the coastal landscape (temporary influence). The Eastern Link convertor Station would be situated on land between the Dunbar Energy Recovery Facility and Dunbar Landfill site. There is also potential for the construction of these developments to occur within a similar time period as the construction of the Proposed Development.	Whilst some disruption would occur as a result of these cumulative developments it is considered that the magnitude of change disruption to agricultural land resulting from these developments would be of a similarly low level. The disruption would be localised within the largely agricultural context. No potential for significant cumulative effects and this receptor is not included in the CEA.
LCT 277: Coastal Margins – Lothians	The Branxton Grid Substation is not located within this LCT and would exert a limited influence on the key characteristics of the coastal margins.	No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
	The Eastern Link cable corridor would be under construction within this LCT at the same time as the Proposed Development, with a similar cable route between Branxton and the onshore substation. The Convertor Station would bring further built development of an industrial nature to the coastal margins.	It is considered that the Eastern Link cabling within the study area would have a similarly limited effect on the characteristics of this LCT as the cabling works for the Proposed Development. However, there is potential for significant effects due to the introduction of the Convertor Station. Receptor is included in the CEA for this development.
	The Branxton BESS Project would be located within this LCT and would exert an increased industrial influence on its key characteristics.	The Branxton BESS Project may have an effect on the character of this LCT within a limited area of the study area. There is potential for significant cumulative effects due to the addition of the facility to the Proposed Development and other cumulative developments. Receptor is included in the CEA for this development.
LCT 269: Upland Fringes – Lothians	The Branxton Grid Substation is located within this LCT and would exert an increased industrial influence on its key characteristics.	Potential for significant cumulative effects and this receptor is included in the CEA for this development.
	The Eastern Link cable corridor would be under construction within this LCT at the same time as the Proposed Development, with a similar cable route between Branxton	It is considered that the Eastern Link cabling within the study area would have a similarly limited effect on the characteristics of this LCT as the cabling works for the

Receptor	Influence of Cumulative Developments	Potential for significant cumulative effects
	and the onshore substation. The Convertor Station is not located within this LCT and would exert a very limited influence on its characteristics.	Proposed Development. Given the limited influence of the Convertor Station, it is considered that there is no potential for significant cumulative effects for this receptor and is not included in the CEA for this development.
	Theoretically, the Branxton BESS Project is visible from higher east facing areas of the LCT and would exert an increased industrial influence on its key characteristics.	The Branxton BESS Project may have an effect on the character of this LCT within a limited area of the study area. There is potential for significant cumulative effects due to the addition of the Proposed Development to the facility and other cumulative developments. Receptor is included in the CEA for this development.
Viewpoint 1: A1, Skateraw Junction	Neither the Branxton Grid substation nor the Branxton BESS Project or the Eastern Link Convertor Station would be visible from this location. Parts of the Eastern Link cable corridor would be theoretically visible behind immediately behind the Proposed Development substation; however, the cumulative influence is temporary and minimal.	No potential for significant cumulative effects and this receptor is not included in the CEA.
Viewpoint 2: Innerwick	Neither the Branxton Grid substation nor the Branxton BESS Project or the Eastern Link Convertor Station would be visible from this location. Parts of the Eastern Link cabling construction activity would be visible within the fields to the south of the Proposed Development substation site; however, this cumulative influence is temporary and minimal.	No potential for significant cumulative effects and this receptor is not included in the CEA.
Viewpoint 3: John Muir Link near Skateraw Harbour	Neither the Branxton Grid substation nor the Branxton BESS Project would be visible due to screening from intervening landform and mature vegetation.	No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
	The Eastern Link Convertor Station would be visible to the west with the Proposed Development substation visible in views to the southwest. The Eastern Link cabling construction activities would be predominantly screened from view apart from the section that lies to the east of Innerwick which would be visible in the distance in the same part of the view as the Proposed Development substation.	Potential for significant cumulative effects and this receptor is included in the CEA for this development.
Viewpoint 4: Minor road near Thornton	The Branxton Grid substation would not be visible due to screening from intervening landform and mature vegetation.	No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
	The Branxton Grid substation would be visible to the north-west; the Branxton BESS Project to the south-east; and the Eastern Link Convertor Station, cabling construction activities and the Proposed Development substation visible to the north-west.	Potential for significant cumulative effects and this receptor is included in the CEA for this development.

Receptor	Influence of Cumulative Developments	Potential for significant cumulative effects
	The Eastern Link Convertor Station would not be visible due to intervening topography. Construction of the Eastern Link cable corridor would be screened from view by intervening landform, properties and mature vegetation.	No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
Viewpoint 5: Minor road near Thurston	Neither the Branxton Grid Substation, nor the Branxton BESS Project, nor the Eastern Link Convertor Station/Link Cable corridor would be visible due to intervening topography.	No potential for significant cumulative effects and this receptor is not included in the CEA.
Viewpoint 6: Blackcastle Hill	The Branxton Grid substation would not be visible due to intervening topography.	No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
	The Eastern Link Convertor Station would be visible to the north with the Proposed Development substation visible in views to the north-northeast. The Eastern Link cabling construction activities would be visible between the Eastern Link Convertor Station and the Proposed Development substation.	Potential for significant cumulative effects and this receptor is included in the CEA for this development.
	The Branxton BESS Project would be visible to the north-east, with the Eastern Link Convertor Station, cabling construction activities and the Proposed Development substation visible further north. Branxton Grid substation would not be visible due to screening by the landform of the hill.	Potential for significant cumulative effects and this receptor is included in the CEA for this development.
Individual property at Links Cottage, Skateraw Harbour	Neither the Branxton Grid Substation, nor the Branxton Energy Storage Facility, nor the Eastern Link Convertor Station/ Link Cable corridor would be visible due to intervening topography.	No potential for significant cumulative effects and this receptor is not included in the CEA.
Individual property at Castledene	The Branxton Grid substation would be visible to the southeast of this property. The Eastern Link Convertor Station would not be visible from this property. The Eastern Link Cable corridor would be visible to the rear of the property. Due to the limited visibility of the Proposed Development substation from this location, cumulative influence is limited to effects that may arise in relation to the short term, temporary and reversible construction of the Proposed Development cable corridor to the rear of the property.	Given the limited and short-term, temporary and reversible nature of the potential cumulative interaction, it is considered that there is no potential for significant cumulative effects and this receptor is not included in the CEA.

Receptor	Influence of Cumulative Developments	Potential for significant cumulative effects
Core Path 18, north of Innerwick	Branxton Grid Substation and Branxton BESS Project would not be visible due to intervening topography.	No potential for significant cumulative effects and this receptor is not included in the CEA.
	The Eastern Link Convertor Station would not be visible due to intervening topography. Only a short section of Eastern Link Cable corridor would be visible (immediately west of the onshore substation site). Cumulative influence is limited to the short term, temporary and reversible construction activities associated with the Eastern Link.	Given the limited and short-term, temporary and reversible nature of the potential cumulative interaction, it is considered that there is no potential for significant cumulative effects and this receptor is not included in the CEA for this development.
Individual property at Railway Cottage, Skateraw Gate	Neither Branxton Grid substation nor Branxton BESS Project would be visible due to screening from intervening landform and mature vegetation.	No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
	The Eastern Link cabling construction activities would be predominantly screened from view apart from the section between Branxton and the onshore substation. The Eastern Link Convertor Station would not be visible due to intervening topography.	It is considered that the Eastern Link cabling within the study area would have a similarly limited effect on the characteristics of this LCT as the cabling works for the Proposed Development. No potential for significant cumulative effects and this receptor is not included in the CEA for this development.
A1 trunk road	The LVIA has assessed the potential effect of the Proposed Development from the A1 at Viewpoint 1 – A1 Skateraw Junction. Whilst neither the Branxton Grid substation or the Branxton BESS Project would be visible from Viewpoint 1, it is accepted that these cumulative developments are visible from other parts of the A1 to the south of Viewpoint 1 and that a sequential effect could occur in this cumulative scenario.	Potential for significant sequential cumulative effects. While the intervention of landscape elements and topography will restrict the visibility of these developments, such that no significant cumulative effects are anticipated in combination with the Proposed Development, there is potential sequential visibility of these developments over a relatively short section of the road. Potential for significant sequential effects and is included in the CEA for these developments.
	The Eastern Link Convertor Station is theoretically visible along with parts of the Eastern Link cable corridor which otherwise lie behind the Proposed Development.	No potential for significant cumulative effects and this receptor is not included in the CEA, as the cumulative influence would be temporary and minimal.

2.2.5. Tier 2 Detailed Cumulative Assessment

19. Detailed baseline descriptions and sensitivity assessments have been provided in Volume 1, Chapter 6, Section 6.11.4 (Landscape Character Assessment) and 6.11.6 Visual Effects Assessment of Onshore EIA Report. To avoid duplication of reporting, these assessments are referenced for each receptor included below. Potential construction and operational cumulative effects as a result of the onshore substation are assessed and reported together to avoid a similar repetition of reporting.

2.2.6. LCT 277: Coastal Margins – Lothians

Baseline and sensitivity

20. Please refer to Volume 1, Chapter 6, Section 6.11.5 (Detailed Landscape Character Assessment) of the Onshore EIA Report. The LCT is deemed to be of medium value and medium susceptibility and the sensitivity of the receptor considered to be medium.

Magnitude of change

21. The Eastern Link cable corridor could be under construction within this LCT within the same time period as the Proposed Development, with a shared stretch of cabling construction activity between Branxton and the onshore substation. While the processes involved in excavating land, storing material and installing cabling are not considered to be wholly out of context with the agricultural practices that are a key character of the LCT, the construction of both developments simultaneously would increase the presence of this development type for a short period of time. The introduction of the Eastern Link converter station to the cumulative context would, in itself, increase the presence of industrial built form within this LCT, however, it is located in an area of the LCT that is already characterised by industrial developments including the operation quarry at Dunbar Cement Plant, Dunbar Energy Recovery Facility and Dunbar Landfill. The Eastern Link development would therefore slightly increase the industrial backdrop of development already experienced within this LCT.

22. Construction of the Branxton BESS Project may occur within the same time period as that of the Proposed Development. Simultaneous construction of both developments would increase the presence of construction activity within the area for a short period of time. The introduction of the Branxton BESS Project to the cumulative context would increase the presence of industrial built form within an area of this LCT that is already characterised by industrial development. Within this context, the increase in industrial structures or elements within the LCT arising from the Branxton BESS Project would be slight.

23. It is considered that the addition of the Proposed Development to a scenario that includes the Eastern Link and Branxton BESS Project would increase the amount of industrial development within this LCT, however, there would be minimal cumulative interaction between these developments due to the physical and visual separation afforded by a combination of distance from the larger built parts of these developments, intervening topography and other landscape elements such as the A1 road corridor embankments. Furthermore, the presence of the Branxton BESS Project and Eastern Link developments in this scenario further strengthens the developed baseline of this LCT when combined with the existing industrial context of the coastal landscape. This has a moderating effect when considering the addition of the Proposed Development as it would introduce development that is not entirely uncharacteristic.

24. Taking all of this into account, the cumulative magnitude of change is considered to be medium-low during construction and low during year 1 and in year 15.

Significance of the cumulative effect

25. The cumulative effect would be **moderate-minor** and not significant during construction reducing to **minor** and not significant during year 1 and year 15. Construction effects are direct, adverse, reversible and temporary. Operational effects are direct, adverse and permanent.

2.2.7. LCT 269: Upland Fringes – Lothians

Sensitivity of the receptor

26. Please refer to Volume 1, Chapter 6, Section 6.11.5 (Detailed Landscape Character Assessment) of the EIA Report. The LCT is deemed to be of medium-high value and medium-low susceptibility and the sensitivity of the receptor is considered to be medium.

Magnitude of change

27. The Branxton Grid substation would increase the presence of electricity infrastructure within a localised part of the LCT that is already characterised by this kind of development. In itself, the effect of the Branxton Grid substation upon the key characteristics of this LCT are considered to be limited by its location and the containing influence of surrounding topography. Cumulative interaction between the Branxton Grid substation and the Proposed Development substation would also be limited by the same topographical and locational characteristics. The Proposed Development onshore cabling works would have limited influence on the characteristics of this LCT as described in Volume 1, Chapter 6, Section 6.11.3 of the EIA Report, and the cumulative interaction is also considered to be minimal and short term.

28. The Branxton BESS Project would further increase the presence of electricity infrastructure largely within the neighbouring LCT 277, within an area that is already characterised by similar development, including Torness Power Station, overhead power lines, the East Coast Main Line and A1 trunk road. The influence of the Branxton BESS Project would extend across areas near Branxton and Innerwick, and the eastern faces of Thornton Hill and Blackcastle Hill. In itself, the effect of the Branxton BESS Project on the key characteristics of this LCT 269 would be limited to its visual presence in coastal views, overlooking the lowlands adjoining this LCT. The existing influence of industrial and electrical development within the context of the Coastal Margins LCT 277; the containment by surrounding topography; and the visual separation from the Proposed Development would limit the cumulative interaction between the Branxton BESS Project and the Proposed Development onshore substation.

29. From the western edges of this LCT within the eastern Lammermuirs, both the Branxton Grid substation and Branxton BESS Project would be viewed from an elevated position, however, a degree of separation exists in these views between these developments and the onshore substation element of the Proposed Development such that cumulative interaction is minimal when considering the key characteristics overall. The Proposed Development would also be experienced in distant views within the context of other existing industrial and electrical development already present within the Coastal Margins LCT 277. When combined with the presence of the Branxton BESS Project and Eastern Link developments in this scenario, the additional effect of the Proposed Development is moderated as it would introduce development that is not entirely uncharacteristic.

30. Taking all of this into account, it is considered that the addition of the Proposed Development to a scenario that includes the Eastern Link and Branxton BESS Project would result in a cumulative magnitude of change of low during construction, year 1 and in year 15.

Significance of the cumulative effect

31. The cumulative effect is considered to be **minor** and not significant in EIA terms during construction, year 1 and in year 15. Construction effects are direct, adverse, reversible and temporary. Operational effects are direct, adverse and permanent.

2.2.8. Viewpoint 3: John Muir Link, Skateraw Harbour

Sensitivity of the receptor

32. Please refer to Volume 1, Chapter 6, Section 6.11.7 (Detailed Visual Effects Assessment) of the Onshore EIA Report. The viewpoint is deemed to be of high value and medium susceptibility and the sensitivity of the receptor is considered to be medium-high.

Magnitude of change

33. The Eastern Link converter station would be partially visible from this location. The screening influence of intervening restored landform, at Dunbar Landfill, mature woodland and Skateraw Farm restricts potential views, however, the upper parts of the development would be visible above the intervening trees. The Eastern Link cable corridor would be screened from view by the Proposed Development with limited opportunities for it and the onshore cable corridor to be viewed in combination. The Eastern Link Convertor Station would occupy a different part of panorama than the Proposed Development onshore substation and their locations would be further separated by the mature trees within the intervening landscape that appear to form a break in the view.

34. The addition of the Proposed Development to a scenario that includes the Eastern Link development would therefore have minimal cumulative interaction given the visual separation and limited visibility of the Eastern Link development. The cumulative magnitude of change is therefore considered to be low during construction, year 1 and in year 15.

Significance of the cumulative effect

35. The cumulative effect is considered to be **moderate-minor** and not significant in EIA terms during construction, year 1 and in year 15. Construction effects are direct, adverse, reversible and temporary. Operational effects are direct, adverse and permanent.

2.2.9. Viewpoint 4: Minor Road Near Thornton

Sensitivity of the receptor

36. Please refer to Volume 1, Chapter 6, Section 6.11.7 (Detailed Visual Effects Assessment) of the Onshore EIA Report. The viewpoint is deemed to be of high value and medium susceptibility and the sensitivity of the receptor is considered to be medium-high.

Magnitude of change

37. The Branxton BESS Project would be partially visible when looking south east from this location. Screening by landform and hedgerow within the farmland cover would limit visibility of the facility to it uppermost parts, against a backdrop of the easternmost Lammermuir Hills. The Branxton BESS Project, Proposed Development onshore substation and Eastern Link Convertor Station would occupy different parts of the panorama and would

not be viewed simultaneously. There would be limited visibility of the facility in combination with the cumulative developments.

38. To the north-west, the Proposed Development would screen the Eastern Link cable corridor. Landform and mature trees within the intervening landscape would restrict visibility of the onshore cable corridor and Eastern Link cable corridor.

39. Minimal cumulative interaction would occur due to the addition of the Proposed Development to a scenario that includes the Branxton BESS Project and Eastern Link development. This is due to the visual separation arising from the spatial arrangement of these developments and limited visibility of the cumulative developments. The cumulative magnitude of change is therefore considered to be low during construction, year 1 and in year 15.

Significance of the cumulative effect

40. The cumulative effect is considered to be **moderate-minor** and not significant in EIA terms during construction, year 1 and in year 15. Construction effects are direct, adverse, reversible and temporary. Operational effects are direct, adverse and permanent.

2.2.10. Viewpoint 6: Blackcastle Hill

Sensitivity of the receptor

41. Please refer to Volume 1, Chapter 6, Section 6.11.7 (Detailed Visual Effects Assessment) of the Onshore EIA Report. The viewpoint is deemed to be of medium-high value and medium susceptibility. The sensitivity of the receptor is therefore, considered to be medium-high.

Magnitude of change

42. The introduction of the Eastern Link converter station to the cumulative context would increase the presence of industrial built form within an area that is already characterised by industrial developments including the operation quarry at Dunbar Cement Plant, Dunbar ERF and Dunbar Landfill. The converter station would slightly increase the presence of industrial development within successive views to the north-west. The cumulative interaction between the converter station and the Proposed Development would however be marginal due to the context of existing industrial development in proximity to the converter station site, distance from the view and the visual separation of these sites is also evident from this viewpoint. Construction of the cable corridor for the Eastern Link would be visible across the central portion of the lower lying landscape in the view, including the connection point to the Convertor Station on the Coastal Margins. The construction activities associated with the Eastern Link cabling works would be viewed in close context to the Proposed Development cable corridor for a short distance south of the onshore substation.

43. The introduction of the Branxton BESS Project to the cumulative context would further increase the presence of industrial built form, however, the Branxton BESS Project would appear more peripheral to the view, beyond the broad plateau of the hilltop in the foreground. As construction activities for the Branxton BESS Project, Eastern Link and the Proposed Development may occur within a similar time period, they may be visible at the same time. While the processes involved in excavating and storing land and installing the onshore cable corridor are not considered to be wholly out of context with the agricultural land use, the construction of these developments simultaneously would increase the presence of this development type for a short period of time.

44. When considering the addition of the Proposed Development onshore substation to a scenario that includes the Eastern Link Convertor Station and Branxton BESS Project minimal cumulative interaction is predicted given the visual separation and existing industrial backdrop. When considering the addition of the Proposed Development to a scenario that includes the Eastern Link and Branxton BESS Project cabling works there is potential for the effect of construction activities to be visible in more areas than that of either development on its own and also potentially more intensive within the same time period. These construction activities are however still considered to be short term and temporary and for the most part similar in scale to other agricultural practices seen from this viewpoint throughout the year. Taking all of this into account, the overall cumulative interaction is considered to be minimal resulting in a low magnitude of change during construction, year 1 and in year 15.

Significance of the cumulative effect

45. The cumulative effect would be **moderate-minor** and not significant in EIA terms during construction, year 1 and year 15. Construction effects are direct, adverse, reversible and temporary. Operational effects are direct, adverse and permanent.

2.2.11. A1 trunk road

Sensitivity of the receptor

46. Please refer to Volume 1, Chapter 6, Section 6.11.7 (Detailed Visual Effects Assessment) of the Onshore EIA Report. Viewpoint 1 is representative of receptors using this road, who are deemed to place a medium value on the view and who are of medium susceptibility. The receptor sensitivity is considered to be medium.

Magnitude of change

47. Theoretically, the Branxton BESS Project would be intermittently visible from sections of the road within the study area with more constant visibility from the stretch of road between the overpass crossing the ECML, to the north; and the junction with road to Bilsdean, to the south. Whilst set further back from the A1, due to its elevated location, visibility of the Branxton Grid Substation is potentially similar in extent, however, the intervening screening elements such as localised topography, small woods and field boundary vegetation restrict clear views towards it. Theoretical visibility of the Proposed Development extends from the bridge over the Dry Burn to Thorntonloch Bridge, to the north and south, respectively. Whether northbound or southbound, receptors using the road would periodically see these developments where screening by topography and intervening smaller landscape elements allows. Due to their close proximity to the road, the Proposed Development and the Branxton BESS Project would be glimpsed between landform and roadside tree planting. These glimpses would be relatively close range and would mainly occur as receptors approach and pass each of these developments in turn.

48. When considering the addition of the Proposed Development to a cumulative scenario that includes the Branxton BESS Project the perceived level of electricity infrastructure along the road within the study area would increase. This would be particularly notable for southbound receptors west of the Proposed Development, where the Proposed Development will appear directly ahead from the A1. For northbound receptors, intervening trees would initially screen the Proposed Development, which would gradually come into view as the road turns west. It would lie just to the side of the view with the greater focus of Torness Power Station on the opposite side of the road. The Branxton BESS Project be more peripheral to the direction of travel for both northbound and southbound receptors. It

would also be less visible due to intermittent screening provided by intervening woods and field boundary vegetation.

49. The existing influence of Torness Power Station; the spatial separation of the Proposed Development and cumulative developments; and their very limited simultaneous visibility, would limit their sequential visual impact resulting in two separate and short sections of the road having brief glimpses of these developments within differing landscape and topographical contexts. Maturation of mitigation planting would moderate the adverse nature of the cumulative effect to a slight degree. It is considered that, taken in sequence, the magnitude of change to views from the A1 would be noticeable but not definitive.

50. The cumulative magnitude of change is considered to be medium during construction, year 1 and in year 15.

Significance of the cumulative effect

51. The cumulative effect is considered to be **moderate** and not significant in EIA terms during construction, year 1 and in year 15. Construction effects are direct, adverse, reversible and temporary. Operational effects are direct, adverse and permanent.

2.2.12. Summary and conclusions

52. This Addendum provides an updated cumulative effects assessment (CEA) to be read alongside Volume 1, Chapter 6 of the Onshore EIA Report. The key change between this Addendum and the CEA provided within Volume 1, Chapter 6 of the Onshore EIA Report is the inclusion of the Branxton BESS Project within the assessment of cumulative effects. This report therefore replaces the Tier 2 cumulative assessment found within Chapter 6. Volume 2, Figure 6.3 has also been updated as part of this Addendum which illustrates the locations of cumulative developments included within the Tier 2 cumulative assessment and this Addendum.

53. Of these cumulative developments, Branxton Grid Substation, Branxton BESS Project and Eastern Link have been considered in detail in a Tier 2 cumulative assessment (application scenario). None of the key landscape and visual receptors are assessed as having significant cumulative effects as a result of other developments in the study area. Where cumulative developments are visible from key landscape and visual receptors, they would have limited cumulative interaction with the Proposed Development or the cumulative effect would be minimal, short term and temporary, substantially limiting their cumulative influence when considering the additional effect of the Proposed Development. Additionally, when experienced in sequence (by receptors using the A1 trunk road), the cumulative effect of the Proposed Development and cumulative developments is assessed as being not significant.

2.3. ECOLOGY

54. A total of four projects and plans were initially selected as relevant to the CEA and presented within the ecology chapter (Volume 1, Chapter 7 of the Onshore EIA Report) based upon the results of a screening exercise (see Volume 4, Appendix 2.4 of the Onshore EIA Report). This Addendum updates the CEA in relation to ecology to include the Branxton BESS Project.

55. Each project or plan was considered on a case-by-case basis for screening in or out of the ecology chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

56. The specific projects scoped into the CEA for ecology are described below and outlined in Table 2.4.

2.3.1. Developments Scoped into Assessment

57. Crystal Rig IV wind farm (Planning application ref: 18/00004/SGC) lies 7.9 km south-west of the site in upland areas, comprising a combination of moorland and forestry habitats. Though the site is upland areas within significantly different habitats from lowland farmland and there is a significant distance between the two developments, the results of the baseline species and habitat surveys overlap with those of the Proposed Development. Due to the overlap in ecology receptors assessed within the EIA and the Proposed Development, including designated sites, this development is scoped into the CEA.

58. A planning application for a cable route and sub-station which overlaps the site (SPEN Eastern Link- Branxton Grid Substation, 21/01569/PM) is currently withdrawn but expected to be resubmitted in the near future. A Preliminary Ecological Appraisal (including otter and badger survey) and bat surveys were completed in 2021. A similar range of species and habitats were recorded during the ecology surveys and the withdrawn EIA report scoped out all designated sites and species except bats. The predicted impacts on bats were concluded to be minor and not significant during construction, operation and cumulative.

59. The SPEN Eastern Link Project – Converter Station and Cabling (Planning application ref: 22/00852/PPM) is a scheme for a new 525kV electricity converter station, underground cables and associated works and overlaps the current site. Also includes S37 application (22/00002/SGC) to install and keep a new 265 m section of 400 kV overhead line east of the proposed Branxton Grid substation. Due to the overlap in ecology receptors assessed within the EIA and the Proposed Development, including designated sites, this development is scoped into the CEA.

60. The Branxton BESS Project is a S36 application to construct and operate a BESS with a generating capacity in exceedance of 50 MW, comprising battery-based electricity storage containers and associated infrastructure. The above ground area being developed totals 13.35 hectares. The current land use is arable, and hedgerows, trees and boundary features will be retained. Due to the overlap in ecology receptors assessed within the Branxton BESS Project EcIA and the Proposed Development, including designated sites, this development is scoped into the CEA.

OFFSHORE PROPOSED DEVELOPMENTS

Berwick Bank Offshore

- Up to 307 wind turbines (each comprising a tower section, nacelle and three rotor blades) and associated support structures and foundations;
- Up to ten Offshore Substation Platforms (OSPs) and associated support structures and foundations;
- Estimated scour protection area of up to 2,280 m^2 per wind turbine and 11,146 m^2 per OSP;

- A network of inter-array cabling linking the individual wind turbines to each other and to the OSPs plus inter-connections between OSPs (approximately 1,225 km of inter-array cabling and 94 km of interconnector cabling); and
- Up to eight offshore export cables connecting the OSPs to Skateraw Landfall. It is possible that either High Voltage Alternating Current (HVAC) or High Voltage Direct Current (HVDC) cables will be used at the Proposed Development. The options currently considered include:
  - Up to eight HVAC offshore export cables; or
  - Up to four HVDC offshore export cables.
- Construction to start 2025 with an 8-year build programme.

Table 2.4 Updated List of Other Projects Considered Within the CEA for Ecology

Project/Plan	Application Ref	Description	Status	Location	Construction Timescale
Berwick Bank Offshore Infrastructure	N/A	Offshore infrastructure and associated works of the Berwick Bank Project	Application	Offshore	2025 - 2033
SPEN Eastern Link Project – Converter Station & Cable Route	22/00852/PPM & 22/00002/SGC	Planning permission in principle for a converter station and associated development including a landfall at Thorntonloch and connecting buried cabling, all in association with the Scottish Power Eastern Link 1 project, for a new subsea High Voltage Direct Current (HVDC) link. Also includes S37 application (22/00002/SGC) to install and keep a new 265m section of 400 kV overhead line east of the proposed Branxton Grid substation.	Application	Land Adjacent to Dunbar Landfill Site Oxwell Mains Dunbar East Lothian EH42 1SW.	2024-2027
SPEN Eastern Link - Branxton Grid Substation	21/01569/PM	Construction of a 400 kilovolt (kV) gas insulated switchgear (GIS) substation and associated works	Application (Application Withdrawn but expected to be submitted again in near future)	Fields To The South Of Thornton Bridge Sealing End Compound Branxton	2023-2026
Crystal Rig IV Wind Farm	18/00004/SGC	Construction and operation of crystal rig wind farm (phase iv) – 11 turbines	Consented	5 km north of Cranshaw village	Unknown. Worst case assume to be overlapping.

Project/Plan	Application Ref	Description	Status	Location	Construction Timescale
Branxton BESS Project	ECU00004659	Construction and operation of 50 MW generating capacity BESS comprising battery-based electricity storage containers and associated infrastructure.	Application	Thornton, East Lothian, EH42 1QT	Unknown. Worst case assumes to be overlapping.

2.3.2. Maximum Design Scenario

61. The maximum design scenarios summarised here have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the details provided in Volume 1, Chapter 5 of the Onshore EIA Report as well as the information available on other projects and plans, to inform a 'maximum design scenario'. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope, to that assessed here, be taken forward in the final design scheme.

2.3.3. Cumulative Effects Assessment

62. An assessment description of the likely significance of the cumulative effects of the Proposed Development upon ecology receptors arising from each identified impact is given below.

