

# 7 Ecology and Nature Conservation

## Contents

7.1	Introduction	7-1
7.2	Legislation, Policy and Guidelines	7-2
7.3	Consultation	7-3
7.4	Assessment Methodology and Significance Criteria	7-6
7.5	Ecological Baseline	7-11
7.6	Evaluation of Recorded Features	7-26
7.7	Receptors Brought Forward for Assessment	7-30
7.8	Standard Mitigation	7-32
7.9	Potential Effects	7-33
7.10	Additional Mitigation	7-41
7.11	Residual Effects	7-42
7.12	Compensation	7-43
7.13	Cumulative Assessment	7-43
7.14	Summary	7-44
7.15	References	7-49

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# 7 Terrestrial Ecology and Nature Conservation

## 7.1 Introduction

- 7.1.1 This chapter sets out the methods used to describe and evaluate the non-avian ecological interests within the Study Area of the Proposed Development. It documents the non-avian ecological baseline and includes an assessment of the potential effects of the Proposed Development on ecological features above a certain value, and defines mitigation and compensation measures where significant effects are predicted.
- 7.1.2 The non-avian ecological studies which form the basis of this chapter were conducted by appropriately qualified and experienced ecologists (refer to Chapter 1) . Ornithological features are described and assessed in Chapter 6: *Ornithology*.
- 7.1.3 The Proposed Development is described in full in Chapter 3: Proposed Development but can be summarised as a 29-turbine wind farm on an area of moorland covering circa 1,689 hectares (ha). The operational lifespan is expected to be 30 years; turbine tip height will be up to a maximum of 200m, with the nacelle mounted on a tapering tubular steel tower. Associated works will include cabling, access tracks, temporary borrow pits (as required), substation, crane pads and temporary construction compounds.
- 7.1.4 The site of the Proposed Development is located in the north-west of the northern tip of Yell. The Dalsetter Hill Road (known locally as the Old Cullivoe Road) runs from the head of Basta Voe to Cullivoe on the east coast of Yell; this track runs along much of the eastern edge of the site and forms part of the access to the site from the A968 From the Old Cullivoe Road, the site extends to just short of the western coastal cliffs and rocky exposures; to the head of Gloup Voe in the north and the head of Basta Voe to the south. The landscape is principally one of undulating peat moorland, with numerous waterbodies (from bog pools to small lochs) and small burns. The moorland includes areas of grassland and the whole application area is subject to sheep grazing.
- 7.1.5 This chapter has been authored by ITP Energised (ITPE) and is supported by baseline data provided in the following technical appendices:
- **Appendix 7.1** – Non-Avian Desk Study;
  - **Appendix 7.2** – Phase 1 habitat and National Vegetation Classification (NVC) surveys ;
  - **Appendix 7.3** – Additional Phase 1 habitat survey of a proposed access track route;
  - **Appendix 7.4** – Otter (*Lutra lutra*) survey;
  - **Appendix 7.5** – Freshwater Pearl Mussel (*Margaritifera margaritifera*) survey;
  - **Appendix 7.6** – Fisheries survey; and
  - **Appendix 7.7** – Outline Habitat Management Plan.
- 7.1.6 It should be noted that while the Proposed Development application site boundary is fixed, the “Study Area” is variable, depending upon the survey being undertaken. The standard “Study Area” for ecological survey often includes a 50 m radius buffer beyond a planning application boundary, unless otherwise stated. However, for this assessment, vegetation studies are shown to the site boundary (though surveys were conducted for the original, larger application area), which goes well beyond the designed elements of the Proposed Development and includes provision for identification of groundwater dependent terrestrial ecosystems (GWDTES) within a 250 m radius of all proposed infrastructure. Otter survey results are displayed to a 250 m radius around the application boundary.

## 7.2 Legislation, Policy and Guidelines

7.2.1 Production of this chapter has taken into consideration a range of national planning policy guidelines, international commitments, legislation and planning policies and general guidance relevant to the protection, conservation and enhancement of nature conservation interests associated with the Proposed Development.

### **Legislation**

7.2.2 National and international legislation includes:

- Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive) (European Commission, 2019). Annex I to the directive lists habitats of importance at the international (European) level (i.e. “priority habitats”); Annex II lists the species of importance at the international (European) level (i.e. European Protected Species, EPS);
- The Wildlife and Countryside Act 1981 (as amended) (WCA) (UK Government, 2019a);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland; most recently in 2012) (The Habitats Regulations) (UK Government, 2019b);
- The Nature Conservation (Scotland) Act 2004 (as amended) (NCA) (UK Government, 2019c);
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (WANE) (UK Government, 2019d);
- Planning Advice Note (PAN) 60: Planning for Natural Heritage (Scottish Government, 2008);

7.2.3 The hierarchy and interrelationship between the various international, UK national and Scottish legislative instruments is discussed in Chapter