63. Table 2.5 provides an overview of residual effects on Important Ecological Features (IEFs) from each of the scoped-in developments to allow an assessment of overall cumulative effect.

Table 2.5 Summary of Residual Effects of Scoped in Developments on IEFs

IEF	Berwick Bank Onshore Infrastructure	Berwick Bank Offshore Infrastructure	SPEN Eastern Link Project	SPEN Branxton Grid Substation	Crystal Rig IV Wind Farm	Branxton BESS Project	Cumulative residual effect
Designated Sites							
Dunglass Burn LNCS	Impacts on habitats will include direct loss within the footprint of the cable bridge and temporary disturbance of surrounding vegetation. The impact is considered to be of local spatial extent, short-term duration and medium recoverability. Overall significance of effect is Negligible to Minor adverse and not significant.	NA	Assessed under Thornton Burn LWS within the EcIA. Braidwood Burn is to be crossed using either a cable bridge or culvert. Assessment assumes 10 m of vegetation removal on each bank. Significance: Not considered to be significant given small area to be affected and embedded mitigation measures in place for pollution control	No impact pathway identified. Scoped out of detailed assessment.	Located 240 m from the nearest infrastructure and downstream, therefore there is route to impact riparian habitats. Assessed as being of Local value. Mitigation measures proposed. Residual effect Low and Not Significant.	Lies at least 1.5 km from the nearest infrastructure. No impact pathway identified within the EcIA.	Not assessed under the Berwick Bank Offshore Infrastructure. No significant impacts from the construction of the scoped in developments on Dunglass Burn LNCS was predicted. The SPEN Eastern Link Project – Converter Station and Cable Route will affect the receptor directly and impacts are likely to be similar to the Proposed Development as a cable crossing (e.g. cable bridge) is also proposed. The Crystal Rig IV windfarm is assessed as having potential to impact the receptor indirectly and embedded mitigation is proposed to minimise the effect. Based on a worst-case scenario of the footprint of the SPEN Eastern Link – Converter Station & Cable Route Project, and therefore area of habitats to be impacted, being similar to the Proposed Development the cumulative impact is predicted to be of local spatial extent, medium-term duration, intermittent and medium reversibility. The magnitude is therefore increased to medium.

IEF	Berwick Bank Onshore Infrastructure	Berwick Bank Offshore Infrastructure	SPEN Eastern Link Project	SPEN Branxton Grid Substation	Crystal Rig IV Wind Farm	Branxton BESS Project	Cumulative residual effect
							Given the above, the cumulative effect significance is considered to be Minor adverse and Not Significant under the EIA Regulations.
Thornton Glen SWT	No direct impacts (e.g., habitat loss) anticipated. Potential impacts due to fragmentation of the woodland corridor as a result of works to install the cable bridge were assessed as Negligible to Minor adverse and not significant.	NA	No impact pathway identified. Scoped out of detailed assessment.	This site lies 25 m to the east of the application red line boundary. Given the embedded mitigation measures to protect water quality and that a 10 m buffer will be maintained between the construction works and the watercourse, no potential significant effects have been identified.	NA	Lies at least 250 m from nearest infrastructure. No impact pathway identified within the EcIA.	Not assessed under Crystal Rig IV Wind Farm or Berwick Bank Offshore Infrastructure. Scoped out of detailed assessment within the EcIA for the SPEN Eastern Link Project – Converter Station & Cable Route and the Branxton BESS Project. No significant effects from the construction of the SPEN Eastern Link - Branxton Grid Substation on Thornton Glen SWT was predicted. This project will not affect the receptor directly and there is no planned vegetation removal within the woodland corridor to facilitate the project, therefore no increased risk of fragmentation. A significant cumulative effect on this designated site is considered unlikely.
Dryburn Valley LNCS	Impacts on the habitats will include direct loss within the footprint of the cable bridge and temporary disturbance of surrounding vegetation. The impact is considered to be of local spatial	NA	The Dry Burn is to be crossed using either cable bridge or culvert. Assessment assumed 10 m of vegetation removal on each bank. Significance: Not considered to be	NA	NA	NA	Not assessed under Crystal Rig IV Wind Farm, Berwick Bank Offshore Infrastructure, the SPEN Eastern Link - Branxton Grid Substation or the Branxton BESS project. The SPEN Eastern Link Project – Converter Station and Cable Route will affect the receptor directly and impacts

IEF	Berwick Bank Onshore Infrastructure	Berwick Bank Offshore Infrastructure	SPEN Eastern Link Project	SPEN Branxton Grid Substation	Crystal Rig IV Wind Farm	Branxton BESS Project	Cumulative residual effect
	extent, short-term duration and medium recoverability. Overall significance of effect is Negligible to Minor adverse and not significant.		significant given small area to be affected and embedded mitigation measures in place for pollution control.				are likely to be similar to the Proposed Development as a cable crossing is also proposed. Based on a worst-case scenario of the footprint of the SPEN Eastern Link Project – Converter Station and Cable Route, and therefore area of habitats to be impacted, is similar to the Proposed Development the cumulative impact is predicted to be of local spatial extent, medium-term duration, intermittent and medium reversibility. The magnitude is therefore increased to medium. Given the above, the cumulative effect significance is considered to be Minor adverse and Not Significant under the EIA Regulations.
Habitats							
Dense and scattered scrub	Approximately 0.4 ha of this habitat lies under the temporary and permanent footprint of works and will be directly impacted (e.g. removed). Overall significance of effect is Negligible to Minor adverse and not significant.	NA	All common and widespread habitats the loss of which is not considered to be significant.	All common and widespread habitats the loss of which is not considered to be significant.	NA	Areas of dense and scattered present within study area including large areas of gorse and hawthorn. No scrub habitat lies within the development footprint. No impact pathway identified within EcIA.	Not assessed under Crystal Rig IV Wind Farm or Berwick Bank Offshore Infrastructure. No significant effects from the construction of the SPEN Eastern Link – Converter Station and Cable Route Project or the SPEN Eastern Link - Branxton Grid Substation on scrub habitat was predicted. As all three projects require removal of

IEF	Berwick Bank Onshore Infrastructure	Berwick Bank Offshore Infrastructure	SPEN Eastern Link Project	SPEN Branxton Grid Substation	Crystal Rig IV Wind Farm	Branxton BESS Project	Cumulative residual effect
							sections of scrub a cumulative effect is considered though it is unlikely to affect the long-term integrity of the feature. The cumulative impact is predicted to be of local spatial extent, medium-term duration, intermittent and medium reversibility. The magnitude is therefore increased to medium. Given the above, the cumulative effect significance is considered to be Minor adverse and Not Significant under the EIA Regulations.
Species-poor hedgerow	Approximately 1.1 km of species-poor hedgerow lies under or adjacent to the temporary and permanent works and may be impacted by the Proposed Development. The planting scheme is to include replanting hedgerows within the temporary works areas and reinstatement of hedgerows where removed for the permanent works. Overall significance of effect is Negligible to Minor adverse and not significant.	NA	The majority of the hedgerows recorded within the site were species-poor, gappy and heavily managed. Nevertheless, they are of intrinsic nature conservation value for the connectivity they provide with the surrounding landscape, as well as providing habitat for foraging/commuting bats and foraging/nesting birds. Given that only small sections of hedgerows will	The majority of the hedgerows recorded within the site were species-poor, gappy and heavily managed. Nevertheless, they are of intrinsic nature conservation value for the connectivity they provide with the surrounding landscape, as well as providing habitat for foraging/commuting bats and foraging/nesting birds. Given that only small sections of hedgerows will	NA	Defunct, established species-poor hedgerows border field boundaries. Boundary features are to be retained therefore no impact pathway identified within EcIA.	Not assessed under Crystal Rig IV Wind Farm or Berwick Bank Offshore Infrastructure. There is no requirement for removal of hedgerows to facilitate the Branxton BESS Project. No significant effects from the construction of the SPEN Eastern Link – Converter Station and Cable Route Project or the SPEN Eastern Link - Branxton Grid Substation on species-poor hedgerows was predicted. As three projects require removal of sections of species-poor hedgerow a cumulative effect is considered though it is unlikely to affect the long-term integrity of the feature. The cumulative impact is predicted to be of local

IEF	Berwick Bank Onshore Infrastructure	Berwick Bank Offshore Infrastructure	SPEN Eastern Link Project	SPEN Branxton Grid Substation	Crystal Rig IV Wind Farm	Branxton BESS Project	Cumulative residual effect
			be lost, and these will be reinstated, no potential significant effects have been identified.	be lost, and these will be reinstated, no potential significant effects have been identified.			spatial extent, medium-term duration, intermittent and medium reversibility. The magnitude is therefore increased to medium. Given the above, the cumulative effect significance is considered to be Minor adverse and Not Significant under the EIA Regulations
Running water	Approximately 235 m of this habitat will be indirectly impacted, and 100 m will be directly impacted. Overall significance of effect is Negligible to Minor adverse and not significant.	NA	Thornton Burn and Dry Burn assessed above. The unnamed watercourse to the south of the A1, is to be crossed using trenchless technique (e.g. HDD) or open cut. Worst case scenario is open cut which will effect a small area of habitat along the banks (the width of the swale). If trenchless technique is used no negative effect on the watercourse is expected. Embedded mitigation measures are to restore habitats and minimise risk of impacts from	NA	The watercourses within the Site are connected to the River Tweed SAC, via Bothwell Water and Monynut Water. Assessed as being of regional value. Watercourse crossings would be designed in keeping with best practice. Mitigation measures would minimise risk of sedimentation, erosion and risk of impacts from pollution incidents. Residual effect Negligible and Not Significant.	A small unnamed watercourse runs along the eastern boundary of the Site, acting as a field drain. The Ogle Burn, which converges with the Braidwood Burn, lies to the south-west of the development, approximately 750 m at its closest point. No impact pathway identified within EcIA.	Not assessed under Berwick Bank Offshore Infrastructure or SPEN Eastern Link - Branxton Grid Substation. No significant effects from the construction Crystal Rig IV Wind Farm or Branxton BESS Project on running water habitat was predicted. The SPEN Eastern Link – Converter Station and Cable Route Project will affect the same unnamed watercourse directly and impacts are likely to be similar to the Proposed Development if open cut is undertaken. Based on a worst-case scenario of the footprint of the SPEN Eastern Link – Converter Station and Cable Route Project, and therefore area of habitats to be impacted, being similar to the Proposed Development the cumulative impact is predicted to be of local spatial extent, medium-term duration, intermittent and high

IEF	Berwick Bank Onshore Infrastructure	Berwick Bank Offshore Infrastructure	SPEN Eastern Link Project	SPEN Branxton Grid Substation	Crystal Rig IV Wind Farm	Branxton BESS Project	Cumulative residual effect
			pollution. Impact assessed as not significant.				reversibility. The magnitude is therefore negligible. Given the above, the cumulative effect significance is considered to be Negligible to Minor adverse and Not Significant under the EIA Regulations.

HABITAT LOSS/DISTURBANCE

Tier 1 & Tier 2

Construction phase

Magnitude of impact

Designated Sites

64. As described in Table 2.5, no significant impacts on designated site IEFs considered within this assessment were predicted during the construction of the scoped in developments.

65. The cumulative effect and magnitude are predicted to be as follows for each designated site:

- Dunglass Burn LNCS: local spatial extent, medium term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be medium.
- Thornton Glen SWT: local spatial extent, short term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
- Dryburn Valley LNCS: local spatial extent, medium term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be medium.

Habitats

66. As described in Table 2.5, no significant impacts on habitat IEFs considered within this assessment were predicted during the construction of the scoped in developments.

67. The cumulative effect and magnitude are predicted to be as follows for each habitat IEF:

- Dense/scattered scrub: local spatial extent, medium term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be medium.
- Species-poor hedgerow: local spatial extent, medium term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be medium.
- Running water: local spatial extent, medium-term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor indirectly (Skateraw Dean and Braid Burn) and directly (unnamed watercourse). The magnitude is therefore considered to be negligible.

Sensitivity of receptor

Designated Sites

68. The sensitivity of each designated site IEF is as per Paragraphs 112, 119, and 127 in Volume 1, Chapter 7 of the Onshore EIA.

69. The overall sensitivity of each designated site is:

- Dunglass Burn LNCS: low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore considered to be low.
- Thornton Glen SWT: medium vulnerability, low recoverability and local value. The sensitivity of the receptor is therefore considered to be low.
- Dryburn Valley LNCS: medium vulnerability, medium recoverability and local value. The sensitivity of the receptors is therefore considered to be low.

Protected Habitats

70. The sensitivity of each habitat IEF is as per Paragraphs 134, 142, 150 in Volume 1, Chapter 7 of the Onshore EIA.

71. The overall sensitivity of each habitat IEF is:

- Dense/scattered scrub: low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore considered to be low.
- Species-poor hedgerow: low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore considered to be low.
- Running water: medium vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore, considered to be low.

Significance of effect

Designated Sites

72. As summarised in Table 2.5 no significant cumulative effect on the designated site IEFs is considered likely.

- Dunglass Burn LNCS: overall the magnitude of the cumulative effect is deemed to be medium, and the sensitivity of the receptor is considered to be low. The cumulative effect will therefore be of **minor** adverse significance, which is not significant in EIA terms.
- Thornton Glen SWT: overall the magnitude of the cumulative effect is deemed to be low, and the sensitivity of the receptor is considered to be low. The cumulative effect will therefore be **negligible to minor** adverse significance, which is not significant in EIA terms.
- Dryburn Valley LNCS: overall the magnitude of the cumulative effect is deemed to be medium, and the sensitivity of the receptor is considered to be low. The cumulative effect will therefore be of **minor** adverse significance, which is not significant in EIA terms.

Protected Habitats

73. As summarised in Table 2.5 no significant cumulative effect on the habitat IEFs is considered likely.

- Dense/scattered scrub: overall the magnitude of the cumulative effect is deemed to be medium, and the sensitivity of the receptor is considered to be low. The cumulative effect will therefore be of **minor** adverse significance, which is not significant in EIA terms.
- Species-poor hedgerow: overall the magnitude of the cumulative effect is deemed to be medium, and the sensitivity of the receptor is considered to be low. The cumulative effect will therefore be of **minor** adverse significance, which is not significant in EIA terms.
- Running water: overall the magnitude of the cumulative effect is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The cumulative effect will therefore be **negligible to minor** adverse significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

74. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

PROPOSED MONITORING

75. No monitoring is considered necessary.

2.4. ORNITHOLOGY

76. A total of four projects and plans have been selected as relevant to the CEA presented within this Addendum are based upon the results of a screening exercise (see Volume 4, Appendix 2.4 of the Onshore EIA Report). Each project or plan has been considered on a case by case basis for screening in or out of this Addendum section's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

Developments Scoped Out of Assessment

77. Crystal Rig IV wind farm (Planning application ref: 18/00004/SGC) lies 7.9 km south-west of the site in upland areas, comprising a combination of moorland and forestry habitats. With the site being upland areas with significantly different habitats from the lowland farmland within and surrounding the site, they also support different breeding and wintering bird assemblages. The results of the ornithology surveys at Crystal Rig IV wind farm showed little overlap with surveys at the Proposed Development due to the differing habitats, with only low numbers of herring gull in the winter months being the only overlap, curlew was recorded as a breeding species but not recorded in the non-breeding season (Fred Olsen Renewables, 2018). The fact that there is no significant overlap in habitats and hence species mean that the two locations have different breeding and wintering bird assemblages and the significant distance between the two wind farms and the Proposed Development mean this site is scoped out of the cumulative assessment.

Developments Scoped into Assessment

78. A planning application for a cable route and sub-station which overlaps the site (SPEN Eastern Link Project, 22/00852/PPM & 22/00002/SGC) is in ongoing dialogue and breeding bird and wintering bird surveys were completed in 2021. The cable route and proposed sub-station location overlapped with the site which was covered by surveys for the Proposed Development. A similar range of species were recorded during the bird surveys and the Onshore EIA Report scoped out all designated sites and species bar wintering curlew, breeding peregrine falcon and breeding herring gull. The predicted impacts on all three receptors were concluded to be minor and not significant during construction, operation and cumulative.

79. Another similar scheme is a (currently withdrawn) application for the construction of a 400 kilovolt (kV) gas insulated switchgear (GIS) substation and associated works (SPEN Branxton Grid Substation, 21/01569/PM). This works area which would overlap the current site, but the planning application has not been submitted to date. The withdrawn EIA predicts no significant effects on bird species with basic mitigation outlined to fully off-set both the breeding bird and wintering bird assemblages including herring gull, peregrine and curlew (SP Energy Networks, 2021).

80. The Branxton BESS Project site's current land use is noted as arable and the majority of key habitats for breeding birds (field margins and hedgerows) will be retained. No impacts have been predicted on any designated sites in terms of birds, including the Outer Firth of Forth and St Andrews Bay Complex SPA and Firth of Forth SPA and more detailed bird surveys were not considered to be necessary to support the Branxton BESS Project's S36 application (Arcus, 2022).

81. Due to the proposed loss of arable fields which are considered suitable for qualifying species of the Firth of Forth SPA (such as wintering pink-footed goose and golden plover) and given a loss of similar habitats within the Proposed Development, this development is scoped into the CEA. The specific projects scoped into the CEA for ornithology are outlined in Table 2.6.

Offshore Proposed Developments

82. Berwick Bank Offshore Infrastructure (refer to Ecology section above for a summary description of this development).

Table 2.6 Updated List of Other Projects Considered Within the CEA for Ornithology

Project/Plan	Application Ref	Description	Status	Location	Construction Timescale
Tier 1					
Berwick Bank Offshore Infrastructure	N/A	Offshore infrastructure and associated works of the Berwick Bank Project	Application	Offshore	2025-2033
Tier *2*					
SPEN Eastern Link Project – Converter Station, Cable Route & Overhead Line	22/00852/PPM & 22/00002/SGC	New 525kV electricity converter station underground cables and associated works Planning permission in principle for a converter station and associated development including a landfall at Thorntonloch and connecting buried cabling, all in association with the Scottish Power Eastern Link 1 project, for a new subsea High Voltage Direct Current (HVDC) link. Also includes S37 application (22/00002/SGC) to install and keep a new 265m section of 400 kV overhead line east of the proposed Branxton Grid substation.	Application	Land Adjacent To Dunbar Landfill Site Oxwell Mains Dunbar East Lothian EH42 1SW	2024-2027
SPEN Branxton Grid Substation	21/01569/PM	Construction of a 400 kilovolt (kV) gas insulated switchgear (GIS) substation and associated works	Application (Application Withdrawn but expected to be submitted again in near future)	Fields To The South Of Thornton Bridge Sealing End Compound Branxton	2023-2026
Crystal Rig IV Wind Farm	18/00004/SGC	Construction and operation of crystal rig wind farm (phase iv) – 11 turbines	Consented	5 km north of Cranshaw village	Unknown. Worst case assume to be overlapping.
Branxton BESS Project	ECU00004659	Construction and operation of 50 MW generating capacity BESS comprising battery-based electricity storage containers and associated infrastructure.	Application	Thornton, East Lothian, EH42 1QT	Unknown. Worst case assume to be overlapping.

MAXIMUM DESIGN SCENARIO

83. The maximum design scenarios assessed here based on the details in Table 2.6 above are those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the details provided in Volume 1, Chapter 5 of the Onshore EIA Report as well as the information available on other projects and plans, to inform a 'maximum design scenario'. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope, to that assessed here, be taken forward in the final design scheme.

CUMULATIVE EFFECTS ASSESSMENT

84. The potential cumulative impacts arising from the construction, operational and maintenance phases of the Proposed Development and an assessment of the likely significance of the effects of the Proposed Development on ornithological receptors caused by each identified impact is given below.

85. The predicted impacts on all receptors during construction due to disturbance and habitat loss or displacement due to habitat loss during operation of the Proposed Development are predicted to be barely perceptible and not significant. The predicted impacts during operation are predicted to be less than during construction and also not significant for all receptors. The predicted impacts on all IEFs for the five schemes included in the cumulative assessment are also predicted to be not significant.

DISTURBANCE OR HABITAT LOSS: ALL SPECIES

Construction & Operational Phase

86. Cumulative impacts on roosting or foraging bird species during construction and operation activities due to disturbance or direct habitat loss.

Magnitude of impact

87. No significant impacts were predicted for any species based on the scoped in cumulative projects displayed in Table 2.6. The assessment above predicted there would be no significant impacts on any species during construction and operation of the Proposed Development.

88. It is considered that the cumulative construction and operational are assessed to be of short-term duration, reversible and will affect the receptors directly. The magnitude is therefore considered to be barely perceptible.

Sensitivity of the receptor

89. Sensitivity of all species is as set out in Volume 1, Chapter 8: Table 8.9 of the Onshore EIA Report.

Significance of the effect

90. The cumulative effect on all species as a result of construction and operation is considered to be **negligible** and therefore not significant in the context of the EIA Regulations.

Secondary mitigation and residual effect

91. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

PROPOSED MONITORING

92. No monitoring to test the predictions made within the assessment of likely significant effects on ornithology is considered necessary.

2.5. CULTURAL HERITAGE

93. An assessment of the likely significance of the cumulative effects of the Proposed Development upon Cultural Heritage receptors arising from each identified impact is given below. This assessment is based on the methodologies set out in Volume 1, Chapter 10 of the Onshore EIA Report, Section 10.6 Methodology to Inform Baseline, Section 10.9 Methodology for Assessment of Effects, and Section 10.12 Cumulative Effects Assessment. Figure 1.6.1 illustrates the location of the Proposed Development and the Branxton BESS Project and the designated cultural heritage assets in the surrounding area.

94. To avoid duplication of reporting, the cumulative assessment of SPEN Eastern Link – Branxton Grid Substation and SPEN Eastern Link Project – Converter Station & Cable Route on cultural heritage receptors are not included in this Addendum and are provided in Volume 1, Chapter 10, Section 10.12 of the Onshore EIA Report.

DIRECT IMPACTS ON CULTURAL HERITAGE ASSETS

Construction phase

95. The Branxton BESS Project lies outwith the Inner Study Area considered for direct impacts on cultural heritage and would have no construction impact on any of the known cultural heritage assets affected by the Proposed Development (Volume 1, Chapter 10, Section 10.7 Baseline Assessment, and Volume 2 Figure 10.1 of the Onshore EIA Report). As a result, there is no potential for direct cumulative impacts on any of the known cultural heritage assets affected by the Proposed Development.

96. The Branxton BESS Project is approximately 960 m to the east of the Proposed Development's grid connection point at Thornton Law and 1.7 km to the southeast from the proposed onshore substation. Given the distance between the construction footprints of the two developments, it is assessed that there is no potential for direct cumulative construction impacts on any previously unrecorded cultural heritage receptors affected by the Proposed Development.

Operation and maintenance phase

97. Five designated cultural heritage asset (SM 775, SM 3990, SM 5770, SM 5771 and SM 5958) have been identified as potentially being subject to cumulative impacts on their setting.

Innerwick Castle (SM773)

98. The scheduled monument comprises the ruins of a castle dating from the 14th century which occupies a rock promontory on the edge of the steep-sided Thornton Glen. The glen provides an enclosed setting for this castle and views from the castle are largely focused within the steep gorge of Thornton Glen. Its location within the Thornton Glen provides the castle with a relatively hidden position and results in Innerwick Castle not being a prominent local landmark with limited views afforded towards the Castle from the wider landscape.

Views towards the site of the Castle are possible from the north, at Castledene. However, looking from Castledene towards Innerwick Castle, the Castle is backdropped by Torness Power Station.

99. The assessment for the Proposed Development in Volume 1, Chapter 10 and Volume 4, Appendix 10.3 of the Onshore EIA Report identified an impact of minor adverse significance on this scheduled monument. The ZTV predicted no theoretical visibility of the Proposed Development from the area of the castle, however there was potential for the Proposed Development to be visible in combination with views to the castle from the wider area. The ZTV for the Branxton BESS Project is not available however given the location of Innerwick Castle within Thornton Glen it is considered unlikely that there will be visibility of the Branxton BESS Project from the castle area. It is possible that the Proposed Development and the Branxton BESS Project will be seen in combination with Innerwick castle in views from the north. Given the baseline setting of the scheduled monument, the combined cumulative impact will constitute a slight change in views to the castle. However, the localised setting of the castle within Thornton Glen will remain unchanged and it will remain possible for any visitor to understand and appreciate the setting of the monument. As such, the integrity of the setting of Innerwick Castle and its capacity to inform and convey its cultural significance, will not be compromised by the cumulative impact on its setting. It is assessed that there will be an adverse cumulative impact of **minor** significance on Innerwick Castle (SM773).

Thornton Mill, enclosure 350 m ESE of (SM 3990)

100. The scheduled monument comprises cropmark of a possible ring ditch (or barrow) and a row of three large pits and is located on the northeast edge of a rolling hill within an arable field. Views from the asset are over the surrounding arable agricultural land of the Lothian Plain, with the Firth of Forth visible to the north and east. The A1 Trunk Road and the East Coast Mainline are located to the immediate north of the asset and Torness Power Station, approximately 850 m to the north dominates the view from the asset.

101. The assessment for the Proposed Development in Volume 2, Appendix 10.3 of the Onshore EIA Report identified an impact of minor adverse significance on this scheduled monument. It is considered that, given the baseline setting of the scheduled monument, the combined cumulative impact will constitute a slight change to the wider views obtained from the site of the enclosure. The greater effect on the enclosure's localised setting will arise from the proximity of the Branxton BESS Project, which is located 475 m to the west of the scheduled area. The Proposed Development substation is 1.2 km to the northwest (Figure 1.6.1). However, the enclosure will not become isolated from its surroundings, nor will its relationship and associations with contemporary monuments be disrupted by either proposed development. It will remain possible for any visitor to understand and appreciate the setting of the monument, which is dominated by the proximity of the East Coast Mainline. As such, the integrity of the setting of the enclosure and its capacity to inform and convey its cultural significance, will not be compromised by the cumulative impact on its setting. It is assessed that there will be an adverse cumulative impact of **minor** significance on Thornton Mill, enclosure 350 m ESE of (SM 3990).

Crowhill, enclosure WNW of (SM 5770)

102. The scheduled monument comprises the cropmark remains of an enclosed settlement located on southeast facing slope, above the settlement of Crowhill. Views to the north from the asset are slightly restricted by the rising ground. However, from the north edge of the site, the views are over arable fields towards the coast, and include Torness Power Station. The views to the east and west are over arable fields, and, to the south, the fields rise to the Lammermuir Hills.

103. The assessment for the Proposed Development in Volume 2, Appendix 10.3 of the Onshore EIA Report identified an impact of moderate adverse significance on this scheduled monument. The Proposed Development onshore substation will be located approximately 250 m to the north-west of the site. The Branxton BESS Project would also be visible in the

wider landscape, 1.5 km to the west of the settlement, although probably partly screened by intervening buildings at Crowhill and tree belts along Thornton Burn. The two developments will lie in different directions from the monument and will be seen cumulatively in the same view.

104. While the integrity of the setting of this settlement will be compromised to some extent, the greater part of the impact would be as a result of the Proposed Development. It is assessed that the cumulative impact on Crowhill, enclosure WNW of (SM 5570), from the addition of the Branxton BESS Project will be an adverse cumulative impact of **minor** significance.

Innerwick Castle, fort and ring ditch (SM 5771)

105. The scheduled monument comprises cropmark remains of a multivallate fort and a ring ditch, of late prehistoric date, which are located on a gentle southeast facing slope above the steep valley of Thornton Glen. Adjoining the fort to the immediate southeast is the medieval Innerwick Castle (SM 773). Views to the north are slightly restricted by the rising ground, but, from the north edge of the site, they are over arable fields towards the coast, and include Torness Power Station. The view to the west is over arable fields and, to the south, the fields rise to the Lammermuir Hills. To the east, is the valley of Thornton Burn, which is recognisable by the belt of deciduous trees that line it.

106. The assessment for the Proposed Development in Volume 2, Appendix 10.3 of the Onshore EIA Report identified an impact of minor adverse significance on this scheduled monument, due to the limited views of the Proposed Development (630 m to the north) from the north edge of the asset. The Branxton BESS Project, 1.3 km to the east of the asset, may be visible in the wider landscape, although it would most likely be screened by the intervening trees of Thornton Glen. The two developments will lie in different directions from the monument and will be seen cumulatively in the same view.

107. Given the baseline setting of the scheduled monument, the combined cumulative impact would constitute a slight change in views from the asset. However, the key views from this fort, towards the valley of Thornton Glen, will not be affected and the relationship with Innerwick Castle (SM 773), and with possibly contemporary prehistoric assets in the area, will not be compromised. As such, the integrity of the setting of Innerwick Castle, fort and ring ditch, and its capacity to inform and convey its cultural significance, will not be compromised by the cumulative impact on its setting. It is therefore assessed that there will be an adverse cumulative impact of **minor** significance on Innerwick Castle, fort and ring ditch (SM 5771).

Branxton, enclosure 350 m NNW of (SM 5958)

108. The scheduled monument comprises cropmark remains of an enclosed settlement of prehistoric date, sited on a northeast sloping terrace above a meander of the Ogle Burn. The key views from this asset are over the surrounding arable land and to the coast to the north, Torness Power Station is a prominent feature to the north.

109. The assessment for the Proposed Development in Volume 2, Appendix 10.3 of the Onshore EIA Report identified an impact of negligible adverse significance on this scheduled monument, as there will be only limited visibility of the onshore substation, from the southern half of the enclosure, where, if not screened by the intervening trees, it would be visible 1.9 km to the northwest on the lower grounds of the East Lothian Plain sitting to the west of Torness Power Station. The Branxton BESS Project, 620 m to the northeast, will also be visible in the view to the north from this asset sited to the east of the view of Torness Power Station and offset from view of the onshore substation.

110. The cumulative effect of the Proposed Development and the onshore substation and the Branxton BESS Project would constitute a slight change to the wider views obtained from the enclosure and would not affect its localised setting. As such, the integrity of the setting of the Branxton, enclosure and its capacity to inform and convey its cultural significance, will not be compromised by the cumulative impact on its setting. It is therefore assessed

that there will be an adverse cumulative impact of **negligible** significance on Branxton, enclosure 350 m NNW of (SM 5958).

Decommissioning phase

111. The potential for decommissioning effects was scoped out of the assessment for cultural heritage see Volume 1, Chapter 10 of the Onshore EIA Report, Table 10.6. Therefore, cumulative decommissioning effects are not considered relevant here.

2.6. SOCIO-ECONOMICS

112. An assessment of the likely contribution of the Branxton BESS Project to the significance of cumulative effects associated with the Proposed Development upon employment activities (including supply chain) is given below. This is based on information provided within the Branxton BESS Project Planning Statement (EastCoastGridServices, 2022), which provides an estimate of 'local area' job impacts[1]. The Planning Statement does not provide estimates of potential GVA impacts; therefore, assessment of this receptor is omitted, with any potential cumulative impacts assumed to be of negligible significance.

113. Cumulative impacts associated with the Branxton BESS Project are anticipated to be relevant for the 'Local study area' assessed within Volume 1, Chapter 13 of the Onshore EIA Report. Cumulative impacts are anticipated to be negligible at the Scotland study area level – assessment at this geography is therefore omitted here.

CUMULATIVE IMPACT ON EMPLOYMENT ACTIVITIES (INCLUDING SUPPLY CHAIN)

Construction phase

Magnitude of impact

114. The potential impact of the Branxton BESS Project on employment activities is estimated as circa 40–60 'local area' jobs (EastCoastGridServices, 2022). In addition to the potential cumulative impacts described in Section 13.12.1 of Volume 1, Chapter 13 of the Onshore EIA Report, the scale of Branxton BESS Project impacts are considered low.

115. The cumulative impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude of the Branxton BESS Project cumulative impacts is therefore, considered to be low (beneficial).

Sensitivity of receptor

116. The receptor is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be low.

Significance of effect

117. Overall, the magnitude of the cumulative effect is deemed to be low (beneficial), and the sensitivity of the receptor is considered to be low. The cumulative effects associated with the Branxton BESS Project will, therefore, be of **negligible to minor** (beneficial) significance, which is not significant in EIA terms.

[1] The term 'local area' is assumed to be comparable to the 'local' study area assessed within volume 1, chapter 13: Socio-economics of the Onshore EIA report.

Secondary mitigation and residual effect

118. The Applicant has committed to enhancement of beneficial effects as per Section 13.9 of Volume 1, Chapter 13 of the Onshore EIA report. No other secondary mitigation is required.

Operation and maintenance phase

Magnitude of impact

119. No material operation and maintenance phase impacts are assessed for the Branxton BESS Project. The scale of Branxton BESS Project impacts is therefore considered negligible.

120. The cumulative impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude of the Branxton BESS Project cumulative impacts is therefore, considered to be negligible.

Sensitivity of receptor

121. The receptor is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be low.

Significance of effect

122. Overall, the magnitude of the cumulative effect is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The cumulative effects associated with the Branxton BESS Project will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

123. The Applicant has committed to enhancement of beneficial effects as per Section 13.9 of Volume 1, Chapter 13 of the Onshore EIA report. No other secondary mitigation is required.

Decommissioning phase

124. No material decommissioning phase impacts are assessed for the Branxton BESS Project.

125. The scale and duration of decommissioning activity is uncertain. The exact approach to decommissioning is not yet confirmed as best practice at the time is not currently known.

126. Based on knowledge of existing industry practice, and in line with the approach taken to assess decommissioning phase cumulative impacts in volume 1, chapter 13: Socio-economics of the Onshore EIA Report, the workforce for the decommissioning of the onshore infrastructure associated with the Branxton BESS Project (as with other cumulative projects) is assumed to be supported in a similar way to installation and commissioning. However, the scale of activity is assumed to be greatly reduced.

127. Based on currently available information, the cumulative effects associated with the Branxton BESS Project will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

128. The Applicant has committed to enhancement of beneficial effects as per Section 13.9 of Volume 1, Chapter 13 of the Onshore EIA report. No other secondary mitigation is required.

Summary

129. Overall, within the context of socio-economics the potential cumulative impacts associated with the Branxton BESS Project do not change the significance of cumulative effects on

employment activities (including supply chain) assessed within Volume 1, Chapter 13: Socio-economics of the Onshore EIA Report.

2.7. LAND USE, TOURISM AND RECREATION

130. An assessment of the likely significance of the cumulative effects of the Proposed Development upon tourism and recreation receptors arising from each identified impact is given in Volume 1, Chapter 10 of the Onshore EIA Report. This Addendum section provides a cumulative effects assessment of Branxton BESS Project with the Proposed Development. A worst-case scenario has been assumed whereby the construction and operational phases of the developments overlap.

131. To avoid duplication of reporting, the cumulative assessment of SPEN Eastern Link – Branxton Grid Substation and SPEN Eastern Link Project – Converter Station & Cable Route on tourism and recreation receptors are not included in this Addendum section and is provided in Volume 1, Chapter 14, Section 14.12 of the Onshore EIA Report.

CUMULATIVE IMPACT ON CHANGE IN LAND USE

Magnitude of impact

132. The construction of Branxton BESS Project will result in a loss of approximately 6.26 ha of Class 3.2 land, 0.13 ha of Class 3.1 land and 5.44 ha of Class 2 land. The breakdown of temporary and permanent land take of the Branxton BESS Project is not available at this time and therefore the cumulative temporary and permanent land take cannot be calculated.

133. Assuming all land take is permanent as a worst-case scenario, the cumulative loss of prime agricultural land associated with the Branxton BESS Project, the SPEN Eastern Link – Branxton Grid Substation and the Proposed Development will be less than 23 ha.

134. The impact of permanent change in land use is predicted to be of local spatial extent, long term duration, continuous and low reversibility. The magnitude is therefore considered to be low.

Magnitude of impact

135. Given the presence of Class 2 and 3.1 land (prime agricultural land) in additional land take, the sensitivity of this receptor is medium.

Significance of effect

136. The magnitude of the impact of cumulative permanent changes to land use is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

CUMULATIVE IMPACT ON VISITOR NUMBERS TO VISITOR ATTRACTIONS

Construction Phase

137. As a worst-case scenario, the construction of the Branxton BESS will overlap with the construction of the Proposed Development. The construction has the potential to reduce visual amenity and accessibility to visitor attractions. Given the proximity of Torness Power Station to the Branxton BESS Project there may be temporary reduction in accessibility to this receptor. The cumulative magnitude of impact is likely to be low.

138. The sensitivity of the receptor is as detailed in Volume 1, Chapter 14, Paragraph 70 of the Onshore EIA Report.

139. The cumulative effect of change in visitor numbers to Torness Power Station during construction will therefore be of **negligible to minor adverse** significance, which is not significant in EIA terms.

Operation and maintenance phase

140. The addition of the Branxton BESS Project will slightly increase the cumulative presence of industrial built form within the existing landscape and has the potential to reduce visual amenity of visitor attractions during operation. Given the separation distance Barns Ness Lighthouse and Doon Hill, the cumulative magnitude of impacts on these receptors are likely to remain low.

141. The sensitivities of receptors are as detailed in Volume 1, Chapter 14, Paragraph 88 of the Onshore EIA Report.

142. The cumulative effects of change in visitor numbers to Doon Hill and Barns Ness Lighthouse will therefore be of **negligible to minor adverse** significance which is not significant in EIA terms.

CUMULATIVE IMPACT ON VISITOR NUMBERS TO BEACHES

Construction Phase

143. Construction activities associated with the Branxton BESS Project have the potential to impact access to Skateraw Harbour and Thorntonloch Beach as a result of additional HGV traffic on the A1. This has the potential to affect the number of visitors to these receptors. There will be no additional traffic on direct access routes from the A1 to either receptor, therefore it is anticipated that the cumulative magnitude of impact will remain at medium and low for Skateraw Harbour and Thorntonloch Beach, respectively.

144. The sensitivities of receptors are as detailed in Volume 1, Chapter 14, Paragraphs 97 and 98 of the Onshore EIA Report.

145. The cumulative effect of change in visitor numbers to Skateraw Harbour and Thorntonloch Beach will be of **minor adverse** significance which is not significant in EIA terms.

Operation and maintenance phase

146. The Branxton BESS Project is likely to be visible from Thorntonloch Beach during operation and may have a limited impact on the visual amenity of this receptor. There is potential for overlapping views with the Proposed Development. However, given the existing baseline of industrial infrastructure visible from Thorntonloch Beach, the cumulative magnitude of impacts on this receptor is considered to be low.

147. The sensitivity of this receptor is as detailed in Volume 1, Chapter 14, Paragraph 104 of the Onshore EIA Report.

148. The cumulative effect of change in visitor numbers to Thorntonloch Beach will be of **minor adverse** significance, which is not significant in EIA terms.

CUMULATIVE IMPACTS TO TOURIST ACCOMMODATION

Construction Phase

149. The construction of the Branxton BESS Project has the potential to reduce access to Thorntonloch caravan park, Dunbar Thorntonloch House Bed and Breakfast. This has the potential to affect the number of visitors to these receptors. However, adverse impacts may

be offset by the potential to increase customer turnover at tourist accommodation facilities during the construction period. The cumulative magnitude of impact will therefore remain low.

150. The sensitivities of receptors are as detailed in Volume 1, Chapter 14, Paragraph 110 of the Onshore EIA Report.

151. Therefore, the cumulative effect of change in visitor numbers to Thorntonloch caravan park and to Dunbar Thorntonloch House Bed and Breakfast will be of **negligible to minor adverse** significance which is not significant in EIA terms.

Operation and maintenance phase

152. The addition of the Branxton BESS Project to the cumulative context has the potential to be viewed in conjunction with the Proposed Development from Thorntonloch caravan park, Dunbar Thorntonloch House Bed and Breakfast, The Old Coastguard Lookout and the Blue Cabin by the Sea. This may reduce the visual amenity of views from these receptors which has the potential to reduce visitor numbers. Due to the proximity of the Branxton BESS Project and the Proposed Development to Thorntonloch caravan park and Dunbar Thorntonloch House Bed and Breakfast, the cumulative magnitude of impacts on visitor numbers to these receptors will be medium. Due to the separation distance of Old Coastguard Lookout and the Blue Cabin by the Sea the cumulative magnitude of impacts on visitor numbers to these receptors will be low.

153. The sensitivities of receptors are as detailed in Volume 1, Chapter 14, Paragraph 118 of the Onshore EIA Report.

154. The cumulative effect of change in visitor numbers to Thorntonloch Caravan Park and Dunbar Thorntonloch House Bed and Breakfast is therefore considered to be of **minor adverse** significance, which is not significant in EIA terms. The cumulative effect of change in visitor numbers to Old Coastguard Lookout and the Blue Cabin by the Sea will, therefore, be of **negligible to minor adverse** significance, which is not significant in EIA terms.

IMPACTS TO RECREATIONAL USERS OF PATHS

Construction Phase

155. The construction of the Branxton BESS Project has the potential to be visible in conjunction with the Proposed Development from some stretches of the John Muir Link and Core Paths 309 and 310. The impact on recreational amenity of the paths as a result of visual disturbance from construction activities will be minimal and temporary. The cumulative magnitude of impact on recreational users of these paths will be low.

156. The sensitivities of receptors are as detailed in Volume 1, Chapter 14, Paragraphs 129-132 of the Onshore EIA Report.

157. Therefore, it is considered that the cumulative effect of change in number of recreational users of the John Muir Link will be of **minor adverse** significance and the effect on Core paths 309 and 310 will be of **negligible to minor adverse** significance which is not significant in EIA terms.

Operation and maintenance phase

158. The Branxton BESS Project may be visible from sections of the John Muir Link, Core Paths 310 and 309, the Southern Upland Way (SUW) and the Berwickshire Coastal Path in conjunction with the Proposed Development. This may reduce recreational amenity of the receptors which has the potential to impact their recreational users. Clear views of both the Branxton BESS Project and Proposed Development experienced by recreational users

would be limited to short sections of the overall paths. Additionally, there would be no cumulative effect on key views out to sea. The magnitude of impact on the recreational users of these receptors will be low.

159. The sensitivities of receptors are as detailed in Volume 1, Chapter 14, Paragraph 145 of the Onshore EIA Report.

160. The cumulative effect of change in number of recreational users of the John Muir Link and the SUW will be of **minor adverse** significance which is not significant in EIA terms. In relation to the Berwickshire Coastal Path, Core Paths 310, 18 and 42, and the SUW the cumulative effect will be of **negligible to minor adverse** significance which is not significant in EIA terms.

IMPACT ON NUMBER OF RECREATION USERS OF CYCLE PATHS

Construction Phase

161. The construction activities associated with the Branxton BESS Project will be visible in conjunction with the Proposed Development from the NCN 76 and local cycle route. Reduced recreational amenity of the NCN 76 and local cycle route as a result of visual disturbance and construction traffic on the A1 will have the potential to impact a number of recreational users of the cycle path. The cumulative impact on the number of recreational users on the cycle paths will be temporary and of low magnitude.

162. The sensitivity of the cycle route is as detailed in Volume 1, Chapter 14, Paragraph 153 of the Onshore EIA Report.

163. The cumulative effect of change in number of recreational users of cycle paths will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operation and maintenance phase

164. The Branxton BESS Project is likely to be visible from short sections of the NCN 76 and local cycle route in conjunction with the Proposed Development. Therefore, there is the potential for cumulative impacts on recreational amenity of the cycle paths as a result of a change in views inland when travelling southeast on the NCN 76 and northwest on the local cycle route. This has the potential to impact a limited number of recreational users of the paths. Given the baseline of industrial infrastructure within the existing view inland, the cumulative magnitude of impact is considered to be low.

165. The sensitivity of the cycle route is as detailed in Volume 1, Chapter 14, Paragraph 157 of the Onshore EIA Report.

166. Therefore, the cumulative effect of change in number of recreational users of cycle paths will be of **negligible to minor adverse** significance, which is not significant in EIA terms.

PROPOSED MONITORING

167. No monitoring to test the predictions made within the assessment of likely significant effects on land use, tourism and recreation is considered necessary.

3. OTHER ISSUES

3.1. FLOOD RISK AND DRAINAGE

168. A Flood Risk Assessment (FRA) was originally prepared as a Technical Appendix to Chapter 11 of the Onshore EIA Report. In response to comments from ELC's Flood Risk Officer following the submission of the PPP, the FRA has been updated to align the assessment with NPF4 and is provided as an appendix to this document (Appendix A11.1). The following updates have been made:

- The assessment of coastal flood risk with respect to the landfall location has been updated to account for the most up to date sea level rise allowance for the 2100 epoch.
- In accordance with NPF4 the Braidwood Burn crossing assessment has been updated to ensure the proposed culvert can convey the estimated peak flow for the 1 in 200 year plus climate change design event.

169. The above changes have not affected the outcome of the FRA, with additional sea level rise being shown not to affect any above ground infrastructure and the proposed crossing of the Braidwood Burn is capable of conveying the updated design flow.

3.2. ECOLOGY

170. The Phase 1 habitat survey data, used to inform the ecology chapter (Volume 1, Chapter 7 of the onshore EIA report), mapped the habitat along the Braidwood Burn corridor as broadleaved, semi-natural woodland, which is the dominant habitat type at that location. Following the consultation response from the East Lothian Council Officer, habitats under the footprint of the cable bridge crossing at Braidwood Burn were mapped in detail to assist with discussions regarding the potential impact of the crossing on Dunglass Burn LNCS and assist the Initial Biodiversity Net Gain assessment (see Section 3.4). When viewed at a smaller scale, habitats within the area of the cable bridge crossing include dense and scattered scrub, semi-improved grassland, and scattered trees.

171. In addition, the footprint of the both the Braidwood Burn crossing and the Skateraw Burn crossing, were assessed as temporary habitat loss within the ecology chapter. These areas have now been assessed as permanent habitat loss (as shown on Figures A1 and A2).

172. The above revisions have resulted in small amendments of habitat area values within Volume 1, Chapter 7, Sections 7.7.5, 7.8.3 and 7.11 including Table 7.11, Table 7.15 and Table 7.20. Figure 7.4 has also been updated and is presented as Figure A7.4 within this addendum.

173. Whilst these amendments have not altered the conclusions of the impact assessment, all amendments are included within the following sections, with amended text italicised.

HABITATS (SUPERSEDES VOLUME 1, CHAPTER 7, SECTION 7.7.5)

174. In 2020 the extended Phase 1 habitat study area comprised the full site and a 250 m buffer, as shown in Volume 4, Appendix 7.1, Appendix Figures 7.1.4-5. In addition, a National Vegetation Classification (NVC) survey was undertaken of all wetland communities recorded. This level of survey effort aimed to inform the design process, to allow for mitigation through design and reduce potential negative impacts on ecological receptors.

175. The EcIA considers habitats within the potential zone of influence of the Proposed Development, namely the potential works areas (i.e. the development footprint, temporary construction compounds/ laydown areas, access tracks) and a 250 m buffer as shown on Figure A7.4 (herewith referred to as the 'ecology study area').

176. The Phase 1 habitat survey results are shown on Figure A7.4 and summarised in Table 3.1 (this supersedes Table 7.11 in Volume 1, Chapter 7). The Phase 1 analysis was informed by an extended Phase 1 habitat survey in July and October 2020. In addition to summarising the Phase 1 habitats within the site, Table 3.1 also details those specifically present within the ecology study area. Volume 4, Appendix 7.1 should be consulted for full descriptions, including Target Notes, of habitats found within the ecology study area. Note that the original Phase 1 habitat survey documented in Volume 4, Appendix 7.1 was undertaken to inform the location of the Proposed Development and the document therefore includes a larger survey area and describes some habitats that are not present within the ecology study area as defined above. Table 3.1: Phase 1 Habitats within the Study Area. The original Phase 1 habitat survey documented in Volume 4, Appendix 7.1 was undertaken to inform the location of the Proposed Development and the document therefore includes a larger survey area and describes some habitats that are not present within the ecology study area as defined above.

Table 3.1: Phase 1 Habitats within the Study Area

Phase 1 Code	Phase 1 Habitat	Extent in the Site	Extent in Ecology Study Area	% of Ecology Study Area
A1.1.1	Broadleaved, semi-natural woodland	8.07 ha	*11.19 ha*	*2.38*
A1.1.2	Broadleaved, plantation woodland	0.55 ha	1.60 ha	0.34
A1.2.1	Coniferous, semi-natural woodland	0.24 ha	0.11 ha	0.02
A1.2.2	Coniferous, plantation woodland	2.52 ha	2.67 ha	0.57
A1.3.1	Mixed, semi-natural woodland	2.79 ha	2.83 ha	0.60
A1.3.2	Mixed, plantation woodland	0.45 ha	0.70 ha	0.15
A2.1	Dense/Continuous Scrub	5.67 ha	*13.14 ha*	*2.79*
A2.2	Scattered scrub	1.83 ha	*3.24 ha*	*0.69*
A3.1	Broadleaved scattered trees	0.08 ha	-	-
B2.2	Semi-improved neutral grassland	18.49 ha	*39.56 ha*	*8.41*
B4	Improved grassland	352.60 ha	*208.03 ha*	*44.24*
C1.1	*Bracken (continuous)*	*0.04 ha*	*0.04 ha*	*0.01*
C3.1	Tall ruderal	0.60 ha	0.24 ha	0.05
G1	Standing water	0.04 ha	0.09 ha	0.02
G2	Running water	9.1 km	*10.48 km*	-
H1.1	Intertidal mud/sand	2.91 ha	4.16 ha	0.88
H1.3	Intertidal boulders/rocks	27.33 ha	21.06 ha	4.48
H3	Shingle above high tide mark	0.14 ha	0.23 ha	0.05
H8.4	Coastal grassland	2.33 ha	3.29 ha	0.70
J1.1	Arable	134.12 ha	*126.23 ha*	*26.84*
J2.1.2	Intact species-poor hedgerow	15.57 km	*6.55 km*	-
J2.2.2	Defunct species-poor hedgerow	0.81 km	0.81 km	-
J2.5	Wall	15.62 km	7.79 km	-
J3.6	Buildings	0.09 ha	1.87 ha	0.40
J4	Bare ground	0.95 ha	1.88 ha	0.40
J5	Other (incl. roads/railway and grounds of properties)	40.53 ha	28.08 ha	5.97
Total		**602.33 ha**	***470.25 ha***	**100**

Please note approximate lengths of linear features (e.g. walls, hedgerows, watercourses) are provided in km but are excluded from habitat area totals in table.

IEFS SCOPED IN/OUT OF THE ASSESSMENT (SUPERSEDES VOLUME 1, CHAPTER 7, SECTION 7.8.3)

177. Following the collation of the baseline data, including desk study and field survey data, and following the embedded mitigation measures described in Volume 1, Chapter 7, Section 7.10, several potential effects on ecological features can be scoped out of further assessment, as described in Table 3.2 below (supersedes Table 7.15, Volume 1, Chapter 7). This is based on professional judgement and experience from other relevant projects in the region.

178. The habitats present and their respective areas within the ecology study area are presented in Table 3.1. Estimates of direct and indirect habitat losses from the Proposed Development are presented in Table 3.3 (supersedes Table 7.20, Volume 1, Chapter 7). An estimated total of 58.5 ha will be directly lost due to the Proposed Development, approximately 12.44 % of the ecology study area. This includes *13.35 ha* under the permanent footprint of works and *45.12 ha* under the temporary footprint of works.

179. As listed in Table 3.2 the assessment of effects will be applied to IEFs that are known to be present within the site or surrounding area (as confirmed through survey results and consultations outlined above) and which could be susceptible to impacts from the Proposed Development.

Table 3.2: IEFs Scoped In or Out of the Assessment

IEF	Rationale for Scoping In/Out	Scoped In/Out
Designated Sites (Local Importance and Above)		
Barns Ness SSSI	The Barns Ness SSSI lies within the northern reaches of the site under the footprint of the Proposed development. Trenchless techniques (e.g. HDD) will be used for cable installation under the SSSI which will avoid direct habitat loss or disturbance. The footprint of the temporary works area for the cable pits is within 30 m of the SSSI. Mitigation is presented in Section 7.10 to protect habitats within the SSSI during works.	Out
Pease Bay Coast SSSI	The Pease Bay Coast SSSI is approximately 1.15 km south-east of the Proposed Development and designated for its maritime cliff habitat assemblage. Due to the separation distance and the nature of the designated interest, no pathway for significant effects on the SSSI has been identified.	Out
Lammermuir Deans SSSI	The Lammermuir Deans SSSI is approximately 3.3 km south-west of the Proposed Development designated for its upland mixed ash woodland, subalpine calcareous grassland and valley fen habitat assemblage. Due to the separation distance and the nature of the designated interest, no pathway for significant effects on the SSSI has been identified.	Out
Woodhall Dean SSSI	The Woodhall Dean SSSI is approximately 3.8 km south-west of the Proposed Development designated for its broadleaved, mixed and yew woodland; and upland oak woodland habitat assemblage. Due to the separation distance and the nature of the designated interest, no pathway for significant effects on the SSSI has been identified.	Out
Pease Bridge Bay SSSI	The Pease Bridge Bay SSSI is approximately 4.1 km south-east of the Proposed Development designated for its upland oak woodland and bryophyte assemblage. Due to the separation distance and the nature of the designated interest, no pathway for significant effects on the SSSI has been identified.	Out
Thornton Glen SWT	Thornton Glen SWT borders the site and forms part of the semi-natural, broadleaved woodland habitat that extends along the Thornton Burn and Braidwood Corridor. As part of the wider woodland lies within the footprint of the Proposed Development, there is potential for indirect effects such as habitat fragmentation to impact the integrity of the designated site.	In
Dryburn Valley LNCS	Dryburn Valley LNCS lies largely outwith the western reaches of the site. However, Skateraw Dean lies within the LNCS and extends under the footprint of the Proposed Development near the landfall.	In
Dunglass Burn LNCS	Dunglass Burn LNCS forms part of the semi-natural, broadleaved woodland habitat that extends along the Braidwood Burn corridor and lies under the footprint of the Proposed Development.	In
Thurston Burn Valley LNCS	Thurston Burn Valley LNCS forms part of the semi-natural, broadleaved woodland habitat that extends along the Thornton Burn corridor and overlaps with the Thornton Glen SWT.	Assessed as part of the Thornton Glen SWT.
Bilsdean Coast LNCS	Bilsdean Coast LNCS, which is designated for habitats, lies within 270 m of the site at its closest point and outwith 250 m of the Proposed Development. Due to the separation distance and the nature of the designated interest, no pathway for significant effects on the LNCS has been identified.	Out

IEF	Rationale for Scoping In/Out	Scoped In/Out
AWI Woodland	Two areas of AWI woodland lie within Thornton Glen SWT noted to be Ancient of Semi-Natural Origin 1a and Ancient of Semi-Natural Origin 2b. Both lie outwith the footprint of the Proposed Development but may be indirectly impacted through habitat fragmentation, therefore these areas of AWI are scoped in but assessed under Thornton Glen SWT.	Assessed as part of Thornton Glen SWT.
	A further area of AWI which comprises an area of semi-natural broadleaved woodland and coniferous woodland lies adjacent to the east edge of the Proposed Development at a proposed site access point. This lies 10 m outwith the Proposed Development footprint and is separated from the site by a road. Therefore, significant effects are very unlikely.	Out
	All other areas of AWI lie outwith Proposed Development, with the closest woodland located 425 m south-west of the Proposed Development footprint. These woodlands are also scoped out of the assessment.	Out
Habitats (Local Importance and Above)		
Broadleaved, semi-natural woodland	The semi-natural broadleaved woodland that extends along the Thornton Burn and Braidwood Burn corridor lies under the footprint of the Proposed Development at the proposed cable crossing (e.g. cable bridge) location. This area of woodland forms part of the Dunglass LNCS.	Assessed as part of Dunglass Burn LNCS
Mixed, semi-natural woodland	The woodland is approximately 370m at its closest point from the footprint of the Proposed Development. The habitat will not be directly or indirectly impacted by the Proposed Development and is therefore scoped out of the assessment.	Out
Scrub (Dense/Continuous and scattered)	Approximately *16.38 ha* of this habitat lies within the ecology study area, of which approximately *0.36 ha or 2.19 %* of the total extent of this habitat within the ecology study area will be lost.	In
Running water	The Proposed Development includes cable bridge crossings over the Braidwood Burn and the Skateraw Dean.	In
Intertidal mud/sand	Approximately 4.16 ha of this habitat lies at the landfall location within Barns Ness SSSI. Trenchless techniques (e.g. HDD) will be used for cable installation under the SSSI which will avoid direct habitat loss or disturbance. This habitat is scoped out of the assessment.	Out
Intertidal boulders/rocks	Approximately 21.06 ha of this habitat lies within the ecology study area at the landfall location within Barns Ness SSSI. Trenchless techniques (e.g. HDD) will be used for cable installation under the SSSI which will avoid direct habitat loss or disturbance. This habitat is scoped out of the assessment.	Out (Assessed as part of Barns Ness SSSI)
Shingle above high tide mark	Approximately 0.23 ha of this habitat lies within the ecology study area within the Barns Ness SSSI and is a designated feature of the SSSI. Trenchless techniques (e.g. HDD) will be used for cable installation under the SSSI which will avoid direct habitat loss or disturbance. This habitat is scoped out of the assessment.	Out (Assessed as part of Barns Ness SSSI)
Coastal grassland	Approximately 3.29 ha of this habitat lies within the ecology study area within the Barns Ness SSSI. Trenchless techniques (e.g. HDD) will be used for cable installation under the SSSI which will avoid direct habitat loss or disturbance. This habitat is scoped out of the assessment.	Out (Assessed as part of Barns Ness SSSI)
Intact and defunct species-poor hedgerow	Approximately *7.36 km* of species-poor hedgerow lies within the ecology study area, of this approximately *1.1 km or 14.94%* lies under the temporary and permanent footprint of works and will be lost as a result of the Proposed Development.	In
Otter	Otter have been recorded within the ecology study area including three potential holts which lie over 30 m but within 200 m of the Proposed Development. Further camera monitoring has found no evidence that these potential holt features are in use by otter. All active resting sites identified during baseline surveys completed to date lie outwith 30 m of the Proposed Development. Due to their legal protection, mitigation is presented in Section 7.10 to reduce the risk to individual otters and minimise disruption to foraging and commuting behaviour during construction but significant effects on the local otter population are very unlikely.	Out

IEF	Rationale for Scoping In/Out	Scoped In/Out
Badger	Badger have been recorded within the ecology study area but no setts have been identified within 30 m of the Proposed Development. Due to their legal protection mitigation is presented in Section 7.10 to reduce the risk to individual badgers moving within works areas, but significant effects on the local badger population are very unlikely.	Out
Bats	Potential roost features were identified within the ecology study area; however, the final design has been routed to avoid these potential roost features, all of which are located outwith 30 m of the Proposed Development. Due to their legal protection, mitigation is presented in Section 7.10 to reduce the risk to individual bats and minimise disruption to foraging and commuting behaviour during construction but significant effects on local bat populations are very unlikely.	Out
Great crested newt	A great crested newt breeding pond is located 450 m south-west of the Proposed Development footprint at its closest point. Approximately 1.8 ha of land, within the 500 m buffer of the pond, lies under the footprint of temporary and permanent works. The habitat under the footprint of works is improved grassland which is suboptimal for newts. In consultation with NatureScot, it was agreed that, as it was unlikely that great crested newt would be present within the footprint of the works, a protected species licence was not required. A Species Protection Plan (SPP) has been produced detailing measures to minimise the impact of the Proposed Development on individual newts, and contingency measures should newts be encountered. The SPP is provided in Volume 4, Appendix 7.4.	Out
Reptiles	Limited suitable terrestrial habitat for reptiles is present within the footprint of works and significant effects on the local reptile population are unlikely.	Out

ASSESSMENT OF SIGNIFICANCE (SUPERSEDES VOLUME 1, CHAPTER 7, SECTION 7.11)

180. The potential impacts arising from the construction phase of the Proposed Development on the scoped-in IEF and the likely significance of the effects of the Proposed Development on ecological receptors caused by each identified impact is given below.

181. Impacts on designated sites and habitats may include direct losses e.g. permanent land-take for the onshore substation and other infrastructure, SuDS wetland creation, temporary land-take for access tracks, laydown areas and construction site compounds. Negative impacts on habitats can also be indirect e.g., through habitat fragmentation. It is estimated that of the total habitat loss under the temporary and permanent footprint of works (c. 58.5 ha), *77.2%* of this will be temporary such as access tracks and site compounds and will be restored at the end of the construction period.

182. All habitat loss calculations are presented in Table 3.3 (supersedes Table 7.20, Volume 1, Chapter 7), **with habitat IEFs brought forward for assessment shown in bold**[2]. As in Table 3.1, the ecology study area is defined as the potential works areas and a 250 m buffer. Note that the figures in the tables have been rounded to the nearest two digits but calculations have been completed using the unrounded figures.

[2] Habitat IEFs not brought forward for assessment detailed in Table 3.2.

Table 3.3: Estimated Loss of Habitat from Proposed Development Infrastructure

Phase 1 Habitat	Extent in Ecology Study Area	Direct Habitat Loss Permanent Works Areas (ha)	Direct Habitat Loss Temporary Works (ha)	Total Direct Permanent and Temporary Habitat Loss (% of Total Extent)
Broadleaved, semi-natural woodland	**11.19**	**0.00**	**0.00**	**0.93**
Broadleaved, plantation woodland	1.60	0.00	0.01	0.63
Coniferous, semi-natural woodland	0.11	0.00	0.00	0.00
Coniferous, plantation woodland	2.67	0.00	0.22	8.24
Mixed, semi-natural woodland	2.83	0.00	0.00	0.00
Mixed, plantation woodland	0.70	*0.02*	*0.09*	15.71
Dense/Continuous Scrub	***13.14***	***0.04***	***0.19***	**0.82**
Scattered scrub	***3.24***	**0.00**	***0.13***	**3.73**
Semi-improved neutral grassland	*39.56*	*0.04*	*7.19*	17.92
Improved grassland	*208.03*	*6.55*	*19.29*	12.41
Bracken (continuous)	*0.04*	*0.00*	*0.00*	*0.00*
Tall ruderal	0.24	0.00	0.00	0.00
Standing water	0.09	0.00	0.00	0.00
Running water (km)	***10.48***	**0.00**	***0.32***	***3.05***
Intertidal mud/sand	4.16	0.00	0.00	0.00
Intertidal boulders/rocks	21.06	0.00	0.00	0.00
Shingle above high tide mark	0.23	0.00	0.00	0.00
Coastal grassland	*3.29*	0.00	0.00	0.00
Arable	126.23	6.07	17.31	18.52
Species-poor hedgerow (intact and defunct) (km)	***7.36***	***0.46***	***0.59***	***14.16***
Wall (km)	7.79	0.00	*0.44*	*5.65*
Buildings	1.87	0.00	0.00	0.00
Bare ground	1.88	0.00	0.00	0.00
Other (incl. roads/railway and grounds of properties)	28.08	0.64	0.69	*4.72*
Total	***470.25* ha**	**13.35 ha**	**45.12 ha**	
Please note approximate lengths of linear features (e.g., walls, hedgerows, watercourses) are provided in km but are excluded from habitat area totals in table.				

DUNGLASS BURN LNCS

Nature Conservation Value and Conservation Status

183. Part of the Dunglass Burn LNCS lies under the footprint of the Proposed Development as shown on Volume 2, Figure 7.2 and Figure A1. The site is designated for its broadleaved, semi-natural woodland habitat. Approximately *c.11.19 ha* of broadleaved semi-natural woodland extends along the Thornton Burn and Braidwood Burn corridor within the ecology study area and is comprised of native woodland which is semi-natural in its origins. Native woodlands are defined as those whose tree species arrived naturally in Scotland without

any apparent direct human assistance. Most of native tree and shrub species colonised Scotland after the last Ice Age, which ended roughly 9,000 years ago. The cover of native woodlands in Scotland has been calculated to be 311,153 ha, of which 23,189 ha comprises lowland mixed deciduous woodland (Patterson *et al*., 2014), which is the category of the best fit with the broadleaved semi-natural woodland at this location.

184. This woodland is connected to two areas of AWI which lie within Thornton Glen SWT. These AWI stands are defined as Ancient (of semi-natural origin) 1a and 2b. This indicates that part of this woodland corridor has been continuously wooded since 1750 (1a) and 1860 (2b).

Construction Phase

Impact

185. Impacts on the Dunglass Burn LNCS will include direct loss of habitats within the footprint of temporary and permanent works to install the cable bridge over the Braidwood Burn, as well as temporary disturbance of vegetation adjacent to works areas.

Magnitude of Impact

186. As shown on Volume 2, Figure 7.3, Figure A7.4 and Figure A1, a cable bridge crossing is proposed across the Braidwood Burn that passes through the Dunglass Burn LNCS for approximately *40 m*. The footprint of the temporary and permanent works areas for the cable bridge within Dunglass LNCS is approximately *675 m²*. The route has been microsited to minimise tree felling requirements and at the location of the cable bridge there is a natural gap in the broadleaved semi-natural woodland corridor. The proposed cable bridge is 40 m in length and 10 m in width therefore the footprint of the permanent works is estimated to be 400 m². *Habitat within the footprint of the permanent works is predominantly semi-improved grassland and dense scrub*. The canopy is comprised of scattered semi-mature, multi-stem, ash trees with no mature tree specimens recorded within the footprint of the permanent or temporary works. Assuming the works could affect a zone of up to 15 m on either side of the footprint of works, up to *2,000 m² of Dunglass Burn LNCS* may be susceptible to temporary disturbance, including *140 m²* of broadleaved, semi-natural woodland, this is approximately *0.13%* of the total extent of this habitat within the ecology study area.

187. The impact is predicted to be of local spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low.

Sensitivity of the Receptor

188. The Dunglass Burn LNCS is deemed to be of low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore considered to be low.

Significance of the Effect

189. Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **negligible to minor** adverse and not significant under the EIA Regulations.

Secondary Mitigation and Residual Effect

190. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

Nature Conservation Value and Conservation Status

191. Thornton Glen SWT is approximately 6.50 ha in area and lies within 45 m of the footprint of the Proposed Development at its closest point as shown on Volume 2, Figure 7.3. The site is designated for its broadleaved, semi-natural woodland habitat. The SWT includes two areas of AWI. These AWI stands are defined as Ancient (of semi-natural origin) 1a and 2b. This indicates that this area of the woodland corridor has been continuously wooded since 1750 (1a) and 1860 (2b). The Thurston Burn Valley LNCS overlaps the SWT.

Construction Phase

Impact

192. As the Thornton Glen SWT lies over 15 m from the footprint of the Proposed Development no direct impacts are anticipated (e.g. habitat loss). The Proposed Development bisects the wider Thornton Burn and Braidwood Burn corridor at the location of a proposed cable bridge crossing which is to be installed over the Braidwood Burn (as shown on Volume 2, Figure 7.3, Figure A7.4 and Figure A1). These works may impact up to *2000 m²* of the riparian woodland corridor as discussed under Dunglass Burn LNCS. As these works have been micro-sited to pass through a natural gap in the woodland corridor it is anticipated that loss of tree canopy will be minimal and therefore the works are unlikely to result in the fragmentation of the woodland corridor.

Magnitude of Impact

193. The cable bridge crossing is proposed across Braidwood Burn that passes through an area of broadleaved, semi-natural woodland that connects to Thornton Glen SWT to the east. The footprint of the works areas for the cable bridge crossing within the Dunglass LNCS is approximately *675 m²* and the route has been micro-sited to minimise tree felling requirements. At the location of the cable bridge crossing there is a natural gap in woodland and the canopy is comprised of a scattered semi-mature, multi-stem, ash trees with no mature tree specimens recorded within the footprint of the works. The cable bridge crossing is 40 m in length and 10 m in width therefore the footprint of the permanent works is estimated to be 400 m². The habitat under the permanent footprint of works is predominantly semi-improved neutral grassland and dense scrub. Assuming this could affect a zone of up to 15 m on either side of the footprint of works, up to *2,000 m² of the Dunglass Burn LNCS* may be susceptible to temporary disturbance, including *140 m²* of broadleaved, semi-natural woodland, this is approximately *0.13%* of the total extent of this habitat within the ecology study area.

194. The impact is predicted to be of local spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor indirectly. The magnitude is therefore considered to be low.

Sensitivity of the Receptor

195. The Thornton Glen SWT is deemed to be of medium vulnerability, low recoverability and local value. The sensitivity of the receptor is therefore, considered to be low.

Significance of the Effect

196. Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **negligible to minor** adverse and not significant under the EIA Regulations.

Secondary Mitigation and Residual Effect

197. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

DRYBURN VALLEY LNCS

Nature Conservation Value and Conservation Status

198. The Dryburn Valley LNCS lies under the footprint of the Proposed Development where a proposed cable bridge crosses the Skateraw Dean near the landfall, as shown on Volume 2, Figure 7.3. The features that this site is designated for include woodland listed within the Native Woodland Survey Scotland (NWSS), AWI woodland, and grassland. Notable species are ancient woodland flora. The site extends over an area of approximately 115 ha (or 1,150,000 m^2), of which 1,650 m^2 lies under the footprint of the Proposed Development (or 0.14 % of the total area).

199. The habitat present within the footprint of the Proposed Development is mixed plantation woodland, with sycamore, Scots pine, silver birch, beech, elder and ash recorded in the stand. This habitat type is not considered to be a designated feature of the LNCS.

Construction phase

Impact

200. Impacts on the woodland habitat will include a direct and permanent loss to the cable bridge crossing over the Skateraw Dean as well as temporary disturbance of vegetation adjacent to works areas.

Magnitude of Impact

201. As shown on Figure A7.4 and Figure A2 a cable bridge crossing is proposed across Skateraw Dean. The footprint of the temporary and permanent works area for the cable bridge within the Dryburn Valley LNCS is approximately 25 m long, with an area of approximately 1,650 m^2. The route will use an existing culvert which will be widened from 18 m to 30 m to accommodate the cables. This will require felling works either side of the existing culvert. Assuming this could affect a zone of up to 15 m on either side of the footprint of works, up to *2,600 m^2* of the LNCS may be susceptible to temporary disturbance which represents *0.23%* of the total area of the LNCS. The permanent footprint of the cable bridge crossing is *350 m^2* which represents *0.03%* of the total area of the LNCS.

202. The impact is predicted to be of local spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low.

Sensitivity of the Receptor

203. The Dryburn Valley LNCS is deemed to be of medium vulnerability, medium recoverability and local value. The sensitivity of the receptors is therefore, considered to be low.

Significance of the Effect

204. Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **negligible to minor** adverse and not significant under the EIA Regulations.

Secondary Mitigation and Residual Effect

205. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

DENSE AND SCATTERED SCRUB

Nature Conservation Value and Conservation Status

206. Dense and scattered scrub is a priority habitat on the East Lothian LBAP. Within the ecology study area, scrub vegetation is mostly dense and scattered gorse with some blackthorn and hawthorn recorded along the Braidwood Burn corridor. Approximately *16.38 ha* of this habitat was recorded within the Proposed Development.

Construction phase

Impact

207. Impacts on the scrub habitat will include a direct loss where it lies under the footprint of temporary *and permanent works* as well as temporary disturbance of vegetation adjacent to works areas.

Magnitude of Impact

208. As shown on Figure A7.4 and Figure A1 scrub habitat lies under the footprint of a proposed temporary access road that runs parallel to the northern edge of Braidwood Burn woodland corridor and also under the temporary and permanent works area for the proposed cable bridge crossing over the Braidwood Burn. The total footprint for both works is *0.37 ha* which represents *2.26 %* of the total area of this habitat recorded within the ecology study area.

209. The impact is predicted to be of local spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low.

Sensitivity of the Receptor

210. The scrub habitat is deemed to be of low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore considered to be low.

Significance of the Effect

211. Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **negligible to minor** adverse and not significant under the EIA Regulations.

Secondary Mitigation and Residual Effect

212. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

SPECIES-POOR HEDGEROW

Nature Conservation Value and Conservation Status

213. Hedgerow is listed under the East Lothian LBAP as a Priority Habitat. Approximately *7.36 km* of species-poor hedgerow lies within the ecology study area.

Construction Phase

Impact

214. Impacts on species-poor hedgerows will include a direct and permanent loss where it lies under the footprint of the permanent works area as well as temporary disturbance of vegetation adjacent to works areas.

Magnitude of Impact

215. As shown on Figure A7.4 species-poor, intact and defunct hedgerow lies under both temporary and permanent work areas.

Temporary works area: A total of *c.450 m* of species-poor hedgerow lies under the footprint of temporary works areas and *140 m* of species-poor intact hedgerow lies immediately adjacent to temporary works areas. Assuming works may impact a zone of up to 10 m either side of a hedgerow, approximately *600 m* of hedgerow may be impacted by the temporary works.

Permanent works area: Approximately *460 m* of species-poor hedgerow lies under the proposed onshore substation and adjacent access track. Assuming works may impact a zone of up to 10 m either side of a hedgerow, it is estimated that approximately *500 m* of hedgerow may be impacted by the permanent works.

The total area impacted by temporary and permanent works (*c. 1.1 km*) is approximately *14.94%* of the total area of hedgerow habitat recorded within the ecology study area.

216. The planting scheme for the Proposed Development will include replacement hedgerow planting within the temporary works areas, reducing the loss of hedgerows in the long-term to *6.79 %* of the habitat recorded within the ecology study area.

217. The impact is predicted to be of local spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low.

Sensitivity of the Receptor

218. The species-poor hedgerow habitat is deemed to be of low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore considered to be low.

Significance of the Effect

219. Given the above consideration of sensitivity and magnitude, the significance of effect is considered to be **negligible to minor** adverse and not significant under the EIA Regulations.

Secondary Mitigation and Residual Effect

220. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

RUNNING WATER HABITAT

Nature Conservation Value and Conservation Status

221. The Thornton Burn, Thurston Mains, Ogle Burn, Braidwood Burn, Skateraw Dean, Dry Burn and an unnamed watercourse run through the ecology study area. Rivers are a Priority Habitat listed on the SBL and Rivers and Burns are a priority habitat under the East Lothian LBAP. In total approximately 10.48 km of watercourses run through the ecology study area. The Proposed Development crosses the Skateraw Dean at the north and the Braidwood Burn at the south, with cable crossings proposed at each location. It is proposed to temporarily divert, or overpump, the unnamed watercourse to allow for open cut trenching technique and burying of this section of cable. The remaining watercourses lie outwith the footprint of the Proposed Development, however the Braidwood Burn flows into the Thurston Mains and Thornton Burn and Skateraw Dean flows into Dry Burn therefore these watercourses may be indirectly impacted.

Construction phase

Impact

222. Impacts on the running water habitat will include temporary disturbance to the riparian habitat of Skateraw Dean and Braidwood Burn at the proposed cable bridge crossings. The unnamed watercourse will be temporarily diverted.

Magnitude of Impact

223. As shown on Figure A7.4, Figure A1 and Figure A2, cable bridge crossings are proposed across Skateraw Dean and Braidwood Burn. The width of the temporary works areas for the cable bridge crossing at Skateraw Dean is approximately 70 m and works are to include the widening of an existing culvert to cross the burn. At the Braidwood Burn, where the proposed cable bridge crossing is to be constructed, the width of the temporary works area is 45 m. Assuming the works may impact running water habitat 30 m either side of the footprint of works at each site, a combined length of up to 235 m of this habitat may be susceptible to temporary disturbance. This represents *2.24%* of the undesignated running water habitat within the ecology study area.

224. The cable route is then proposed to be installed using open cut trenching underneath the unnamed watercourse to the south of the A1, directly north of the onshore substation, as shown on Figure A7.4. The width of the temporary works area at this location is 100 m and the footprint of the cabling is approximately 30 m. As a worst-case scenario it is assumed that 100 m of running water habitat may be impacted at this location, though it is likely to be less as the width of the cable footprint is approximately 30 m. This represents *0.95%* of the undesignated running water habitat within the ecology study area.

225. The impact is predicted to be of local spatial extent, short-term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor indirectly (Skateraw Dean and Braid Burn) and directly (unnamed watercourse). The magnitude is therefore considered to be negligible.

Sensitivity of the Receptor

226. The running water habitat is deemed to be of medium vulnerability, medium recoverability and local value. The sensitivity of the receptors is therefore, considered to be low.

Significance of the Effect

227. Given the above consideration of sensitivity and magnitude, the effect significance is considered to be **negligible to minor** adverse and not significant under the EIA Regulations.

Secondary Mitigation and Residual Effect

228. No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

3.3. BIODIVERSITY ENHANCEMENT / BIODIVERSITY NET GAIN

229. Chapter 7: Ecology of the EIA Report includes details of Habitat Loss and Mitigation (Table 7.20) that are likely to result from the Proposed Development based on the current indicative level of design. Included within Chapter 6: Landscape and Visual Impact of the EIA Report are outline landscape mitigation measures focussed on the substation where the majority of permanent habitat loss would occur. The outline landscape mitigation which includes habitat creation is set out in Figure 6.12 of Chapter 6 of the EIA Report. In order to address consultee comments regarding the scale of the landscaping and enhancement opportunities the applicant has undertaken an Initial Biodiversity Net Gain Assessment based on the permanent habitat loss set out in the EIA and as amended through this Addendum (as noted in Section 3.2 and in Appendix 1). Based on a worst-case scenario

this indicated that further habitat creation beyond that indicated in Figure 6.12 of Chapter 6 of the EIA Report would be required to deliver a net gain in biodiversity.

230. In order to provide greater confidence that the Proposed Development can deliver biodiversity mitigation and enhancement for habitats which are permanently lost to development or for areas of temporary loss which require time to reinstate the Applicant has clarified that further land would be available for habitat enhancement and has updated Figure 6.12 of the EIA Report (as noted in Section 3.4 of Appendix 1) and as appended as Figure A6.12.

231. The assessment, when considering the additional area available for potential habitat creation indicates that the use of around 60% of that additional available area for woodland and grassland creation would result in a 10% net gain in biodiversity value. For completeness, the assessment and a more detailed explanation of the assessment are appended to this Addendum as Appendix 1. Full details of habitat restoration (for areas of temporary loss) and of new habitat creation will be provided at a detailed design stage for agreement with ELC. The assessment will be updated on the basis of that detailed design in order to demonstrate a significant enhancement in biodiversity value in line with policy requirements.

3.4. LANDSCAPE MITIGATION PLAN

232. The Initial Biodiversity Net Gain Assessment undertaken for the project (refer to Appendix 1 of this Addendum) confirms that additional habitat enhancement is likely to be required in order to meet the policy expectations set out in NPF4. As noted above additional land subject to temporary works as part of the substation development has been identified that could be utilised for additional habitat enhancement that would expand upon and complement the existing outline enhancement and landscaping proposals set out in Figure 6.12 of the EIA Report. The revised Figure A6.12 provided with this Addendum supersedes Figure 6.12 of the EIA Report. The landscape and enhancement proposals remain at an outline stage and will be refined through further detailed design following the granting of planning permission in principle.

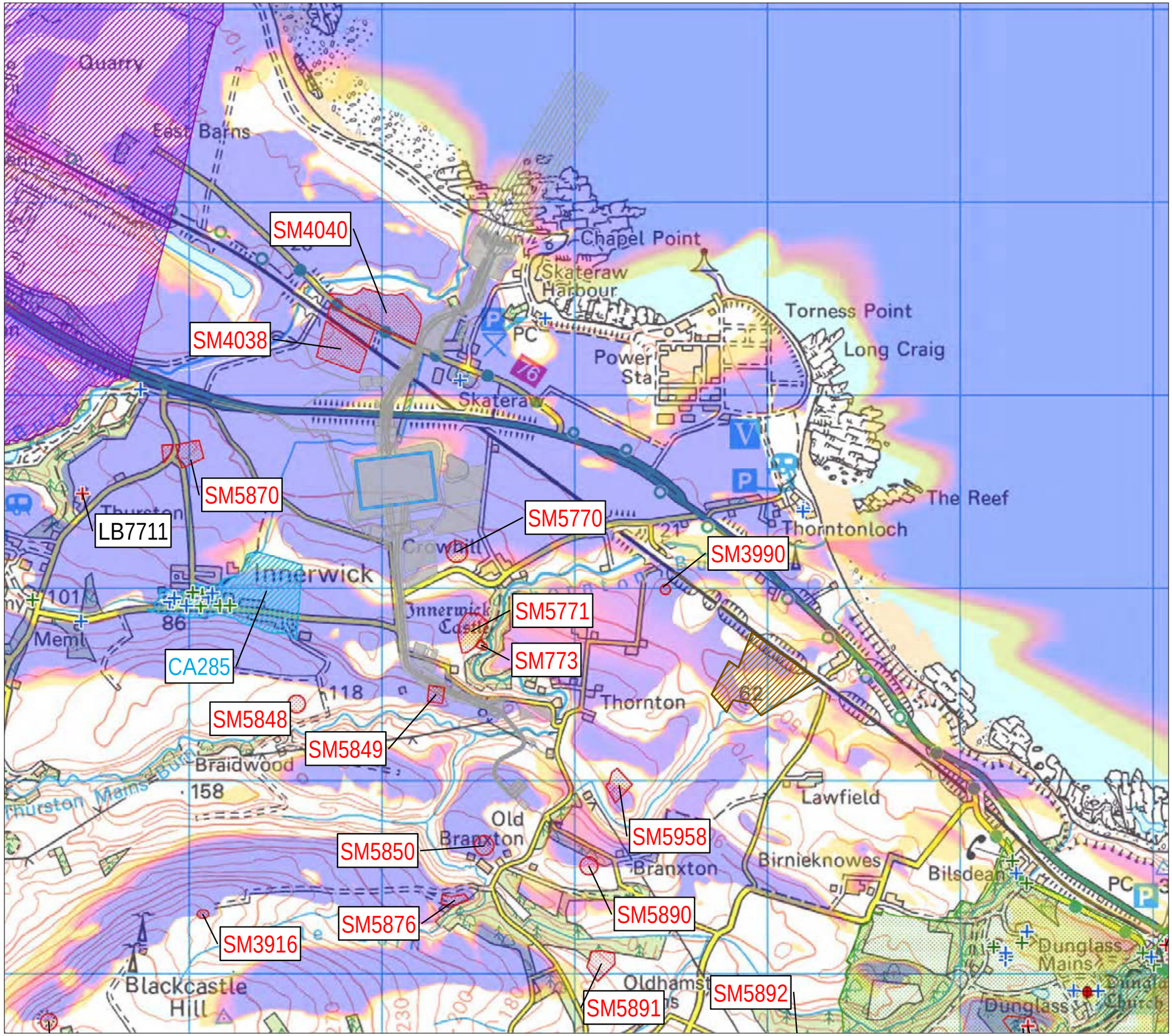
4. REFERENCES

EastCoastGridServices Ltd (2022), *Branxton Energy Storage Facility Planning Statement.*

Crystal Rig Wind Farm (Phase IV) (2018), *CRIV EIAR Appendix 7 – Ornithology.*

FIGURES

FIGURE 1-6-1 CUMULATIVE EFFECTS ASSESSMENT ADDENDUM: CULTURAL HERITAGE



File ref: B:\SECA_4538_Graphics\SECA_EIAR_GIS\SECA_Figure1-6-1_CumulativeAddendum_v1.mxd

Legend

- Proposed Development Infrastructure
- Onshore Substation
- Branxton BESS Site boundary
- Property in Care
- Scheduled Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Inventory Garden and Designed Landscape
- Inventory Battlefield
- Conservation Area

Bare Ground Zone of Theoretical Visibility of the Proposed Development

- High visibility
- Low visibility

0 0.25 0.5 1 km

N

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Project Name

BERWICK BANK WIND FARM

Drawing Title

Cumulative Effects Assessment Addendum: Cultural Heritage

Rev	Date	Details	Status	Drwn	Rqst	Chkd	Appd
R1	15/06/23	First Issue	-	LG	GM	GM	GM

Drawing Number

Figure 1.6.1

Scale	Plot Size	Datum	Projection
1:20,000	A3	OSGB36	BNG

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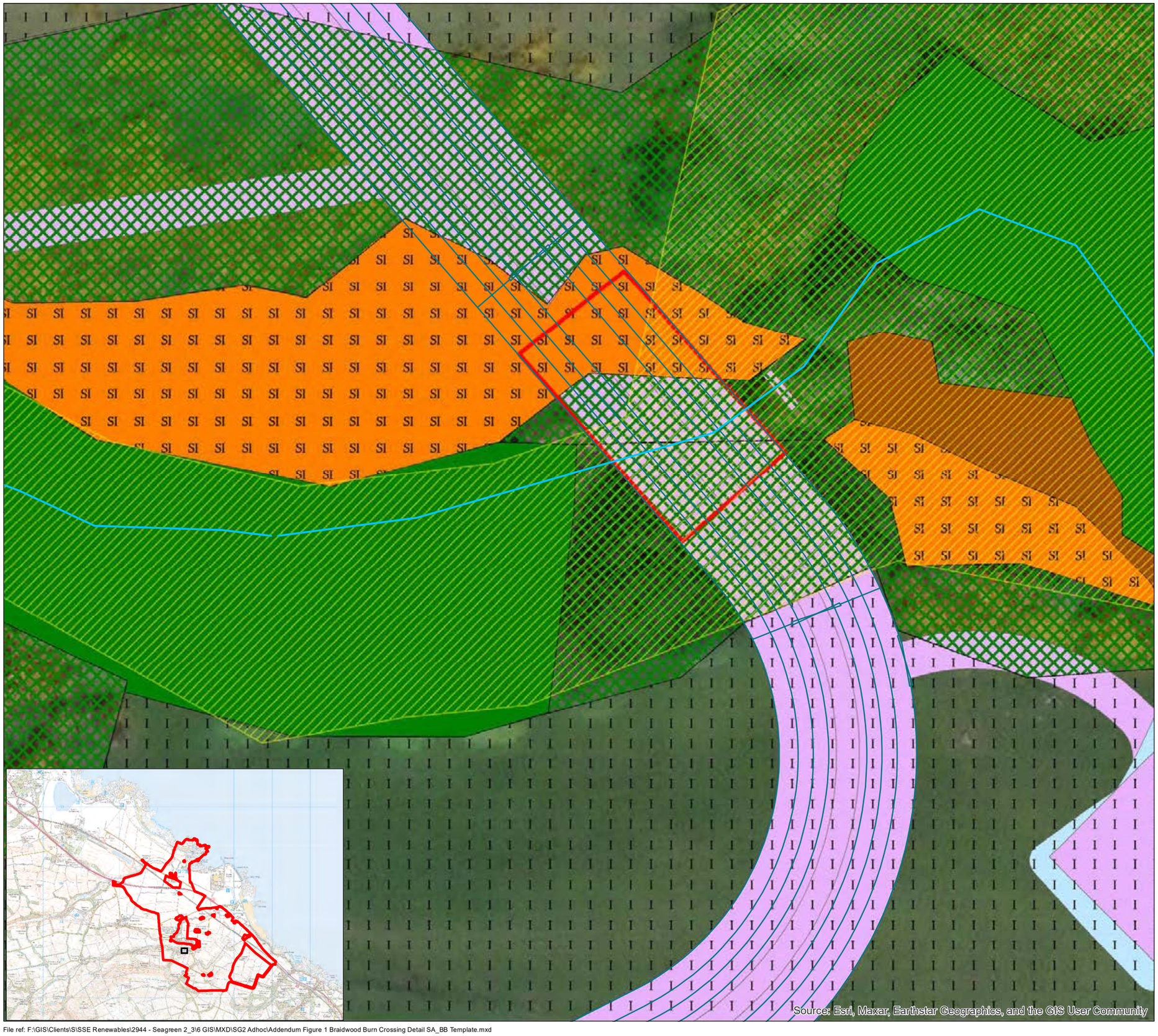
FIGURE A1: PHASE 1 HABITATS BRAIDWOOD BURN CROSSING



Legend

Habitat

- A1.1.1
- A1.1.2
- A1.2.1
- A1.2.2
- A1.3.1
- A1.3.2
- A2.1
- A2.2
- B2.2
- B4
- C1.1
- C3.1
- G1
- H1.1
- H1.3
- H3
- H8.4
- J1.1
- J3.6
- J4
- J5
- Running water (G2)
- Braidwood Burn Crossing - Permanent Works

Infrastructure

- Permanent
- Temporary
- Dunglass Burn LNCS

0 5 10 20 30 Meters

N

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Project Name

BERWICK BANK WIND FARM

Drawing Title

Phase 1 Habitats Braidwood Burn Crossing

Rev	Date	Details	Status	Drwn	Rqst	Chkd	Appd
R1	01/04/2022	First Issue	-	JD	-	ST	-
R2	-	-	-	-	-	-	-
R3	-	-	-	-	-	-	-
R4	-	-	-	-	-	-	-

Drawing Number

Addendum Figure A1

Scale	Plot Size	Datum	Projection
1:500	A3	OSGB36	BNG

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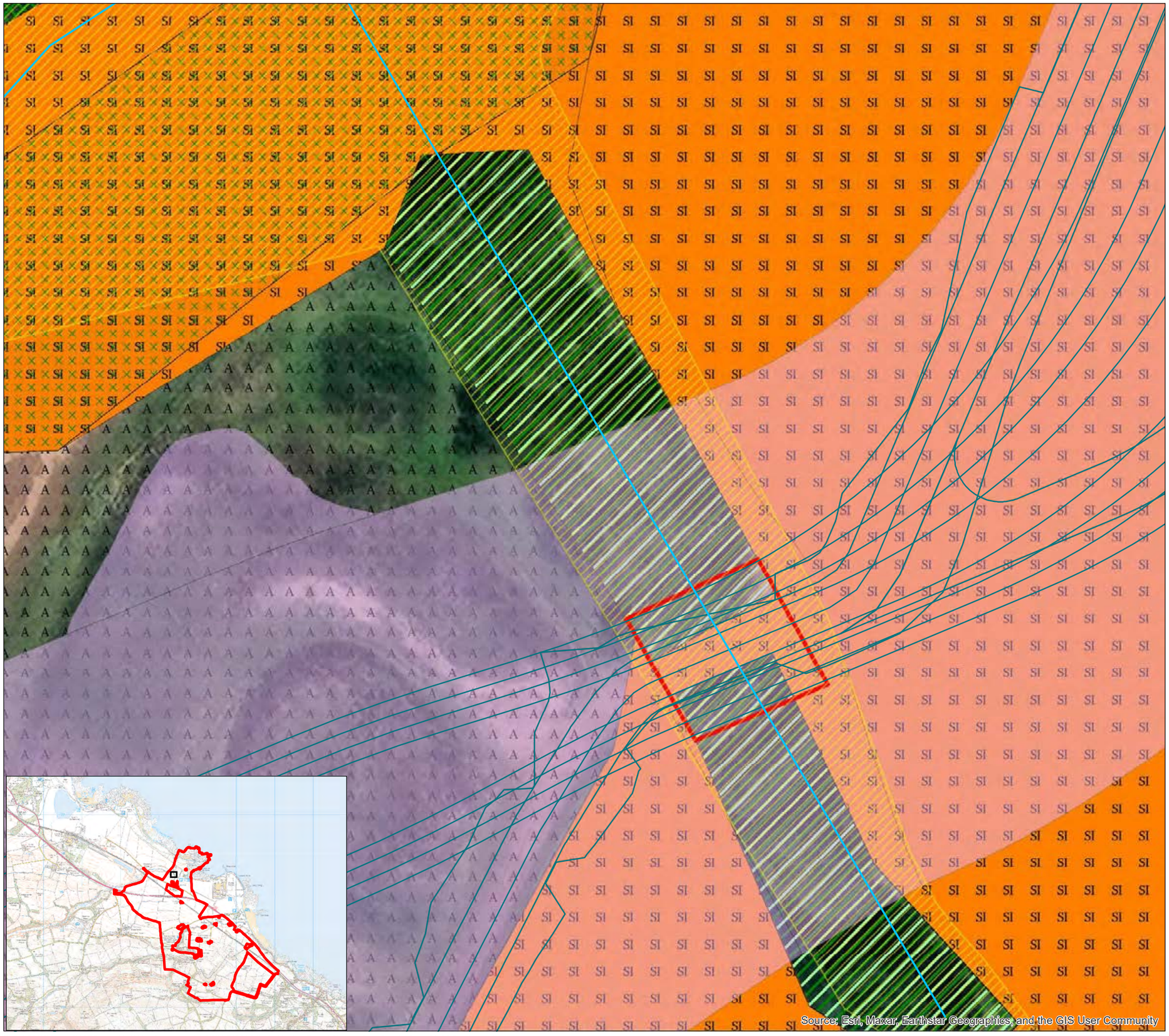
File ref: F:\GIS\Clients\S\SSE Renewables\2944 - Seagreen 2_3\6 GIS\MXD\SG2 Adhoc\Addendum Figure 1 Braidwood Burn Crossing Detail SA_BB Template.mxd

FIGURE A2: PHASE 1 HABITATS SKATERAW DEAN CROSSING



Legend

Habitat

- A1.1.1
- A1.1.2
- A1.2.1
- A1.2.2
- A1.3.1
- A1.3.2
- A2.1
- A2.2
- B2.2
- B4
- C1.1
- C3.1
- G1
- H1.1
- H1.3
- H3
- H8.4
- J1.1
- J3.6
- J4
- J5
- Running water (G2)

Infrastructure

- Permanent
- Temporary
- Skateraw Dean Crossing Permanent Works
- LNCS

0 5 10 20 30 Meters

N

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Project Name

BERWICK BANK WIND FARM

Drawing Title

Phase 1 Habitats Skateraw Dean Crossing

Rev	Date	Details	Status	Drwn	Rqst	Chkd	Appd
R1	01/04/2022	First Issue	-	JD	-	ST	-
R2	-	-	-	-	-	-	-
R3	-	-	-	-	-	-	-
R4	-	-	-	-	-	-	-

Drawing Number

Addendum Figure A2

Scale	Plot Size	Datum	Projection
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File ref: F:\GIS\Clients\S\SSE Renewables\2944 - Seagreen 2_3\6 GIS\MXD\SG2 Adhoc\Addendum Figure 2 Skateraw Dean Crossing Detail SA_BB Template.mxd

FIGURE A6.12: OUTINE LANDSCAPE MITIGATION PRINCIPLES

675000

Extend existing A1 screen planting to west

Infill gap in existing coniferous screen planting to margins of A1

Screen views from A1 southbound

Wet meadow seed mix to pond margins

Proposed planting in this area to be a mix of locally appropriate species rich coastal grassland/meadow wildflower mix and mixed native species woodland.

Proposed boundary hedgerow to increase interconnectivity with existing hedgerows providing ecological benefit

Screen views from A1 northbound and ECML

Understorey of native species woodland to be sown with a locally appropriate meadow wildflower mix or species rich coastal grassland

Proposed 20m deep mixed native species woodland - tree and shrub species (e.g. alder, birch, pine, oak, field maple)

Screen views from Innerwick

Native species hedge reinstatement of removed sections (e.g. hawthorn)

Locally appropriate species rich coastal grassland/meadow wildflower mix to substation margins

NOTES

Woodland mostly comprises native species with a mix of faster growing 'nurse' species and slower growing 'core' species. Nurse species such as alder, birch and pine would grow quicker so that after 15 years they woudl be approximately 7-10m in height. They would provide shelter to bring on core species, such as oak and field maple.

All disturbed hedgerows outside the substation platform area and access roads will be reinstated following construction.

Additional Mitigation Planting - Final details of the planting, landscaping and SUDS to be finalised during detailed design and agreed as part of the discharge of consent conditions.

Legend

- Electricity Transmission Buildings (indicative)
- Site Boundary
- SuDS Pond
- Hedgerow Mitigation Planting
- Woodland Mitigation Planting
- Wet Meadow Seed Mix to SuDs Pond Planting
- Meadow Wildflower Mix Planting
- Additional Mitigation Planting
- Landfall - Access Road
- Temporary Access Road
- Permanent Access Road
- Proposed Haul Road
- Route W Cable Corridor

N

0 50 100 200 300 Meters

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Project Name

BERWICK BANK WIND FARM

Drawing Title

FIGURE A6.12 OUTLINE LANDSCAPE MITIGATION PRINCIPLES

Rev	Date	Details	Status	Drwn	Rqst	Chkd	Appd
R1	11/03/2022	First Issue	-	SH	SC	LT	-
R2	17/08/2022	Second Issue	-	SH	SC	LT	-
R3	15/03/2023	Third Issue	-	SH	SC	LT	-
R4	18/07/2023	Fourth Issue	-	SH	SC	LT	-

Drawing Number

LF000010&11-DEV-MAP-212

Scale	Plot Size	Datum	Projection
1:5,000	A3	OSGB36	BNG

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sse Renewables

File ref: P:\2019\191448_SeaG2&3\GIS\191448_SeaG\ADDENDUM\191448_BB_EADD_FigA6-12_Mitigation.mxd

FIGURE A6.13: CUMULATIVE DEVELOPMENTS

370000

375000

675000

670000

DUNBAR

Spott Estate

Woodhall Farm

Crystal Rig III

Aikengall 1

Neuk Farm

1

2

3

4

5

6

7

8

Legend

- Electricity Transmission Buildings (indicative)
- Site Boundary
- Route W Cable Corridor
- 1km Radii
- 5km Radius Electricity Transmission Buildings (indicative) Study Area
- 1km Radius Cable Corridor Study Area

Cumulative Wind Farm Status

- Operational
- Scoping

Other Cumulative Developments

- Operational
  1. Neart Na Gaoithe Cable Route
  2. Dunbar Cement Plant & Quarry
  3. Dunbar Energy Recovery Facility
  4. Dunbar Landfill
  5. Torness Nuclear Power Station
- Application
  6. Eastern Link - 22/00852/PPM
  7. Branxton Substation - 21/01569/PM and 22/00002/SGC
  8. Branxton Energy Storage Facility

0 0.5 1 2 3 km

N

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Project Name

BERWICK BANK WIND FARM

Drawing Title

EIAR ADDENDUM FIGURE A6.13 CUMULATIVE DEVELOPMENTS

Rev	Date	Details	Status	Drwn	Rqst	Chkd	Appd
R1	16/06/2023	First Issue	-	SH	SC	LT	-
R2	-	-	-	-	-	-	-
R3	-	-	-	-	-	-	-
R4	-	-	-	-	-	-	-

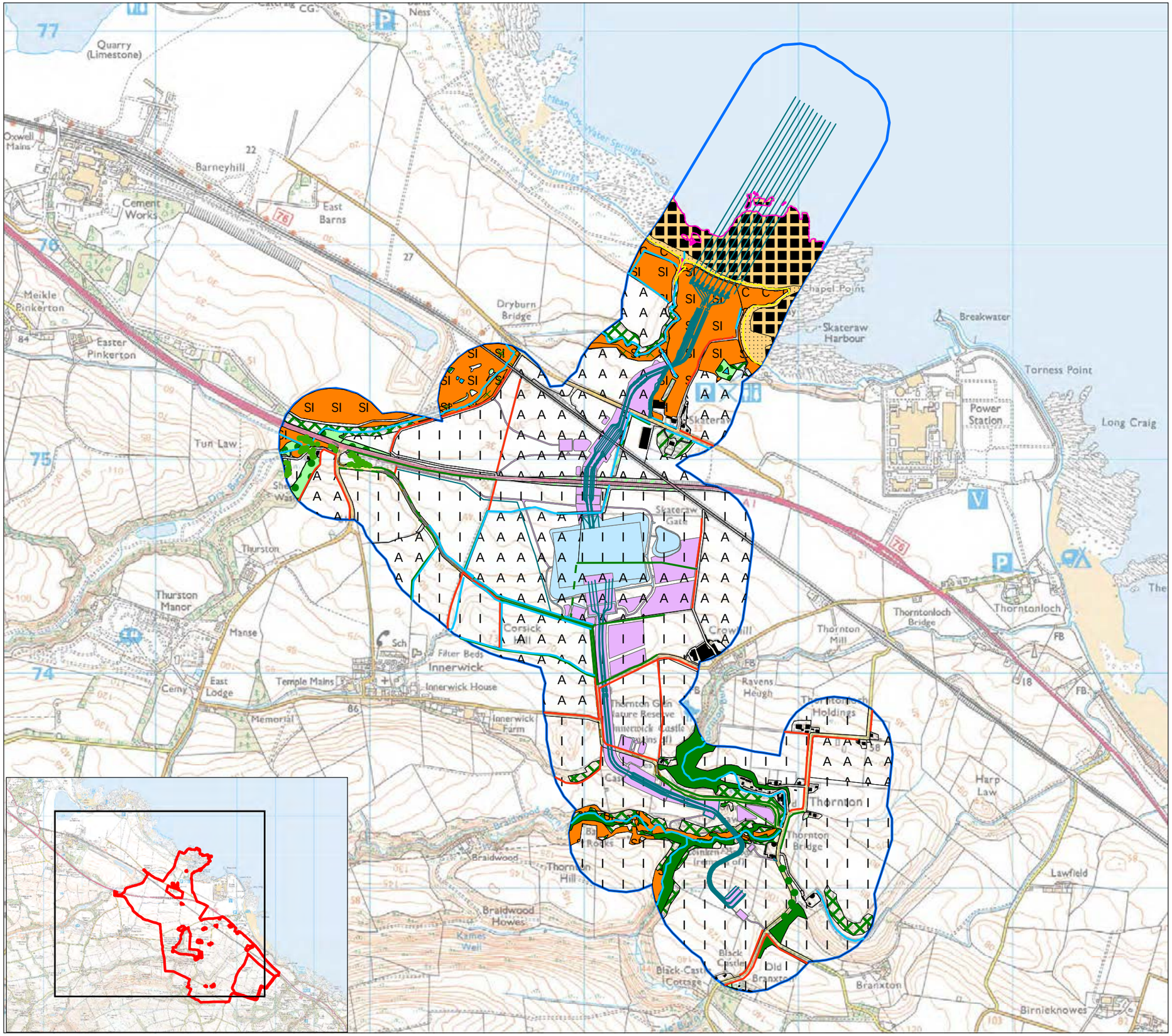
Drawing Number

LF000010&11-DEV-MAP-213

Scale	Plot Size	Datum	Projection
1:40,000	A3	OSGB36	BNG

File ref: P:\2019\191448_SeaG2&3\GIS\191448_SeaG\ADDENDUM\191448_BB_EADD_Fig6-13_CumulativeDev.mxd

FIGURE A7.4 PHASE 1 HABITATS ECOLOGY STUDY AREA



Legend

Habitat

- A1.1.1
- A1.1.2
- A1.2.1
- A1.2.2
- A1.3.1
- A1.3.2
- A2.1
- A2.2
- B2.2
- B4
- C1.1
- C3.1
- G1
- H1.1
- H1.3
- H3
- H8.4
- J1.1
- J3.6
- J4
- J5

- Broadleaved, scattered trees (A3.1)
- Species-poor, defunct hedgerow (J2.2.2)
- Species poor intact hedgerow (J2.1.2)
- Wall (J2.5)
- Running water (G2)
- 250m buffer of infrastructure - Ecology Study Area
- Mean High Water (Springs)
- Mean Low Water (Springs)

Infrastructure

- Permanent
- Temporary

0 0.5 1 km

N

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Project Name

BERWICK BANK WIND FARM

Drawing Title

Phase 1 Habitats Ecology Study Area

Rev	Date	Details	Status	Drwn	Rqst	Chkd	Appd
R1	01/04/2022	First Issue	-	JD	-	ST	-
R2	-	-	-	-	-	-	-
R3	-	-	-	-	-	-	-
R4	-	-	-	-	-	-	-

Drawing Number

Figure A7.4

Scale	Plot Size	Datum	Projection
1:18,000	A3	OSGB36	BNG

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File ref: F:\GIS\Clients\S\SSE Renewables\2944 - Seagreen 2_3\6 GIS\MXD\SG2 Adhoc\Addendum Figure A7.4 Phase 1 habitats Ecology SA_BB Template.mxd

APPENDIX 1: ONSHORE INITIAL BIODIVERSITY NET GAIN ASSESSMENT

Berwick Bank Wind Farm: Onshore Initial Biodiversity Net Gain Assessment

July 2023

EIA Addendum Appendix 1

Prepared by SSE Renewables Ltd on behalf of Berwick Bank Wind Farm Ltd

Contents

Page 1: Introduction and Summary
Page 2: Overview of Biodiversity Project Toolkit
Page 4: Biodiversity Project Toolkit Summary Outputs
Page 5: Biodiversity Project Toolkit Results Analysis
Pages 6-9: Biodiversity Units Calculations Sheets

1 Introduction and Summary

SSE Renewables have undertaken an Initial Biodiversity Net Gain Assessment on behalf of the applicant, Berwick Bank Wind Farm Ltd. This assessment has been undertaken in order to demonstrate that the proposed development is capable, at a high level, of achieving a biodiversity enhancement in line with Policy 3: Biodiversity of NPF 4 and in order to address matters raised in the consultation responses received from East Lothian Council. This assessment is based on the indicative development detail set out in the current 'in principle' planning application and associated EIA Report but is subject to the updates provided as part of the EIA Addendum to which this assessment forms part.

The assessment has been undertaken using SSE Renewables Biodiversity Project Toolkit. This toolkit has been developed for use on SSE projects in order to consider and demonstrate biodiversity uplift on its projects. The metric has been welcomed as a means of demonstrating compliance with NPF 4 and is similar to the DEFRA Metric utilised in England. Further details relating to the metric are in Section 2 on Page 2.

The permanent and anticipated temporary habitat loss across all habitats resulting from the proposed development has been identified in Table 7.20 of Chapter 7: Ecology of the EIA Report. That table has been updated as part of the EIA Addendum in order to better reflect the very small amounts of permanent habitat loss associated with the Dry Burn and Braidwood Burn cable crossings. These updates have been included in the assessment. In total permanent habitat loss (which is primarily agricultural and improved grassland habitat types) is anticipated to be approximately 13.35 ha.

The assessment contained within this document considered the suitability of the outline landscape mitigation set out in Figure 6.12 of the EIA in providing mitigation for the anticipated permanent habitat loss. The assessment has been run on a worst-case basis and considers all of the habitats lost to be of 'good quality' in respect of their condition. For avoidance of doubt the intention is to reinstate areas of temporary habitat loss, as set out in EIA. Many of the habitats temporarily affected are easily restored over a short duration (such as agricultural and improved grassland) and therefore only areas of temporary loss for habitat types which are difficult to restore have been included within the Biodiversity Toolkit assessment. The assessment identified that the outline landscape mitigation set out in Figure 6.12 would not fully mitigate for habitat loss and would results in small loss of overall habitat value for area-based habitats.

Given the initial findings above would indicate a small overall loss of habitat, an updated outline landscape mitigation plan (Figure A6.12 Outline Landscape Mitigation Principles) has been produced highlighting further areas close to the substation that would be suitable for habitat creation. This additional area is over 6.5 ha in size and would be subject to a subsequent detailed landscaping scheme to be provided for the whole of the area at a detailed design stage. The area is to be used during the construction period and although there are some technical constraints limiting certain types of habitat creation on small areas of that site, it is suitable for a mix of grassland, scrub and woodland planting. We have nominally indicated that using half of this area for woodland

planting (3.2ha) and a small amount of scrubland (0.2ha) would mean that the proposed development achieves over 10% biodiversity net gain for area based habitats and over 75% net gain for linear features.

In terms of the metric used in the Biodiversity Toolkit we would suggest that a significant enhancement would be akin to 10% or more of overall biodiversity net gain demonstrating the proposed development can comply with the terms of Policy 3: Biodiversity of NPF 4 with the final details of the landscaping and biodiversity enhancement scheme confirmed by way of condition including details of reinstatement of areas of temporary habitat loss.

Extracts from the toolkit are provided within this document.

Biodiversity Project Toolkit Summary Outputs – This provides the overview of the assessment including consideration of the enhancement options noted to achieve an enhancement equivalent to 10% Biodiversity Net Gain.

Biodiversity Project Toolkit Results Analysis – Shows the trading rules and high level inputs related to the overall biodiversity units lost during development and provided through enhancement.

Biodiversity Units Calculations Sheets – Provides the background inputs to the assessment including the habitats types and condition information. As noted this is based on the EIA Addendum update to the EIA Report Chapter 7. As the sheets are extracted from excel we would be happy to provide a excel spreadsheet version of the calculation sheets if required.

It would be the applicant's intention to undertake a final Biodiversity Net Gain Assessment(s) to demonstrate compliance across the development following detailed design and taking account of the comments made in consultation responses.

2 Overview of Biodiversity Project Toolkit

Biodiversity Net Gain (BNG) is a target for development projects, in which biodiversity losses are outweighed by measures taken to avoid, minimise or compensate impacts of the project. Delivering BNG requires the project to follow the 10 good practice principles and published UK guidance. SSE Renewables BNG Assessment toolkits are Microsoft Excel spreadsheets that will enable quantitative biodiversity assessments. The toolkits can be used to assess the biodiversity impacts of a given development scheme or to assess the biodiversity benefits of a corresponding landscaping or offsetting scheme to help optimise their design. The latest SSER BNG toolkit is based on the most recent iteration of a toolkit produced by SSE Networks (SSEN) and the latest biodiversity metric (version 4.0) by Natural England.

Within the toolkit, a biodiversity unit (BU) is the nominal figure used to quantify the biodiversity of a habitat. It represents the distinctiveness, condition, connectivity, strategic significance, and the area of a habitat. Each characteristic is given a numerical value. These values are multiplied together to calculate Biodiversity Units and/or Linear Units. Also included within the assessment is information on the habitat type.

Habitat creation and enhancement during the BNG process is not without risks and uncertainties. To mitigate for these risks, the toolkit includes risk multipliers. The risk multipliers are included in the post-development biodiversity calculations, reducing the number of units generated by an area of compensation habitat. The risk factors do not cover all eventualities but provide a numerical value for the main risks to delivering biodiversity gains. The toolkit sets out three risk

factors: how difficult it is to create or enhance a habitat (delivery risk), time taken for created or enhanced habitats to reach target condition (temporal risk) and distance of habitat compensation from the development footprint (spatial risk). Additionally, the post-development calculations assess areas which will be retained and no action (areas of no change), areas which will be permanently lost to development (areas of loss) and areas which will have action to increase biodiversity units (areas of change) within the development site.

Representing biodiversity via Biodiversity Units means that the post-development biodiversity can be easily compared to the baseline biodiversity, allowing the user to identify whether or not a development is designed/will deliver a Net Loss (NL), No Net Loss (NNL) or Net Gain (NG).

As well as the Biodiversity Unit calculation, the overall assessment for a BNG development will include the collection of information on habitat type and species, habitat features such as invasive non-native species, suitability for protected species and whether the habitat is considered irreplaceable.

In order to complete and run the toolkit the following information has been considered:

- The red line boundary for the development (ensuring this covers all areas used for temporary construction works);
- Temporary works plans clearly showing areas of permanent or temporary habitat loss and associated information within the EIA;
- Landscape plan or reinstatement plans showing the permanent development and planting information for the areas of habitat to be created or enhanced;
- Area or length of each habitat including irreplaceable habitat;
- Phase 1 or UKHab information for each habitat; and
- Habitat Condition Assessment (HCA) score for each habitat.

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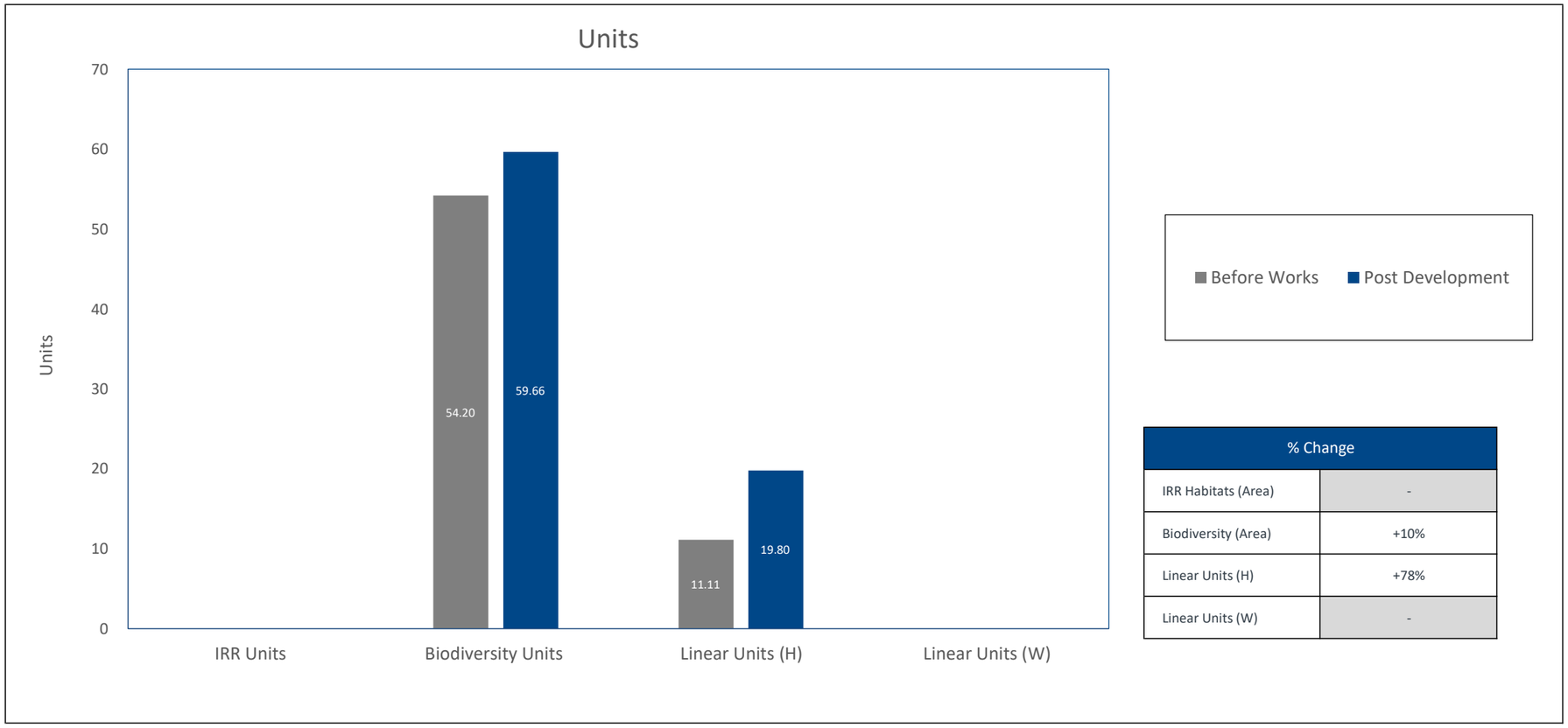
Summary outputs

Review the automatically updated biodiversity unit and linear habitat (hedgerow (H) and water courses (W)) results graphs to help the optioneering process and site selection.



Before Works	Units
IRR Habitats (Area)	0.00
Biodiversity (Area)	54.20
Linear Units (H)	11.11
Linear Units (W)	0.00

Post Development	Units
IRR Habitats (Area)	0.00
Biodiversity (Area)	59.66
Linear Units (H)	19.80
Linear Units (W)	0.00

% Change	
IRR Habitats (Area)	-
Biodiversity (Area)	+10%
Linear Units (H)	+78%
Linear Units (W)	-

Net Change	Units
IRR Habitats (Area)	0.00
Biodiversity (Area)	+5.46
Linear Units (H)	+8.69
Linear Units (W)	0.00

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Results Analysis

Review whether all trading roules were satisfied.

Trading Rules Summary	
Very High Distinctveness	Satisfied
High Distinctiveness	Satisfied
Medium Distinctiveness	Satisfied
Low Distinctiveness	Satisfied

Scottish Biodiversity List (SBL) habitats are highlighted in olive.

'A1.1.1 : Woodland : Broadleaved - semi-natural (High)' is highlighted in pale olive if present as SBL applicability depands on the specific habitat type and condition.

Very High Distinctiveness

Phase 1 Habitat	Habitat Group	Baseline Units	Post Dev. Units	Unit Change	%-Change	Habitat Unit Loss?
B2.1 : Neutral grassland : Unimproved	Grassland	0.00	11.53	+11.53	0.00%	
			Total Biodiversity (Area) Unit Change:	+11.53		

High Distinctiveness

Phase 1 Habitat	Habitat Group	Baseline Units	Post Dev. Units	Unit Change	%-Change	Habitat Unit Loss?
A1.1.1 : Woodland : Broadleaved - semi-natural (High)	Woodland and forest	0.00	17.71	+17.71	0.00%	
			Total Biodiversity (Area) Units:	+17.71		

Medium Distinctiveness

Phase 1 Habitat	Habitat Group	Baseline Units	Post Dev. Units	Unit Change	%-Change	Broad Habitat Unit Loss?
B2.2 : Neutral grassland : semi-improved	Grassland	0.53	0.00	-0.53	-100.00%	
B5 : Marsh/marshy grassland (Low)	Grassland	0.00	29.13	+29.13	0.00%	
A2.1 : Scrub : Dense/continuous	Heathland and shrub	0.55	1.29	+0.74	134.50%	
A1.3.2 : Woodland : Mixed - plantation	Woodland and forest	0.26	0.00	-0.26	-100.00%	
			Total Biodiversity (Area) Units (Excluding Surplus Units):	+29.08		

Low Distinctiveness

Phase 1 Habitat	Habitat Group	Baseline Units	Post Dev. Units	Unit Change	%-Change	Overall Unit Loss?
B4 : Improved grassland	Grassland	52.86	13.56	-39.30	-74.35%	
			Total Biodiversity (Area) Units (Excluding Surplus Units):	-39.30		

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Biodiversity Unit Calculation

Calculate biodiversity and linear (hedgerow (H) and watercourses (W)) units of your site by: (1) establishing the habitat; (2) identifying the condition, connectivity and strategic significance of that habitat, and; (3) entering the hectares (ha) or linear metres (m).

Before works
(Baseline)

Ref	Ignore Row?	Calculation Units *(Area / Linear (H/W))*	Phase 1 Habitat	Area or Length of Habitat *(ha /km)*	Condition *Rating*	Connectivity *Rating*	Strategic significance *Rating*	Irreplaceable Habitat	Distinctiveness *Band*	Units			
										IRR Units	Biodiversity (Area)	Linear (H)	Linear (W)
Project Total										**0.00**	**54.20**	**11.11**	**0.00**
1	Active	Phase1_Area	B2.2 : Neutral grassland : semi-improved	0.04	Good	Low	Medium	No	Medium	-	0.53	-	-
2	Active	Phase1_Area	B4 : Improved grassland	6.55	Good	Low	Low	No	Low	-	39.30	-	-
3	Active	Phase1_Area	J1.1 : Cultivated/disturbed land : Arable (Low)	6.07	Condition Assessment N/A	Low	Low	No	Low	-	0.00	-	-
4	Active	Phase1_Area	J5 : Other habitat (Low)	0.64	N/A - Other	Low	Low	No	Low	-	0.00	-	-
5	Active	Phase1_Area	B4 : Improved grassland	2.26	Good	Low	Low	No	Low	-	13.56	-	-
6	Active	Phase1_Area	J1.1 : Cultivated/disturbed land : Arable (Low)	6.48	Condition Assessment N/A	Low	Low	No	Low	-	0.00	-	-
7	Active	Phase1_Area	J1.1 : Cultivated/disturbed land : Arable (Low)	3.67	Condition Assessment N/A	Low	Low	No	Low	-	0.00	-	-
8	Active	Phase1_Linear_H	J2.1.2 : Boundaries : Hedges - Intact - species-poor	1.61	Good	Low	High	No	Low	-	-	11.11	-
9	Active	Phase1_Area	A1.3.2 : Woodland : Mixed - plantation	0.02	Good	Low	Medium	No	Medium	-	0.26	-	-
10	Active	Phase1_Area	A2.1 : Scrub : Dense/continuous	0.04	Good	Low	High	No	Medium	-	0.55	-	-
11	Active	Phase1_Area	J1.1 : Cultivated/disturbed land : Arable (Low)	3.20	Condition Assessment N/A	Low	Low	No	Low	-	0.00	-	-
12	Active	Phase1_Area	J1.1 : Cultivated/disturbed land : Arable (Low)	0.20	N/A - Other	Low	Low	No	Low	-	0.00	-	-

Action *(During Works)*									
Area or Length of Habitat		IRR UNITS		Biodiversity Units		Linear Units (H)		Linear Units (W)	
Retained	*Removed*	*Retained*	*Removed*	*Retained*	*Removed*	*Retained*	*Removed*	*Retained*	*Removed*
	13.36	**0.00**	**0.00**	**13.56**	**40.64**	**11.11**	**0.00**	**0.00**	**0.00**
0.00	0.04	-	-	0.00	0.53	-	-	-	-
0.00	6.55	-	-	0.00	39.30	-	-	-	-
0.00	6.07	-	-	0.00	0.00	-	-	-	-
0.00	0.64	-	-	0.00	0.00	-	-	-	-
2.26	0.00	-	-	13.56	0.00	-	-	-	-
6.48	0.00	-	-	0.00	0.00	-	-	-	-
3.67	0.00	-	-	0.00	0.00	-	-	-	-
1.61	0.00	-	-	-	-	11.11	0.00	-	-
0.00	0.02	-	-	0.00	0.26	-	-	-	-
0.00	0.04	-	-	0.00	0.55	-	-	-	-
3.20	0.00	-	-	0.00	0.00	-	-	-	-
0.20	0.00	-	-	0.00	0.00	-	-	-	-

After work actions
(Following Actions)

After work action	Phase 1 Habitat	Area or Length of Habitat *(ha /km)*	Target Condition *Rating*	Connectivity *Rating*	Strategic significance *Rating*	Distinctiveness *Band*	Difficulty *Highlighted orange if manually adjusted*	Time to target condition *(Years)* *Highlighted orange if manually adjusted*	Spatial	After works units			
										IRR Units	Biodiversity (Area)	Linear (H)	Linear (W)
Project Total										**0.00**	**46.10**	**8.69**	**0.00**
Creation	J4 : Bare ground	0.04	N/A - Other	Low	Low	Low	Low	Not Possible		-	0.00	-	-
Creation	J4 : Bare ground	6.55	N/A - Other	Low	Low	Low	Low	Not Possible		-	0.00	-	-
Creation	J4 : Bare ground	6.07	N/A - Other	Low	Low	Low	Low	Not Possible		-	0.00	-	-
Creation	J4 : Bare ground	0.64	N/A - Other	Low	Low	Low	Low	0		-	0.00	-	-
Creation	B5 : Marsh/marshy grassland (Low)	2.26	Good	Low	Medium	Medium	Medium	7		-	15.57	-	-
Creation	B2.1 : Neutral grassland : Unimproved	6.48	Good	Moderate	High	Very High	Very high	15		-	11.53	-	-
Creation	A1.1.1 : Woodland : Broadleaved - semi-natural (High)	3.67	Good	Moderate	High	High	High	30+		-	9.46	-	-
Enhancement	J2.1.1 : Boundaries : Hedges - Intact - native species-rich	1.61	Good	Moderate	High	Medium	Low	12		-	-	8.69	-
Creation	J4 : Bare ground	0.02	N/A - Other	Low	Low	Low	Low	Not Possible		-	0.00	-	-
Creation	J4 : Bare ground	0.04	N/A - Other	Low	Low	Low	Low	Not Possible		-	0.00	-	-
Creation	A1.1.1 : Woodland : Broadleaved - semi-natural (High)	3.20	Good	Moderate	High	High	High	30+		-	8.25	-	-
Creation	A2.1 : Scrub : Dense/continuous	0.20	Good	Low	High	Medium	Medium	10		-	1.29	-	-

Post development				Net change								
Post development units				Net change in units								
IRR UNITS	Biodiversity (Area)	Linear (H)	Linear (W)	IRR (Area)	IRR (Area) %	Biodiversity (Area)	Biodiversity (Area) %	Linear (H)	Linear (H) %	Linear (W)	Linear (W)%	Notes
0.00	59.66	19.80	0.00	0.00		5.46		8.69		0.00		
-	0.00	-	-	-	-	-0.53	-100.00%	-	-	-	-	Original Habitat Impact figures
-	0.00	-	-	-	-	-39.30	-100.00%	-	-	-	-	Original Habitat Impact figures
-	0.00	-	-	-	-	0.00	0%	-	-	-	-	Original Habitat Impact figures
-	0.00	-	-	-	-	0.00	0%	-	-	-	-	Original Habitat Impact figures
-	29.13	-	-	-	-	15.57	+114.82%	-	-	-	-	SUDs Pond in Landscape Mitigation Plan
-	11.53	-	-	-	-	11.53	+1152.85%	-	-	-	-	Wild Meadow Improvement in Landscape Mitigation Plan
-	9.46	-	-	-	-	9.46	+945.88%	-	-	-	-	Native Woodland Creation in the Landscape Mitigation Plan
-	-	19.80	-	-	-	-	-	8.69	+78.24%	-	-	Hedgerow Improvement in the Landscape Mitigation Plan
-	0.00	-	-	-	-	-0.26	-100.00%	-	-	-	-	Mixed Woodland Plantation affected - Additional Impacts included below existing landscape management plan mitigation
-	0.00	-	-	-	-	-0.55	-100.00%	-	-	-	-	Loss of Scrub Wooodland - Additional Impacts included below existing landscape management plan mitigation
-	8.25	-	-	-	-	8.25	+824.75%	-	-	-	-	Additional Habitat Compensation for +8% BNG e.g. 3.2Ha Broadleaved Woodland or Equivalent
-	1.29	-	-	-	-	1.29	+129.44%	-	-	-	-	Additional Habitat Compensation for +10% e.g. 0.20Ha Scrub habitat or Equivalent

APPENDIX A11.1: FLOOD RISK ASSESSMENT

Berwick Bank Windfarm

EIA Addendum Technical Appendix: Flood Risk Assessment

Client:	Berwick Bank Wind Farm Ltd
Project/Proposal No:	2944
Version:	Final for Issue
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Drawing FRA001: Coastal Flood Extent

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Appendix A: Braidwood Burn ReFH2 Analysis

Appendix B: Braidwood Burn Crossing Design

Appendix C: Braidwood Burn Manning's Equation Calculations

1. Introduction

1.1 Context

ITPEnergised (ITP) has been appointed by Berwick Bank Wind Farm Ltd (The Client) to provide support and input to the onshore component of the Environmental Impact Assessment Report (EIAR) submission to support a planning application for the onshore transmission works in connection with the Berwick Bank Windfarm.

This Flood Risk Assessment (FRA) has been originally prepared as Technical Appendix 1 to Chapter 11: Geology, Hydrology, Soils & Flood Risk within the onshore EIAR. This document has been updated to address comments made by East Lothian Council Flood Risk Officer and forms a Technical Appendix to the EIA Addendum report.

The Site has been visited by an experienced ITP Hydrologist and Civil Engineer on several occasions between 2020 and 2022 to inform this assessment.

1.2 Policy and Guidance

This assessment has been completed in accordance with guidance presented within the National Planning Framework for Scotland 4 (NPF4)[1] (which superseded Scottish Planning Policy (SSP) and NPF3) and taking cognisance of the Flood Risk Management (Scotland) Act 2009.

The assessment also references and takes due consideration (where appropriate) of the following principal guidance and policy documents:

- CIRIA (2004) Development and Flood Risk – Guidance for the Construction Industry, Report C624;
- East Lothian Council Local Development Plan (2018)
- East Lothian Council Local Development Plan: Strategic Flood Risk Assessment (2018)
- Scottish Environment Protection Agency (2015) Flood Risk and Land Use Vulnerability Guidance (Reference: LUPS-GU24), Version 4, July 2018;
- Scottish Environment Protection Agency (2017) SEPA Development Plan Guidance Note 2a: Development Management Guidance: Flood Risk (Reference: LUPS-DM-GU2a), Version 2, July 2018;
- Scottish Environment Protection Agency (2018) Flood Risk Management Strategy Forth Estuary;
- Scottish Environment Protection Agency (2019) Technical Flood Risk Guidance for Stakeholders (Reference: SS-NFR-P-002) May 2019; and
- The Strategic Development Planning Authority for Edinburgh and South East Scotland (2013) Strategic Development Plan.

1.3 Site Location

[1] The Scottish Government (2023) National Planning Framework 4, June 2023

The site is situated near Torness and the village of Innerwick, south-east of Dunbar located in East Lothian. The centre of the site is OSGB36, British National Grid (BNG) 373977, 674114 and is approximately 598 ha in size.

The extent of the site runs from the settlement of Branxton in the south, Bilsdean in the south-east, the coastline at Skateraw and Torness in the north, Oxwell Mains Cement Works and Quarry in the north-west and Fouracres in the west. The land on which the site is located is predominantly agricultural land with sparse settlements spread throughout, connected by small local roads and tracks. The A1 trunk road and East Coast Main Line (ECML) railway cut through the site in a north-west to south-east direction running parallel to the coast. Torness Power Station (Nuclear) is located to the south-east of the proposed landfall at Skateraw.

1.4 Proposed Onshore Development

The Onshore Transmission Works (OnTW) shall include the following:

- a new onshore substation;
- landfall works;
- onshore cables within a cable corridor between the landfall and the new onshore substation, and between the new onshore substation and the SPEN Branxton substation; and
- associated ancillary infrastructure.

The Branxton substation is being developed by SPEN and is subject to a separate planning application.

1.5 Topography

Ground levels within the site vary due to the scale of the site and the sloping topography towards the coastline. The highest elevations within the site are approximately 120mAOD around the location of the proposed SPEN Branxton substation whilst the lowest elevations are at sea level along the coastline. The topography at the site generally falls in a north eastern direction.

1.6 Geology and Hydrogeology

1.6.1 Geology

1.6.1.1 Superficial

Review of the British Geological Survey (BGS) online geology maps[2] indicates that the superficial deposits within the site extents are predominantly Glaciofluvial deposits consisting of gravel, sand and silt. Areas of alluvial deposits are present along the extents of watercourses and raised marine deposits can be found at the landfall location. There are also some sparse areas of Till further inland where this becomes the predominant deposit (beyond site extents).

1.6.1.2 Bedrock

Review of the BGS online geology maps indicates that the bedrock geology underlying the central and southern areas of the site is the Ballagan Formation consisting of sandstone, siltstone and dolomitic limestone. In the northern area of the site, near to the coastline the underlying bedrock geology is dominated by various limestone units including Hurlet Limestone, Blackhall Limestone

[2] British Geological Survey (2022) Natural Environment Research Council – online Geology of Britain Viewer, available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html

and Lower Limestone Formation consisting of limestone, argillaceous rocks and subordinate sandstone.

The bedrock geology in the central and southern areas of the site are part of the Inverclyde Group rock unit whilst the northern area is part of the Strathclyde Group rock unit.

1.6.2 Hydrogeology

Review of the BGS online hydrogeology maps indicates that the site is underlain by moderately productive aquifers where flow is virtually all through fractures and other discontinuities.

SEPA classifications identify the site to be within the Torness Coastal groundwater body and the Torness groundwater body which both have an overall status of Good.

1.7 Hydrological Context

1.7.1 Local Hydrology

The site area is divided into four catchments shown in SEPA's Baseline Confluence Inter Catchments data file;

- Dry Burn at the mouth
- East Lothian Coastal between Thornton Burn and Dry Burn
- Thornton Burn at the mouth
- East Lothian Coastal between Dunglass Burn and Thornton Burn

The Dry Burn catchment is approximately 19km^2 and is classified as being of Moderate status (SEPA, 2020, under the Water Framework Directive). With respect to the Proposed Development, the majority of the onshore cable corridor between the landfall location and new onshore substation is located within this catchment near to its divide with the 'East Lothian Coastal between Thornton Burn and Dry Burn' catchment.

The East Lothian Coastal between Thornton Burn and Dry Burn catchment is approximately 4km^2. The main watercourse in this catchment is unnamed and originates from the agricultural land to the west of Innerwick and flows to the west and north of the proposed onshore substation location and is not classified by SEPA. This watercourse has been surveyed for the purpose of informing the drainage strategy for the onshore substation and it has been identified that it is heavily modified with multiple culverts and discharges to the Dry Burn to the north of the settlement of Skateraw.

The Thornton Burn catchment is approximately 14km^2 and is classified as being of Good status. With respect to the Proposed Development, the majority of the onshore cable corridor between the new onshore substation location and the new SPEN substation at Branxton is located within this catchment. The new SPEN substation location is situated at the confluence point of the upper reaches of the Thornton Burn known as the Braidwood Burn (predominant watercourse) and the Ogle Burn (tributary to the Braidwood Burn).

The East Lothian Coastal between Dunglass Burn and Thornton Burn catchment is approximately 17km^2 with no named watercourses present. A short section of proposed access track to the proposed Branxton grid substation is located within the western extents of the catchment. The site boundary extends further east into this catchment however, no further Proposed Development is to be located in this catchment.

With respect to the Proposed Development, the main watercourses are:

- Dry Burn
- Thornton Burn / Braidwood Burn

- Unnamed Watercourse between Innerwick and Skateraw (hereafter referred to as the Innerwick Burn)

A hydrological summary and catchment characteristics of the main watercourses local to the Proposed Development have been obtained from the FEH Web Service[3] and are shown in Table 1 below.

Table 1 – Hydrological characteristics of local catchments

Waterbody Catchment	Area (km^2)	SAAR[1] (mm)	URBEXT[2] (%)	SPRHOST[3] (%)	PROPWET[4]
Dry Burn	19.09	727	0.0007	29.97	0.430
Thornton Burn / Braidwood Burn	14.10	753	0.0000	30.70	0.430
Innerwick Burn	1.88	671	0.0130	33.71	0.430

[1]*SAAR = Standard Annual Average Rainfall*
[2]*URBEXT = Extent of Urban and Suburban Land Cover*
[3]*SPRHOST = Standard Percentage Runoff using UK Hydrology of Soil Types (HOST) Classification*
[4]*PROPWET = Proportion of Time the Soil Moisture Deficit (SMD) was equal to, or below, 6mm during 1961-1990*

The catchments summaries indicate they experience relatively low annual rainfall (for Scottish catchments) and are all essentially completely rural.

2. Planning and Guidance Context

2.1 National Planning Framework

This report has been prepared in accordance with NPF4 Policy 22 relating to Flood Risk and Water Management, which states:

*"**Policy Intent:***

To strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding.

Policy Outcomes:

- *Places are resilient to current and future flood risk.*
- *Water resources are used efficiently and sustainably.*
- *Wider use of natural flood risk management benefits people and nature."*

Furthermore, NP4 states that development proposals at risk of flooding or in a flood risk area will only be supported if they are for:

- *"Essential infrastructure where the location is required for operational reasons;*
- *Water compatible uses;*
- *Redevelopment of an existing building or site for an equal or less vulnerable use; or.*
- *Redevelopment of previously used sites in built up areas where the LDP has identified a need to bring these into positive use and where proposals demonstrate that*

[3] UK Centre for Ecology & Hydrology (2022) Flood Estimation Handbook Web Service, Developed by Wallingford HydroSolutions

longterm safety and resilience can be secured in accordance with relevant SEPA advice".

2.2 East Lothian Council Local Development Plan (LDP) 2018

ELC LDP 2018 provides the following policies that are relevant to flood risk assessment.

- ***"Policy NH9: Water Environment:*** *Where relevant, new development should protect and, where appropriate, enhance the water environment, in line with the Water Framework Directive 2000 (WFD) and the Water Environment and Water Services (Scotland) Act 2003 (WEWS).*

  Development proposals that would have a detrimental impact on the water environment will not be supported."

- ***"Policy NH10: Sustainable Drainage Systems****: All development proposals must demonstrate that appropriate provision for Sustainable Drainage Systems (SuDS) has been made at the time of submitting a planning application, except for single dwellings or developments in coastal locations that discharge directly to coastal waters where there is no or a low risk to designated bathing sites and identified Shellfish Waters. Sufficient space for proposed SuDS provision, including the level and type of treatment appropriate to the scheme of Proposed Development, must be safeguarded in site layouts. Provision must also be made for appropriate long-term maintenance arrangements to the satisfaction of the Council.*

  A drainage assessment may also be required to show the impact of a 1 in 200-year rainstorm event. SuDS schemes should be designed with an allowance for climate change.

  Proposals must also demonstrate through a design-led approach how SuDS proposals are appropriate to place and designed to promote wider benefits such as placemaking, green networks and biodiversity enhancement."

- ***"Policy NH11: Flood Risk****: Development that would be at unacceptable risk of flooding will not be permitted. New development within areas of medium to high risk of coastal or watercourse flooding (with greater than 0.5% annual probability of flooding) should generally be avoided in accordance with the provisions set out in Advice Box 8.*

  All relevant development proposals will be assessed based on the probability of a flood affecting the site and the nature and vulnerability of the proposed use, taking into account the following:

  a) the characteristics of the site and any existing or previous development on it;

  b) the design and use of the proposed development, including use of water resistant materials and construction;

  c) the size of the area likely to flood;

  d) depth of flood water, likely flow rate and path, and rate of rise and duration;

  e) the vulnerability and risk of wave action for coastal sites;

  f) committed and existing flood protection methods: extent, standard and maintenance regime;

  g) the effects of climate change, including an appropriate allowance for freeboard;

  h) surface water run-off from adjoining land;

  i) culverted watercourses, drains and field drainage;

j) cumulative effects, especially the loss of storage capacity;

k) cross-boundary effects and the need for consultation with adjacent authorities;

l) effects of flood on access including by emergency services; and

m) effects of flood on proposed open spaces including gardens.

2.3 SEPA Flood Risk and Land Use Vulnerability Guidance

2.3.1 Context

This guidance outlines how SEPA assess the vulnerability to flooding of different land use with the following categories:

- Most Vulnerable Uses;
- Highly Vulnerable Uses;
- Least Vulnerable Uses;
- Essential Infrastructure; and
- Water Compatible uses.

The following paragraphs are extracted from the guidance for context:

"This guidance classifies land uses according to how they are impacted by flooding, i.e. their relative susceptibility and resilience to flooding, and any wider community impacts caused by their damage or loss.

The classification recognises that certain types of development, and the people who use and live in them, are more at risk from flooding than others (e.g. children, the elderly and people with mobility problems that may have more difficulty in escaping fast flowing water).

The term 'land use vulnerability' is used in this guidance to differentiate between a range of land uses, taking account of flooding impacts on land uses in terms of their relative susceptibility and resilience to flooding. It also reflects wider community impacts caused by their damage or loss. For example, a police station is not more likely to suffer damage (be susceptible) or less able to recover (be resilient) than a comparable office building. However, it is in a more vulnerable category than an office use because a higher value is placed upon the wider community impacts that would be caused by its potential loss or damage during a flood event. Similar considerations apply to the inclusion of hazardous waste facilities within the highly vulnerable category and other waste treatment facilities being within the less vulnerable category."

2.3.2 Proposed Development Suitability

With reference to Table 1 (SEPA Land Use Vulnerability Classification)[4] of the guidance the proposed developed is considered **Essential Infrastructure** category.

With reference to Table 2 (SEPA Matrix of Flood Risk) of the guidance, the proposed **Essential Infrastructure** development is suitable within any fluvial flood risk zone however for sites located in 'medium' to 'high' risk (i.e. >0.5% AEP) within sparsely developed and / or undeveloped areas the following criteria applies:

"*Generally suitable where a flood risk location is required for operational reasons and an alternative lower-risk location, is not available – development should be designed and constructed to be operational during floods (i.e. 0.5% AEP), and not impede water flow."*

[4] Scottish Environment Protection Agency (2018): Flood Risk and Land Use Vulnerability Guidance

3. Flood Risk Assessment

3.1 Sources of Information

3.1.1 National Floodplain Mapping and Risk Assessment

Strategic level information regarding the current flood risk at the Site has been obtained from SEPA via the online Indicative Flood map and National Flood Risk Assessment (NFRA) Portal[5].

3.1.2 Mapping and Terrain Data

Ordnance Survey (OS) Mapping, LiDAR data, the site topographic survey and satellite imagery have been used to set the context of the application site and its immediate surroundings.

3.1.3 Historic Flooding

A focussed internet search was undertaken to identify any significant historical flooding events with the vicinity of the site.

3.1.4 Strategic Flood Risk Assessment

The East Lothian Council Strategic Flood Risk Assessment (SRFA)[6] has been reviewed with respect to sources of flooding within the vicinity of the site.

3.2 Screening Assessment

A Screening Assessment is used to identify if any sources of flood risk require a more detailed analysis and specification of bespoke mitigation measures.

The assessment has been undertaken with consideration of the three main infrastructure elements:

- Landfall Infrastructure
- Onshore Cable Route
- Onshore Substation

There are a number of potential sources of flooding which have been evaluated in accordance with best practice and NPF4 such as:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal / coastal flooding;
- Flooding from land;
- Flooding from groundwater;
- Flooding from sewers; and
- Flooding from infrastructure failure / blockage (e.g., reservoirs, canals, and other artificial sources.

The flood risk from each of these potential sources is discussed in the following Tables 2-4.

[5] Scottish Environment Protection Agency (2022): NFRA data explorer tool, available at: https://www.sepa.org.uk/data-visualisation/nfra2018/

[6] East Lothian Council (2018): Local Development Plan Strategic Flood Risk Assessment

Table 2 – Landfall Infrastructure Flood Risk Screening Assessment

Potential Flood Source	Screening Assessment of Flood Risk at Site[1]	Justification	Requiring Further Consideration i.e. Technical Assessment?
Fluvial flooding	Low	The proposed landfall location is located approximately 60m from the eastern bank of the Dry Burn at the coastline. Review of SEPA flood maps indicates the Dry Burn is not susceptible to flooding as its low to high risk flooding extents are largely confined to the channel. Given the locality of the landfall location to the downstream extents of the Dry Burn there may be some residual risk of out of bank flows as the watercourse opens up onto the coastline. Any out of bank flows would quickly disperse over the flat coastline and into the sea.	No
Tidal flooding	Medium	Review of SEPA flood maps indicates that the landfall location is likely to be partially located within tidal flooding extents. Given the national strategic scale of SEPA mapping it is difficult to discern to what risk the flooding is associated with. The future coastal flood mapping indicates that the site will be partially at medium risk to tidal flooding. As such, it is recommended that a site-specific coastal flood risk assessment is undertaken to quantify the risk more accurately.	Yes
Flooding from land	Negligible	Review of SEPA flood maps indicates that there is no significant accumulation of surface water flooding within the landfall location. The land gently slopes towards the coastline and with minimal upgradient catchment there is negligible risk of surface water flooding.	No
Groundwater flooding	Low	Review of SEPA flood maps indicates that the site is not in an area identified at risk of groundwater flooding. A review of the site-specific Ground Investigation Report and subsequent groundwater monitoring logs indicate that groundwater at the landfall location was not encountered during the borehole investigation and that a minimum depth to groundwater during a 5-month monitoring period was 3m.	No
Flooding from sewers / artificial drains	None	The landfall location is located at the shoreline with only a single property in close proximity downgradient at Skateraw Harbour. As such no sewers within the vicinity of the landfall location pose a flood risk.	No
Flooding due to infrastructure failure / blockage	None	Review of available mapping confirms that there are no significant impoundments of water upgradient and in hydraulic continuity with the Proposed Development area which would pose a flood risk to the site in the event of failure.	No

Table 3 – Onshore Cable Route Flood Risk Screening Assessment

Potential Flood Source	Screening Assessment of Flood Risk at Site	Justification	Requiring Further Consideration i.e. Technical Assessment?
Fluvial flooding	Low – Medium	The onshore cable route interacts with the Dry Burn, Innerwick Burn and Braidwood Burn (Thornton Burn). It is noted that the finished cable route will be buried and will therefore not be sensitive to risk of fluvial flooding. However, watercourse crossing locations have the potential to be at risk of flooding or increase flood risk elsewhere if above ground crossings are proposed instead of the typical open cut trench method or HDD methods. Individual crossing locations are assessed below. The cable route runs approximately"para'lel to the **Innerwick Burn** between the proposed substation location and the discharge location to the Dry Burn. The cable route is proposed to cross the Innerwick Burn twice. One crossing is located at the downstream extents of the burn prior to discharge to the Dry Burn. At this location an existing 900m diameter culvert is present beneath an existing track. The proposed cable crossing will extend this culvert on both sides by approximately 5m and the cables will be laid above the culvert. There is a potential flood risk associated with this existing culvert and extension and therefore further assessment is required. An additional watercourse crossing of the **Innerwick Burn** is proposed to the immediate north of onshore substation location. This crossing will be undertaken using typical open cut trench method and therefore the cables will be buried beneath the bed of the channel. As such, no flood risk is associated with this crossing. A cable bridge crossing is proposed across the **Braidwood Burn**. The watercourse is located in a prominent steep valley feature of approximately 20m depth. Burying the cable route beneath the watercourse in this location is not viable in terms of construction given the steep slopes either side of the watercourse and as such a bottomless arch culvert is proposed to route the cable over the watercourse extents. SEPA flood maps indicate the flooding extents of the Braidwood Burn to be confined to the channel and immediate overbanks within the valley. There is a potential risk that the proposed crossing may impact flood flows and therefore further assessment is required.	Yes

Potential Flood Source	Screening Assessment of Flood Risk at Site	Justification	Requiring Further Consideration i.e. Technical Assessment?
Tidal flooding	None	The potential for tidal flood risk is only associated with the landfall location. The cable route is sufficiently inland to remain unaffected by tidal flooding.	No
Flooding from land	None	The finished cable route will be buried and therefore not sensitive to surface water flooding. Review of SEPA flood maps indicates that there is no significant accumulation of surface water flooding along the cable route.	No
Groundwater flooding	Low	Review of SEPA flood maps indicates that the site is not in an area identified at risk of groundwater flooding. A review of the site-specific Ground Investigation Report indicates that trials pits located along the full cable route were excavated to depths of a maximum of 3m and groundwater was not encountered in any of the pits.	No
Flooding from sewers / artificial drains	None	The finished cable route will be buried and therefore not sensitive to sewer flooding.	No
Flooding due to infrastructure failure / blockage	None	Review of available mapping confirms that there are no significant impoundments of water upgradient and in hydraulic continuity with the Proposed Development area which would pose a flood risk to the site in the event of failure.	No

Table 4 – Onshore Substation Flood Risk Screening Assessment

Potential Flood Source	Screening Assessment of Flood Risk at Site	Justification	Requiring Further Consideration i.e. Technical Assessment?
Fluvial flooding	None	The onshore substation is located close to the banks of the Innerwick Burn at a minimum distance of 70m to the south of the watercourse. Flooding extents of the Innerwick Burn are not modelled by SEPA given its small scale (<2km^2 catchments size). The channel in this location is well formed and any out of bank flows would be predominantly to the north given the overall fall towards the coastline. The proposed substation platform finished level is approximately 10m higher than the watercourse banks.	No
Tidal flooding	None	The onshore substation is located sufficiently inland to remain unaffected by tidal flooding.	No
Flooding from land	Medium	Review of SEPA flood maps indicates that there is no significant accumulation of surface water flooding in the vicinity of the onshore substation location. The existing ground levels slope moderately towards the Innerwick Burn and the A1 / railway line. It is known that existing surface water flooding issues are present to the east of the Innerwick Burn at the A1 and railway line crossing. This low lying area is prone to flooding due to the transport infrastructure blocking any natural runoff routes and the area does not naturally drain to the watercourse. An existing drainage route is present next to the Railway Cottage property that conveys runoff to the east. This low lying area is approximately 10m below the proposed finished substation platform level and thus any accumulation of surface water flooding in this area would not reach the substation platform. Given the sloping topography of the substation site and wider local area, there is a risk of upgradient runoff shedding onto the substation platform if not properly managed. The proposed drainage strategy for the substation (see EIAR Technical Appendix 11.2) provides upgradient cut-off drains to negate the risk of upgradient surface water runoff flowing onto the platform – refer to Appendix 11.2 for further details. Additionally, the proposed drainage strategy will route surface water runoff away from the existing surface water flooding issue area and thus provide a betterment to this pre-existing flooding.	Yes – covered in Appendix 11.2
Groundwater flooding	Negligible	Review of SEPA flood maps indicates that the site is not in an area identified at risk of groundwater flooding. A review of the site-specific Ground Investigation Report indicates that trials pits near to the	No

Potential Flood Source	Screening Assessment of Flood Risk at Site	Justification	Requiring Further Consideration i.e. Technical Assessment?
		substation location did not encounter groundwater. Given the sloping nature of the existing ground levels at the substation location, to form a level platform, a cut into existing ground levels is required at the southern extent of the substation. The maximum cut required down to formation level will be approximately 10m below existing ground level. Review of borehole monitoring data has been used to inform the formation level and to ensure it is located a minimum of 1m above groundwater levels.	
Flooding from sewers / artificial drains	Low	No existing sewer infrastructure is located within the extents of the onshore substation. Any existing field drains crossing the substation location extent will be re-routed to enable existing land drainage regimes to be retained at much as reasonably possible. The substation will be drained formally and runoff from the developed surfaces will be attenuated in order to not increase flood risk offsite.	No
Flooding due to infrastructure failure / blockage	None	Review of available mapping confirms that there are no significant impoundments of water upgradient and in hydraulic continuity with the Proposed Development area which would pose a flood risk to the site in the event of failure.	No

3.3 Flood Risk Screening Assessment Review

Based on the outcome of assessments in Table 3, 4 & 5 the following risks shown in the below Table are to be assessed further.

- Flooding from the sea or tidal / coastal flooding with respect to the landfall location
- Fluvial flooding with respect to watercourse crossings for the onshore cable route
- Flooding from land (overland flow) to the proposed substation – mitigation and discussion of this is provided in EIAR Appendix 11.2 (Drainage Strategy Report).

All outcomes detailed above are risk to the Proposed Development. The screening assessment confirms that no risk from the Proposed Development require further assessment.

3.4 Further Assessment

3.4.1 Landfall Location Coastal Flood Assessment

SEPA flood maps indicate that the landfall location may be partially located within an area at risk of coastal flooding. As such an estimate has been undertaken of the coastal flood extent to quantify the risk to the landfall location throughout the lifetime of the development of 35 years.

As part of this assessment, the vulnerability of the landfall infrastructure has been evaluated by SSE-R with respect to potential future flooding. It was concluded that buried cables and transition joints bays at the landfall location would be resilient to flooding once installed (given that the infrastructure will be underground) which meets the *Land Use Vulnerability Requirements* set out in Section 2.3.2.

A conservative flood extent has been developed based on the Coastal Flood Boundary (CFB) Model. Table 5 provides a summary of the development of the design level coastal flood extent.

Table 5 – Coastal Flood Design Level

Parameter	Unit	Value	Description
1 in 200yr Water Level	mAOD	3.94	From CFB Model – Chainage 3482, C2_t200 Value
Wave Overtopping allowance (CF=20)	m	0.89	Based on EA Technical Report FD2308/TR2 (2005). Determined via Joint Probability Analysis
Sea level rise 2075 epoch	m	0.86	SEPA Climate Change Allowance
Design Level	mAOD	5.69	

Drawing 001 shows the estimated design coastal flood extent in relation to the landfall location. This assessment indicates that there is likely to be some transition joint bay infrastructure located marginally seaward of the design flood level.

In addition, the Dynamic Coast dataset has been assessed to consider any future coastal erosion at the landfall location. No anticipated coastal erosion is mapped within the vicinity of the landfall location.

Taking the above into account, the residual risk to the buried landfall infrastructure (cables and transition joint bays) is 'low'. Despite there being some overlap with the predicted coastal flood level, the infrastructure will be made flood resilient (ensuring any access points to underground

infrastructure are sealed and protect from water ingress) so that it remains safe and operational for the development lifetime. No above ground infrastructure will be located seaward of the coastal flood extents shown on Drawing 001.

3.4.2 Watercourse Crossing Flood Assessment: Innerwick Burn

As previously described, a watercourse crossing is proposed over the Innerwick Burn immediately upstream of its discharge location to the Dry Burn. The proposed crossing is to utilise an existing 900mm diameter culvert beneath a track access. In order to accommodate the cable route, this existing culvert would be lengthened on both sides by approximately 5m.

SEPA generally prefer alternative solutions to culvert crossings unless adequate justification is provided. In this instance it is believed that there is suitable justification in that the crossing is to be located on a minor unnamed watercourse (called Innerwick Burn for reporting purposes only), utilising an existing culvert albeit with a short extension required, to facilitate an Essential Infrastructure project and associated cable route infrastructure.

The extension of the culvert may have the potential to exacerbate any existing flooding issue with the culvert. As previously discussed, the Innerwick Burn has been heavily modified with multiple culverts upstream of this location. These culverts have been subject to a site survey and culvert survey (to inform the proposed substation drainage strategy). A series of culverts route the burn through the settlement of Skateraw and the downstream exit point of this system (immediately upstream of the proposed crossing location) has been surveyed and found to be an 800mm diameter concrete pipe. As this pipe diameter is less than the proposed extended culvert diameter, its capacity is less and any potential flood risk within the burn will be further upstream where the capacity reduces. There is a limited short section of open watercourse between the Skateraw culvert exit point and the proposed extended culvert and thus negligible additional runoff would enter the downstream culvert. As such the culvert extension does not pose any material increased flood risk as the Skateraw culvert is more susceptible to flooding due to its smaller diameter and capacity. In addition, the smaller diameter upstream culvert reduces the risk of potential blockages to the proposed extended culvert from upstream debris and considering the short section of open watercourse between the two culverts, the overall blockage risk of the proposed extended culvert is very low.

This Further Assessment therefore shows that there is negligible risk to the onshore cable route watercourse crossing at this location with respect to fluvial flooding.

3.4.3 Watercourse Crossing Flood Assessment: Braidwood Burn

As previously described, it is proposed to construct a cable route bridge over the Braidwood Burn due to the challenging topography making the typical open cut trench method or HDD techniques unviable. The proposed bridge will include a bottomless arch culvert to convey flows within the Braidwood Burn. In accordance with NPF4, an assessment of the proposed culvert capacity in comparison with the anticipated 1 in 200-year flow plus climate change within the Braidwood Burn is required to determine any potential flood risk associated with the crossing.

3.4.3.1 Braidwood Burn Peak Flow Assessment

An estimate of the peak flow within the Braidwood Burn at the proposed crossing location has been undertaken using catchment characteristics obtained from the FEH Web Service in combination with the industry standard Revitalised Flood Hydrograph V.2 (ReFH2) software.

The estimated 1 in 200-year flow plus climate change within the Braidwood Burn at this location is **16.88m^3/s**. The ReFH2 analysis is presented in Appendix A.

A climate change uplift of 39% has been applied to the analysis as a peak rainfall uplift given the catchment size being less than 30km^2 (as per SEPA guidance).

3.4.3.2 Culvert Capacity Assessment

The proposed bottomless arch culvert will be constructed from corrugated steel arch multiplate and will have a span and rise of 8 and 4m respectively. The span will entirely encompass the existing width of the Braidwood Burn channel (approximately 3-4m wide).

The proposed crossing details drawing are presented in Appendix B.

Given that the proposed culvert's cross-sectional area is significantly larger than the channel cross-sectional area, it is proposed to provide culvert capacity estimates using two methods to demonstrate that there is sufficient capacity to convey the design flow.

The first methodology for estimating the culvert capacity is through the application of the Colebrook-White equation for calculating the flow within a pipe. This equation has its limitations in this application as it is generally for calculating flows within full pipes with a single pipe roughness assumed. The equation has been used to initially estimate full pipe flow (using the 8m span as the pipe diameter) and halving this result to estimate the flow within the culvert.

As a conservative approach, the pipe roughness used within the equation has been based on the worst-case roughness for this application, the rock armour along the base of culvert length. The equivalent pipe roughness for this material has been estimated to be 750mm. Comparatively, the roughness for the corrugated steel is approximately 30mm.

The existing slope along the watercourse over the proposed extent of the culvert has been estimated to be 1 in 40 using site survey information. However, as a conservative estimate, the capacity calculation will use a slope of 1 in 100.

A summary of the parameters and results is shown below in Table 6.

Table 6 – Colebrook-White Equation Summary

Parameter	Units	Value	Description
Pipe Diameter	mm	8000	Span of bottomless arch culvert
Slope	m/m	0.01	Conservative estimate from survey information
Pipe Roughness	mm	750	Conservative estimate for full pipe roughness
Equation Results			
Full Pipe Flow Capacity	*m^3/s*	*201*	Calculated from Colebrook-White Equation
Estimated Culvert Capacity	**m^3/s**	**~100**	Half of the full pipe calculation

The conservative estimate above indicates that the culvert would have a capacity of approximately 100m^3/s. This estimate is over 5 times greater than the estimated peak flow in the watercourse for the 1 in 200-year plus climate change event. There is therefore a high confidence in this estimate that the culvert would be more than capable to convey the design flow.

The second methodology for estimating the culvert's ability to convey the design flow is to undertake a cross-sectional comparison of the culvert and the floodplain within the valley. For this assessment, the capacity of the channel itself has been ignored to provide a conservative estimate as the required cross-sectional of the floodplain to convey the design flow will be greater given its higher roughness value than the channel. From the topographic survey, the following parameters of the valley have been estimated:

- Floodplain width (i.e., valley base, ignoring channel) – 11m
- Lefthand valley slope (looking downstream) – 1 in 4

- Right valley slope (looking downstream) – 1 in 1.3
- Longitudinal valley slope – 1 in 40

The above information has been used to estimate the required cross-sectional area to convey the design flow using the open channel Manning's Equation. For the equation, a Manning's Coefficient of Roughness of 0.07 has been used which is equivalent to a floodplain with medium to dense brush. Similar to the previous assessment, a conservative slope estimate of 1 in 100 has been used despite accurate topographic survey information.

A copy of the Manning's Equation results are provided in Appendix C.

The Manning's equations indicates that a cross-sectional area of approximately 14m^2 is required to convey the design flow within the floodplain. Comparatively the cross-sectional area of the bottomless arch culvert is approximately 50m^2 (excluding channel capacity). Similar to the previous assessment, this methodology indicates that the bottomless arch culvert has a considerable excess capacity to easily convey the design flows without restriction.

This Further Assessment therefore shows that there is negligible risk to the onshore cable route watercourse crossing with respect to fluvial flooding.

3.4.4 Flooding from Land Assessment

The flood risk screening assessment has identified a 'Medium' flood risk to the onshore substation from overland flow from the upgradient natural catchment.

The proposed drainage strategy for the substation (see EIAR Technical Appendix 11.2) provides upgradient cut-off drains to negate the risk of upgradient surface water runoff flowing onto the platform – refer to Appendix 11.2 for further details. Additionally, the proposed drainage strategy will route surface water runoff away from the existing surface water flooding issue area and thus provide a betterment to this pre-existing flooding.

This Further Assessment therefore shows that there is a low risk to the onshore substation from flooding from land.

4. Conclusions

ITPEnergised (ITP) has been appointed by Berwick Bank Wind Farm Ltd (The Client) to provide support and input to the onshore component of the Environmental Impact Assessment Report (EIAR) submission to support a planning application for the onshore transmission works in connection with the Berwick Bank Offshore Windfarm.

In accordance with national planning policy and guidance, all potential sources of flooding to the site have been considered and no history of flooding at the site has been identified.

The flood risk assessment has been undertaken in consideration of the three main element of the Proposed Development; the landfall location, onshore cable route and onshore substation.

With respect to the landfall location, the assessment confirms that the site is overall at 'no risk' or 'low risk' of flooding from all sources with the exception of flooding from sea or tidal / coastal. Further assessment was undertaken to derive a design coastal flood level for the expected lifetime of the development of 35 years. The design flood level indicates that some of the landfall location infrastructure would be sited marginally seaward of the boundary. However, an assessment of the infrastructure undertaken by SSE-R concluded that cables and transition joints bays at the landfall location would be resilient to flooding once installed and remain operational and no above ground infrastructure will be located within the coastal flood extents. As such, the landfall infrastructure is considered to be at 'low' residual risk of flooding from sea or tidal / coastal sources.

With respect to the onshore cable route, the flood risk screening assessment confirms that the site is overall at 'no risk' or 'low risk' of flooding from all sources with the exception of flooding from fluvial sources in relation to two proposed watercourse crossing. Further assessment was undertaken for both crossings to assess any potential flood risk in greater detail. The assessment of the Innerwick Burn crossing has shown that any flood risk within the watercourse would be attributed to the existing upstream culvert given that it has a lower capacity than the proposed culvert to be extended to facilitate the cable crossing. The assessment of the Braidwood Burn crossing has provided two approaches to estimate the culvert's ability to convey the predicted 1 in 200 year flow plus climate change in the watercourse without constriction. Both methods undertaken provided conservative estimates of the culvert capacity and it has been shown that it is capable of conveying the design flow without restriction.

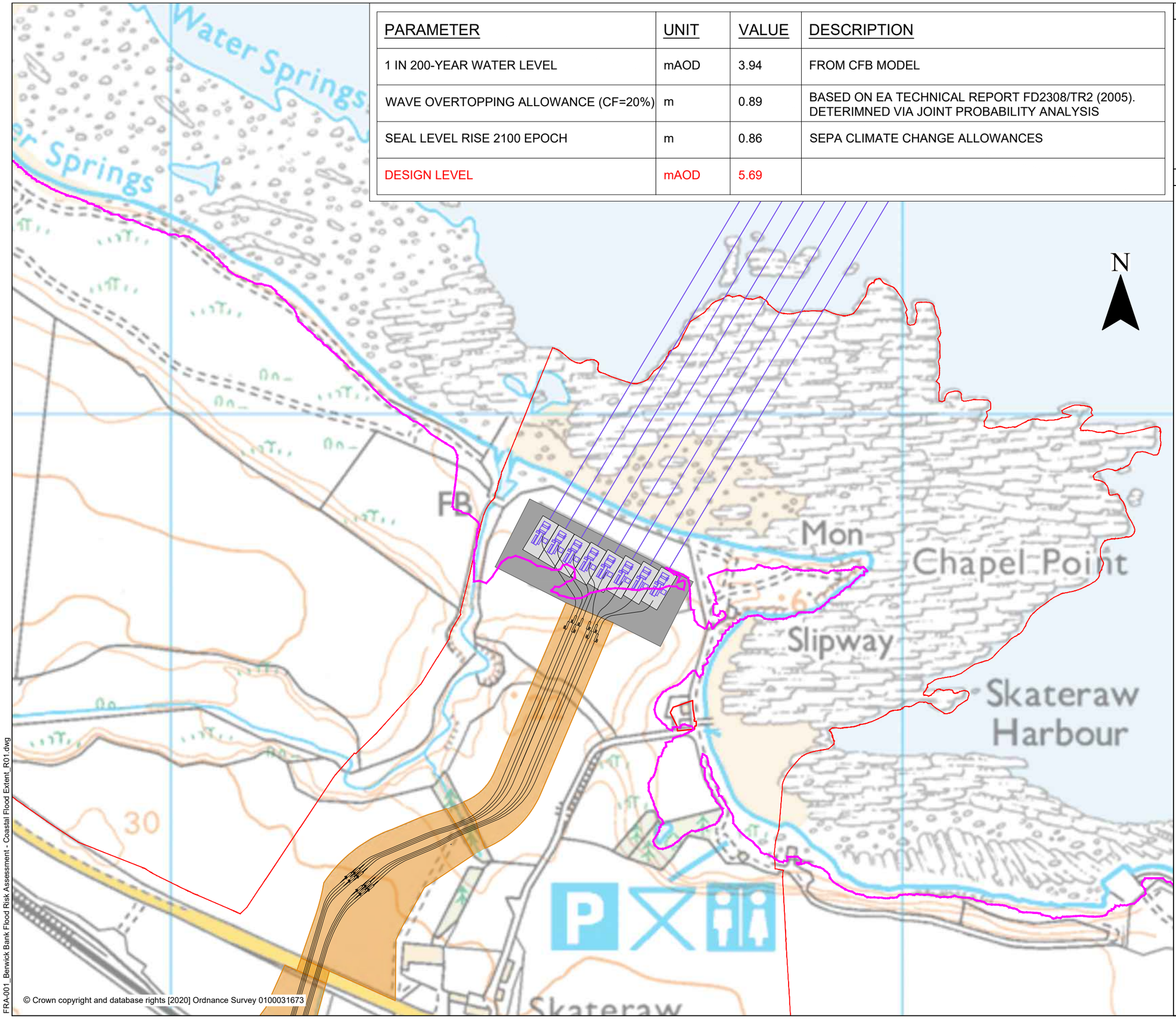
With respect to the onshore substation, the assessment confirms that the site is overall at 'no risk' or 'low risk' of flooding from all sources except 'flooding from land' which the screening assessment classified as 'medium' risk. The mitigation for this and full details are provided in the Drainage Strategy Report (EIAR Technical Appendix 11.2) which confirm that the onshore substation is considered at 'low' residual risk of flooding from land.

In accordance with SEPA guidance and NPF4, the Proposed Development is considered 'Essential Infrastructure' and is suitable within any flood risk zone, with further consideration required for developments in sparsely developed / undeveloped areas of 'medium' to 'high' risk, The screening assessment and technical assessments have shown that for all sources of flooding, the residual flood risk to the development and from the developed is considered to be 'no' to 'low' risk.

Taking all of the above into account it is considered there are no overriding impediments to the development being granted planning permission on the grounds of flood risk.

Drawings

PARAMETER	UNIT	VALUE	DESCRIPTION
1 IN 200-YEAR WATER LEVEL	mAOD	3.94	FROM CFB MODEL
WAVE OVERTOPPING ALLOWANCE (CF=20%)	m	0.89	BASED ON EA TECHNICAL REPORT FD2308/TR2 (2005). DETERIMNED VIA JOINT PROBABILITY ANALYSIS
SEAL LEVEL RISE 2100 EPOCH	m	0.86	SEPA CLIMATE CHANGE ALLOWANCES
DESIGN LEVEL	mAOD	5.69	



NOTES

1. DRAWING PRODUCED WITH REFERENCE TO INFORMATION PROVIDED BY SSE VIA PROJECT FILE SHAREPOINT.

LEGEND

- SITE BOUNDARY
- LANDFALL COMPOUND
- ONSHORE CABLE
- JOINT BAY
- CABLE CORRIDOR
- OFFSHORE CABLE
- COASTAL DESIGN FLOOD LEVEL - 5.69mAOD

REV	DATE	DESCRIPTION	BY	CHK
01	06/23	UPDATED CLIMATE CHANGE	SD	ZR
00	03/22	INITIAL ISSUE	SD	ZR

CLIENT: SSE RENEWABLES

PROJECT: BERWICK BANK OFFSHORE WINDFARM

DRAWING TITLE: **FLOOD RISK ASSESSMENT COASTAL FLOOD EXTENT**

SCALE: 1:5,000 @ A3

DATE: JUNE 2023

DRAWING NUMBER: **FRA-001**

REV: **01**

DRAWING STATUS: FOR PLANNING

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FRA-001_Berwick Bank Flood Risk Assessment - Coastal Flood Extent_R01.dwg

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Appendix A - Braidwood Burn ReFH2 Analysis

UK Design Flood Estimation

Generated on Tuesday, June 20, 2023 12:03:31 PM by steph
Printed from the ReFH2 Flood Modelling software package, version 3.3.8355.27598

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 26DB-1DC9

Site name: FEH_Catchment_Descriptors_373700_673250

Easting: 373700

Northing: 673250

Country: Scotland

Catchment Area (km²): 11.58

Using plot scale calculations: No

Model: 2.3

Site description: None

Model run: 200 year 1.39 CC

Summary of results

Rainfall - FEH 2013 model (mm):	103.82	Total runoff (ML):	253.41
Total Rainfall (mm):	68.32	Total flow (ML):	736.12
Peak Rainfall (mm):	18.58	Peak flow (m³/s):	16.88

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	04:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.69	No
ARF (Areal reduction factor)	0.95	No
Seasonality	Winter	No
Climate change factor	1.39	Yes

Loss model parameters

Name	Value	User-defined?
Cini (mm)	101.42	No
Cmax (mm)	423.17	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.35	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.24	No
BL (hr)	38.06	No
BR	2.12	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Printed from the ReFH2 Flood Modelling software package, version 3.3.8355.27598

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	1.952	0.000	0.472	0.000	0.237	0.237
00:30:00	3.663	0.000	0.911	0.045	0.235	0.280
01:00:00	6.811	0.000	1.778	0.220	0.235	0.456
01:30:00	12.442	0.000	3.530	0.651	0.244	0.895
02:00:00	18.580	0.000	5.953	1.583	0.272	1.856
02:30:00	12.442	0.000	4.442	3.407	0.338	3.745
03:00:00	6.811	0.000	2.587	6.103	0.465	6.568
03:30:00	3.663	0.000	1.437	9.210	0.671	9.881
04:00:00	1.952	0.000	0.779	12.205	0.959	13.164
04:30:00	0.000	0.000	0.000	14.445	1.315	15.760
05:00:00	0.000	0.000	0.000	15.176	1.708	16.884
05:30:00	0.000	0.000	0.000	14.519	2.097	16.616
06:00:00	0.000	0.000	0.000	13.029	2.451	15.480
06:30:00	0.000	0.000	0.000	11.158	2.754	13.912
07:00:00	0.000	0.000	0.000	9.251	3.000	12.252
07:30:00	0.000	0.000	0.000	7.625	3.195	10.820
08:00:00	0.000	0.000	0.000	6.260	3.345	9.605
08:30:00	0.000	0.000	0.000	5.050	3.458	8.508
09:00:00	0.000	0.000	0.000	3.940	3.537	7.478
09:30:00	0.000	0.000	0.000	2.910	3.586	6.496
10:00:00	0.000	0.000	0.000	1.954	3.606	5.561
10:30:00	0.000	0.000	0.000	1.138	3.602	4.740
11:00:00	0.000	0.000	0.000	0.566	3.579	4.145
11:30:00	0.000	0.000	0.000	0.242	3.543	3.785
12:00:00	0.000	0.000	0.000	0.082	3.501	3.584
12:30:00	0.000	0.000	0.000	0.015	3.457	3.473
13:00:00	0.000	0.000	0.000	0.000	3.412	3.412
13:30:00	0.000	0.000	0.000	0.000	3.368	3.368
14:00:00	0.000	0.000	0.000	0.000	3.324	3.324
14:30:00	0.000	0.000	0.000	0.000	3.280	3.280
15:00:00	0.000	0.000	0.000	0.000	3.237	3.237
15:30:00	0.000	0.000	0.000	0.000	3.195	3.195
16:00:00	0.000	0.000	0.000	0.000	3.154	3.154
16:30:00	0.000	0.000	0.000	0.000	3.112	3.112
17:00:00	0.000	0.000	0.000	0.000	3.072	3.072

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.000	0.000	0.000	0.000	3.032	3.032
18:00:00	0.000	0.000	0.000	0.000	2.992	2.992
18:30:00	0.000	0.000	0.000	0.000	2.953	2.953
19:00:00	0.000	0.000	0.000	0.000	2.914	2.914
19:30:00	0.000	0.000	0.000	0.000	2.876	2.876
20:00:00	0.000	0.000	0.000	0.000	2.839	2.839
20:30:00	0.000	0.000	0.000	0.000	2.802	2.802
21:00:00	0.000	0.000	0.000	0.000	2.765	2.765
21:30:00	0.000	0.000	0.000	0.000	2.729	2.729
22:00:00	0.000	0.000	0.000	0.000	2.694	2.694
22:30:00	0.000	0.000	0.000	0.000	2.658	2.658
23:00:00	0.000	0.000	0.000	0.000	2.624	2.624
23:30:00	0.000	0.000	0.000	0.000	2.589	2.589
24:00:00	0.000	0.000	0.000	0.000	2.556	2.556
24:30:00	0.000	0.000	0.000	0.000	2.522	2.522
25:00:00	0.000	0.000	0.000	0.000	2.489	2.489
25:30:00	0.000	0.000	0.000	0.000	2.457	2.457
26:00:00	0.000	0.000	0.000	0.000	2.425	2.425
26:30:00	0.000	0.000	0.000	0.000	2.393	2.393
27:00:00	0.000	0.000	0.000	0.000	2.362	2.362
27:30:00	0.000	0.000	0.000	0.000	2.331	2.331
28:00:00	0.000	0.000	0.000	0.000	2.301	2.301
28:30:00	0.000	0.000	0.000	0.000	2.271	2.271
29:00:00	0.000	0.000	0.000	0.000	2.241	2.241
29:30:00	0.000	0.000	0.000	0.000	2.212	2.212
30:00:00	0.000	0.000	0.000	0.000	2.183	2.183
30:30:00	0.000	0.000	0.000	0.000	2.154	2.154
31:00:00	0.000	0.000	0.000	0.000	2.126	2.126
31:30:00	0.000	0.000	0.000	0.000	2.098	2.098
32:00:00	0.000	0.000	0.000	0.000	2.071	2.071
32:30:00	0.000	0.000	0.000	0.000	2.044	2.044
33:00:00	0.000	0.000	0.000	0.000	2.017	2.017
33:30:00	0.000	0.000	0.000	0.000	1.991	1.991
34:00:00	0.000	0.000	0.000	0.000	1.965	1.965
34:30:00	0.000	0.000	0.000	0.000	1.939	1.939
35:00:00	0.000	0.000	0.000	0.000	1.914	1.914

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:30:00	0.000	0.000	0.000	0.000	1.889	1.889
36:00:00	0.000	0.000	0.000	0.000	1.864	1.864
36:30:00	0.000	0.000	0.000	0.000	1.840	1.840
37:00:00	0.000	0.000	0.000	0.000	1.816	1.816
37:30:00	0.000	0.000	0.000	0.000	1.792	1.792
38:00:00	0.000	0.000	0.000	0.000	1.769	1.769
38:30:00	0.000	0.000	0.000	0.000	1.746	1.746
39:00:00	0.000	0.000	0.000	0.000	1.723	1.723
39:30:00	0.000	0.000	0.000	0.000	1.701	1.701
40:00:00	0.000	0.000	0.000	0.000	1.678	1.678
40:30:00	0.000	0.000	0.000	0.000	1.657	1.657
41:00:00	0.000	0.000	0.000	0.000	1.635	1.635
41:30:00	0.000	0.000	0.000	0.000	1.614	1.614
42:00:00	0.000	0.000	0.000	0.000	1.593	1.593
42:30:00	0.000	0.000	0.000	0.000	1.572	1.572
43:00:00	0.000	0.000	0.000	0.000	1.551	1.551
43:30:00	0.000	0.000	0.000	0.000	1.531	1.531
44:00:00	0.000	0.000	0.000	0.000	1.511	1.511
44:30:00	0.000	0.000	0.000	0.000	1.491	1.491
45:00:00	0.000	0.000	0.000	0.000	1.472	1.472
45:30:00	0.000	0.000	0.000	0.000	1.453	1.453
46:00:00	0.000	0.000	0.000	0.000	1.434	1.434
46:30:00	0.000	0.000	0.000	0.000	1.415	1.415
47:00:00	0.000	0.000	0.000	0.000	1.396	1.396
47:30:00	0.000	0.000	0.000	0.000	1.378	1.378
48:00:00	0.000	0.000	0.000	0.000	1.360	1.360
48:30:00	0.000	0.000	0.000	0.000	1.342	1.342
49:00:00	0.000	0.000	0.000	0.000	1.325	1.325
49:30:00	0.000	0.000	0.000	0.000	1.308	1.308
50:00:00	0.000	0.000	0.000	0.000	1.291	1.291
50:30:00	0.000	0.000	0.000	0.000	1.274	1.274
51:00:00	0.000	0.000	0.000	0.000	1.257	1.257
51:30:00	0.000	0.000	0.000	0.000	1.241	1.241
52:00:00	0.000	0.000	0.000	0.000	1.225	1.225
52:30:00	0.000	0.000	0.000	0.000	1.209	1.209
53:00:00	0.000	0.000	0.000	0.000	1.193	1.193

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:30:00	0.000	0.000	0.000	0.000	1.177	1.177
54:00:00	0.000	0.000	0.000	0.000	1.162	1.162
54:30:00	0.000	0.000	0.000	0.000	1.147	1.147
55:00:00	0.000	0.000	0.000	0.000	1.132	1.132
55:30:00	0.000	0.000	0.000	0.000	1.117	1.117
56:00:00	0.000	0.000	0.000	0.000	1.102	1.102
56:30:00	0.000	0.000	0.000	0.000	1.088	1.088
57:00:00	0.000	0.000	0.000	0.000	1.074	1.074
57:30:00	0.000	0.000	0.000	0.000	1.060	1.060
58:00:00	0.000	0.000	0.000	0.000	1.046	1.046
58:30:00	0.000	0.000	0.000	0.000	1.032	1.032
59:00:00	0.000	0.000	0.000	0.000	1.019	1.019
59:30:00	0.000	0.000	0.000	0.000	1.005	1.005
60:00:00	0.000	0.000	0.000	0.000	0.992	0.992
60:30:00	0.000	0.000	0.000	0.000	0.979	0.979
61:00:00	0.000	0.000	0.000	0.000	0.967	0.967
61:30:00	0.000	0.000	0.000	0.000	0.954	0.954
62:00:00	0.000	0.000	0.000	0.000	0.942	0.942
62:30:00	0.000	0.000	0.000	0.000	0.929	0.929
63:00:00	0.000	0.000	0.000	0.000	0.917	0.917
63:30:00	0.000	0.000	0.000	0.000	0.905	0.905
64:00:00	0.000	0.000	0.000	0.000	0.893	0.893
64:30:00	0.000	0.000	0.000	0.000	0.882	0.882
65:00:00	0.000	0.000	0.000	0.000	0.870	0.870
65:30:00	0.000	0.000	0.000	0.000	0.859	0.859
66:00:00	0.000	0.000	0.000	0.000	0.848	0.848
66:30:00	0.000	0.000	0.000	0.000	0.837	0.837
67:00:00	0.000	0.000	0.000	0.000	0.826	0.826
67:30:00	0.000	0.000	0.000	0.000	0.815	0.815
68:00:00	0.000	0.000	0.000	0.000	0.804	0.804
68:30:00	0.000	0.000	0.000	0.000	0.794	0.794
69:00:00	0.000	0.000	0.000	0.000	0.783	0.783
69:30:00	0.000	0.000	0.000	0.000	0.773	0.773
70:00:00	0.000	0.000	0.000	0.000	0.763	0.763
70:30:00	0.000	0.000	0.000	0.000	0.753	0.753
71:00:00	0.000	0.000	0.000	0.000	0.743	0.743

Printed from the ReFH2 Flood Modelling software package, version 3.3.8355.27598

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
71:30:00	0.000	0.000	0.000	0.000	0.734	0.734
72:00:00	0.000	0.000	0.000	0.000	0.724	0.724
72:30:00	0.000	0.000	0.000	0.000	0.715	0.715
73:00:00	0.000	0.000	0.000	0.000	0.705	0.705
73:30:00	0.000	0.000	0.000	0.000	0.696	0.696
74:00:00	0.000	0.000	0.000	0.000	0.687	0.687
74:30:00	0.000	0.000	0.000	0.000	0.678	0.678
75:00:00	0.000	0.000	0.000	0.000	0.669	0.669
75:30:00	0.000	0.000	0.000	0.000	0.660	0.660
76:00:00	0.000	0.000	0.000	0.000	0.652	0.652
76:30:00	0.000	0.000	0.000	0.000	0.643	0.643

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Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	11.58	No
ALTBAR	227	No
ASPBAR	28	No
ASPVAR	0.36	No
BFIHOST	0.68	No
BFIHOST19	0.5	No
DPLBAR (km)	4.66	No
DPSBAR (mkm^{-1})	170.7	No
FARL	1	No
LDP	9.44	No
PROPWET	0.43	No
RMED1H	8.8	No
RMED1D	36.4	No
RMED2D	47.7	No
SAAR (mm)	764	No
SAAR4170 (mm)	788	No
SPRHOST	30.66	No
Urbext2000	0	No
Urbext1990	0	No
URBCONC	0	No
URBLOC	0	No
DDF parameter C	-0.01	No
DDF parameter D1	0.44	No
DDF parameter D2	0.53	No
DDF parameter D3	0.2	No
DDF parameter E	0.24	No
DDF parameter F	2.21	No
DDF parameter C (1km grid value)	-0.01	No
DDF parameter D1 (1km grid value)	0.43	No
DDF parameter D2 (1km grid value)	0.54	No
DDF parameter D3 (1km grid value)	0.21	No
DDF parameter E (1km grid value)	0.24	No
DDF parameter F (1km grid value)	2.2	No

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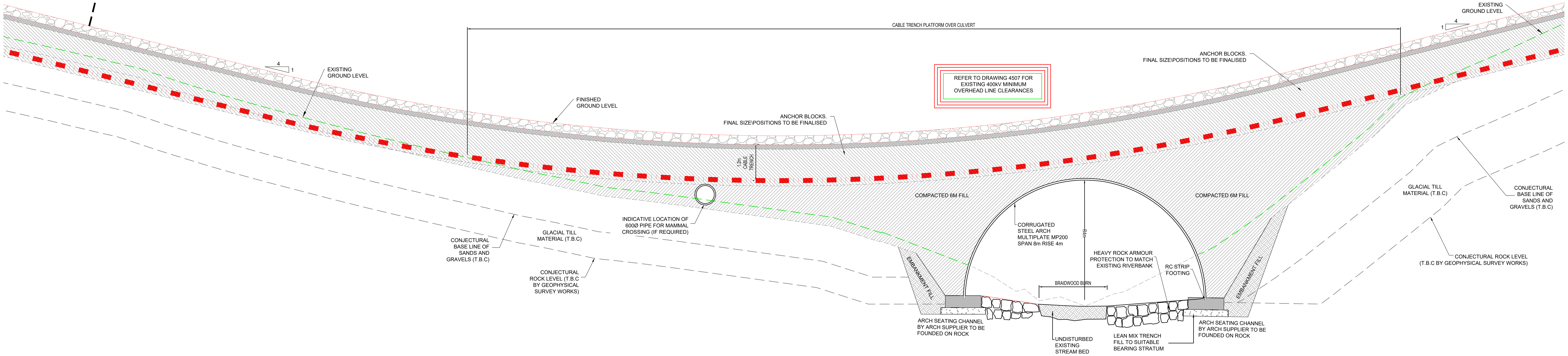
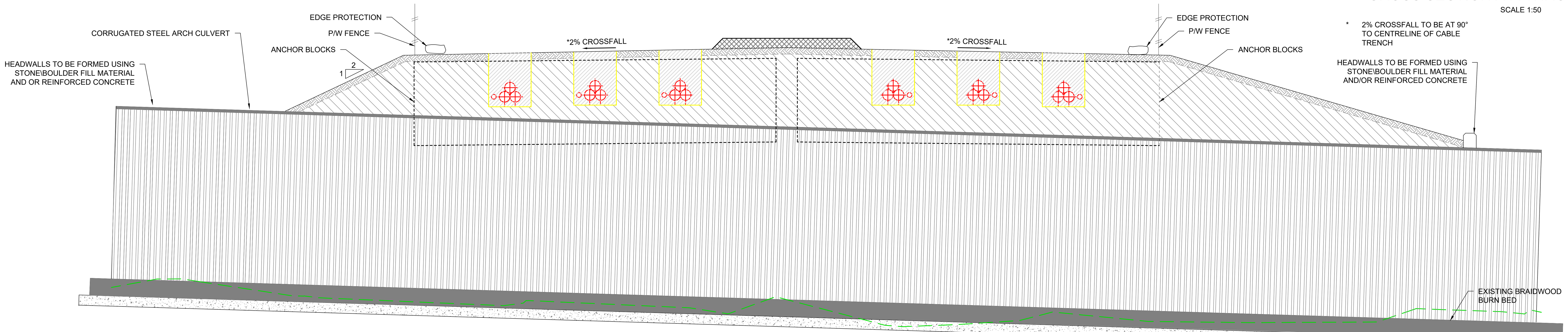
Appendix B - Braidwood Burn Crossing Design

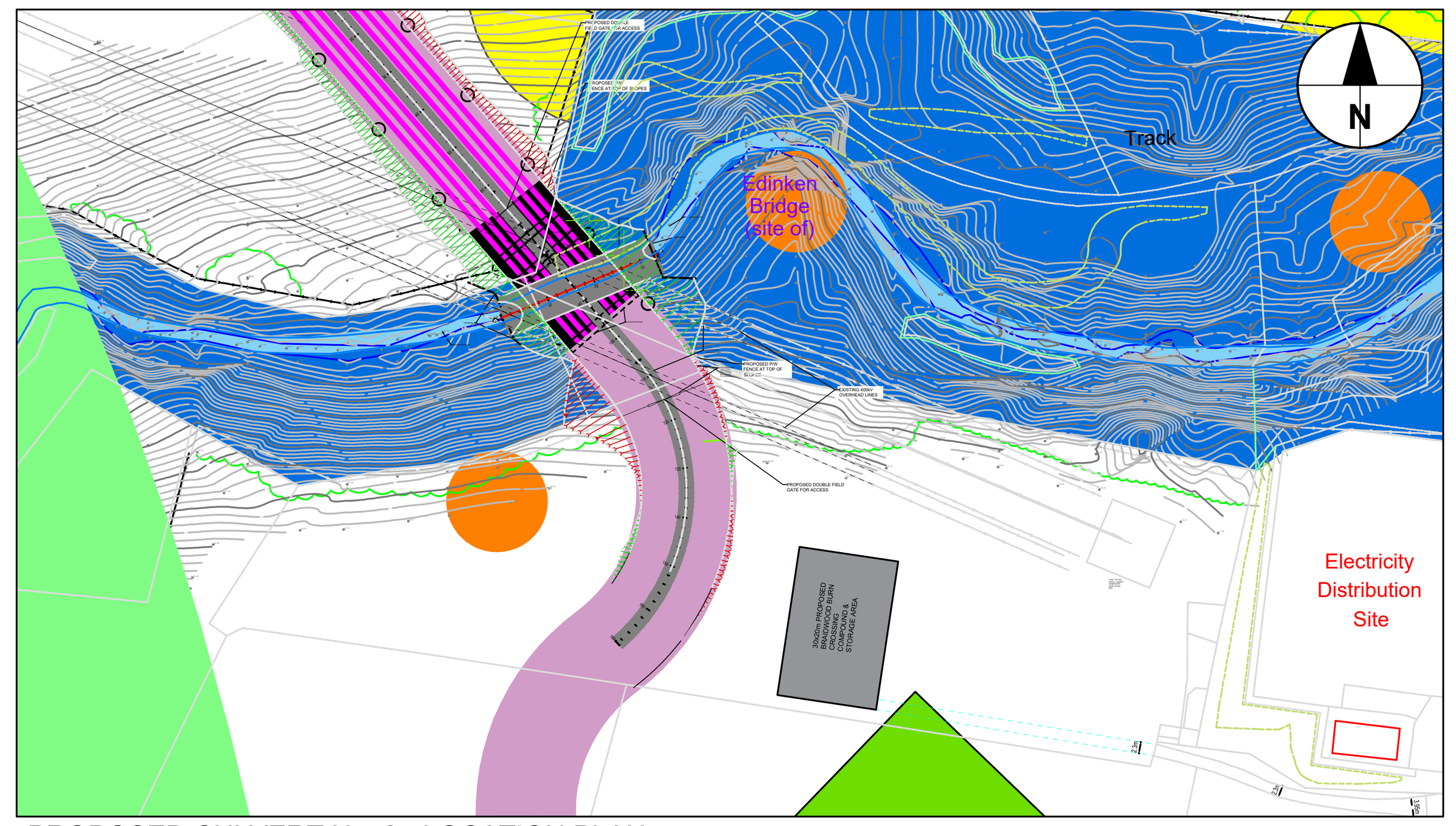


CROSS SECTION A-A THROUGH CULVERT

SCALE 1:50

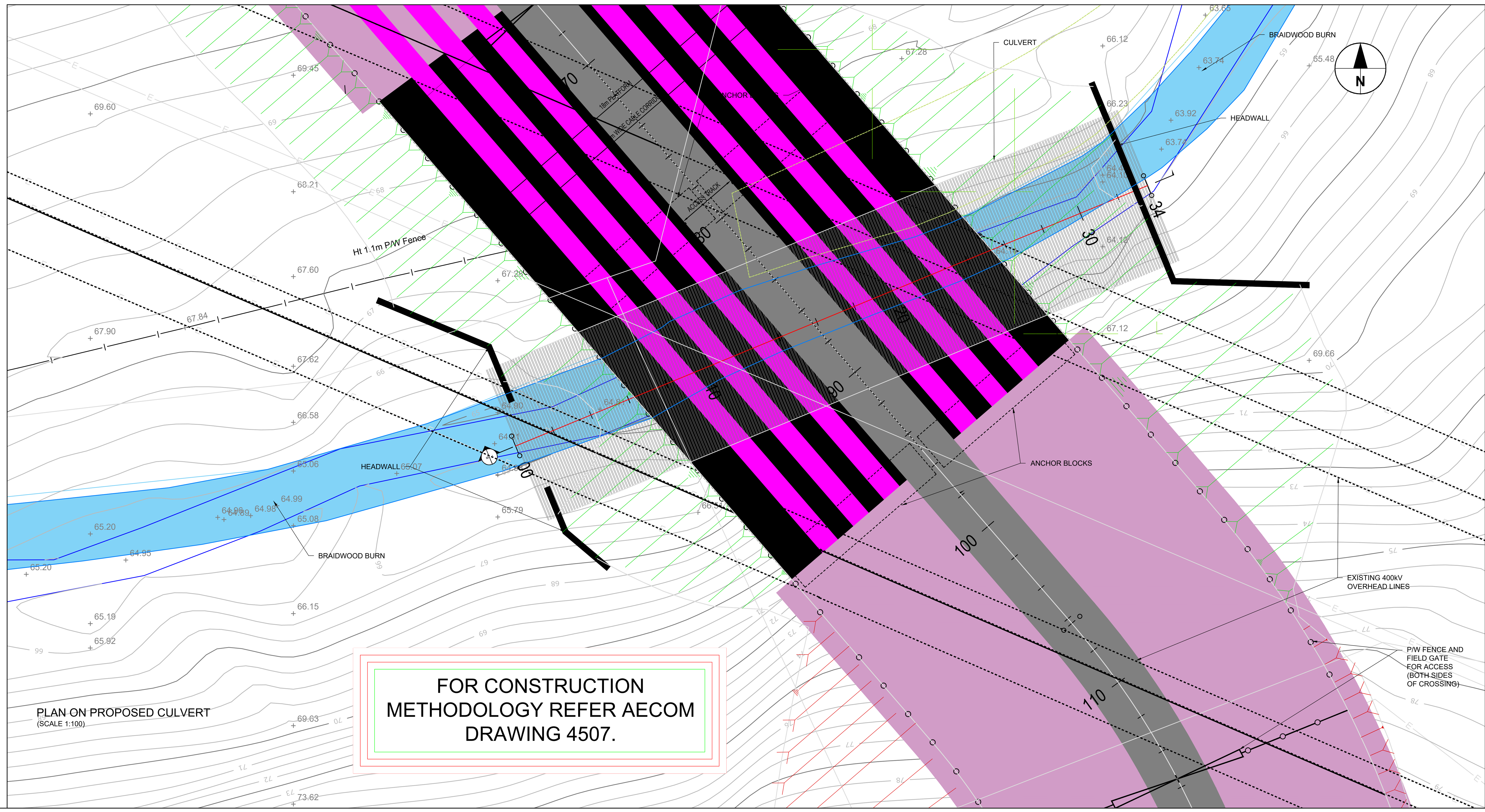


SECTION B-B - LONG SECTION AT CULVERT No. 2 - SCALE: H 1:50,V 1:50



PROPOSED CULVERT No. 2 - LOCATION PLAN

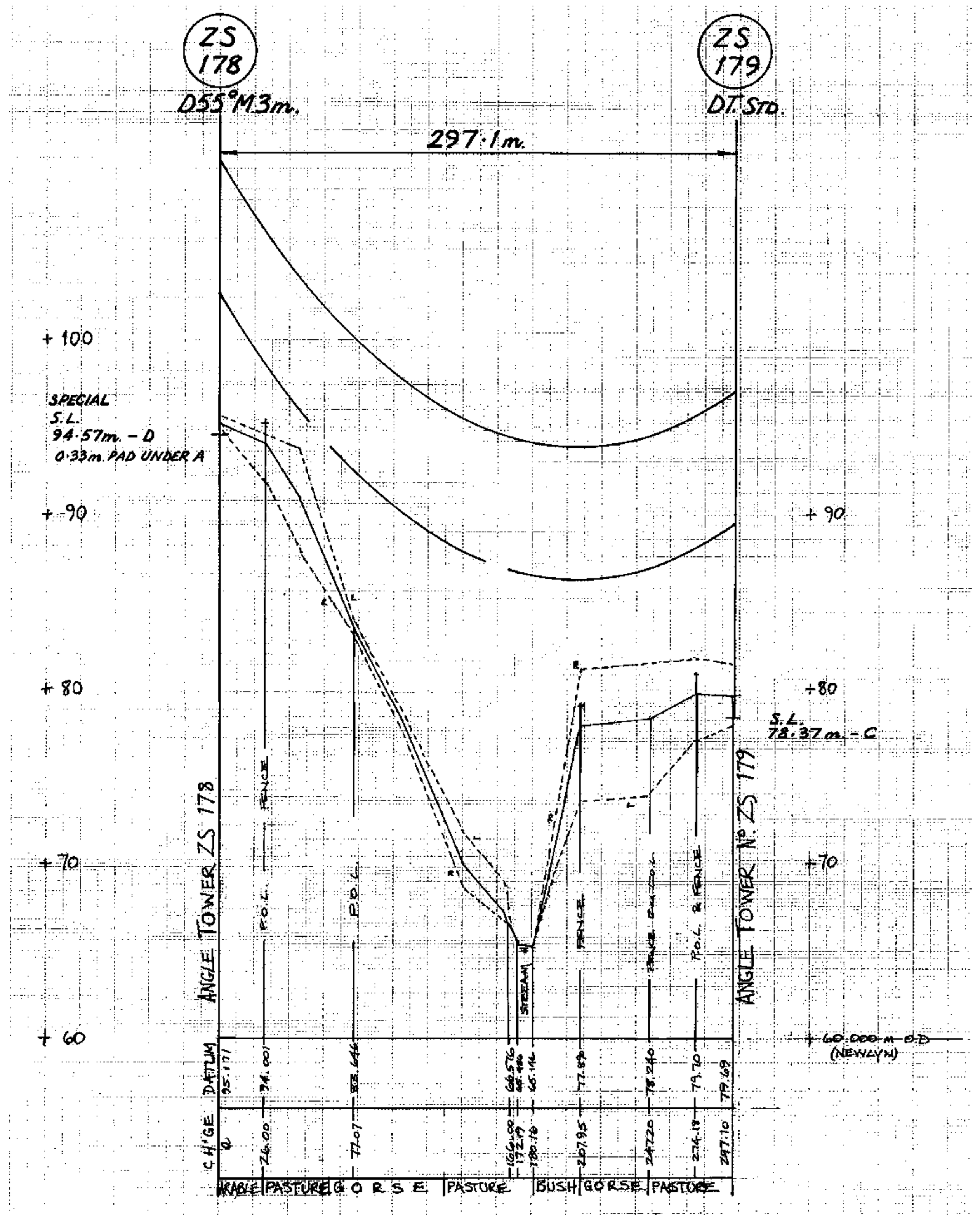
(SCALE 1:1000)



PLAN ON PROPOSED CULVERT

(SCALE 1:100)

FOR CONSTRUCTION METHODOLOGY REFER AECOM DRAWING 4507.



EXISTING SCOTTISH POWER 400kV OVERHEAD LINE PROFILE

(N.T.S)

AECOM

PROJECT

BERWICK BANK OFFSHORE WINDFARM ONSHORE CABLE ROUTE

CLIENT

BERWICK BANK WIND LIMITED

Consultant

Aecom
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Edinburgh
EH3 5DA
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Fax +44 (0)131 301 8699
Tel +44 (0)131 301 8600
www.aecom.com

Notes

1. FOR DETAILS REFER TO DRAWING 60646019-ACM-XX-00-DR-CE-4507.
2. OVERHEAD LINE HEIGHTS BASED ON SOUTH OF SCOTLAND ELECTRICITY BOARD RECORDS - 400kV OVERHEAD LINE PROFILE TOWER NOs ZS 177-179 - DOCUMENT REFERENCE P.828-30B. ALL HEIGHTS TO BE SITE CHECKED BY APPOINTED CONTRACTOR AT DETAILED DESIGN STAGE.

NOT FOR CONSTRUCTION

FOR INFORMATION

ISSUE/REVISION

Rev	Date	Description	Drn/Chk/Appr
R06	12.10.21	AMENDED TO SSE COMMENTS.	GMcE / CGY / RT
R05	11.10.21	CORRECTED TO SPEN OHL PROFILE DATA	GMcE / CGY / DL
R04	04.10.21	ALIGNMENT AMENDED FOR CLARITY.	GMcE / CGY/DL
R03	28.09.21	OHL LEVELS CORRECTED.	GMcE / CGY / CGY
R02	27.09.21	COMPOUNDS AND OHL HEIGHTS ADDED.	GMcE/CGY/CGY
R01	19.08.21	REVISED TO CLIENTS COMMENTS	DR/CGY/CGY
R0	23.07.21	1st ISSUE	DR/CGY/CGY

Key Plan

Suitability Status

S2 - Suitable For Information

Project Number

60646019

Sheet Title

BRAIDWOOD BURN
PROPOSED CULVERT No. 2
TYPICAL DETAILS

Sheet Number

60646019-ACM-XX-00-DR-CE-4506

Scale: As shown @A0 **Rev:** R06

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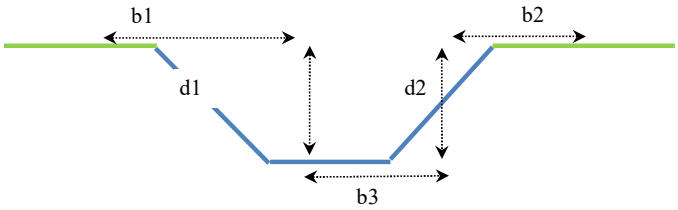
Project Management Initials: Designer: MMcF Checked: DWT Approved: DR ISO A0 841mm x 1189mm

Last saved by: GRAHAM.MCEWAN(2021-10-13) Last Plotted: 2021-10-13

Appendix C - Braidwood Burn Manning's Equation Calculations

Spreadsheet to Determine Open Channel Flow - Using Manning's Equation

Given a typical channel cross section:



Peak Flow to Convey =	16.880	m^3/s	*estimated from ReFH2 analysis - 200-year peak flow +39% climate change uplif*

When channel dimensions are:

b1 =	4.000	(m)	*Adjusted to estimate cross-sectional area required to convey peak flow*
d1 =	1.000	(m)	*Adjusted to estimate cross-sectional area required to convey peak flow*
Left Hand Slope (1 in X)	4.000		*Measured from topographic survey*
b2 =	1.338	(m)	*Adjusted to estimate cross-sectional area required to convey peak flow*
d2 =	1.000	(m)	*Adjusted to estimate cross-sectional area required to convey peak flow*
Right Hand Slope (1 in X)	1.333		*Measured from topographic survey*
b3 =	11.000	(m)	*Base of valley measured from topographic survey*
S =	0.010	(dim)	*Measured from topographic survey (decreased slope for conservative estimate)*
n =	0.07	(dim)	*Estimated from published values and site observations*

Mannings Equation is:

$$V = \frac{R^{0.67} \times S^{0.5}}{n}$$

where:

V	Velocity (m/s)
R	(Cross Sectional Area of ditch) / (Wetted Perimeter)
S	Slope
n	Mannings Coefficient of Roughness
A	Cross Sectional Channel Area (m^2)
P	Wetted Perimeter (m)

Gives:

R =	0.814	m	
V =	1.245	(m/s)	
P =	16.794	m	
A =	**13.669**	m^2	**Required Cross-Sectional Area**
Q =	17.011	(m^3/s bankfull)	

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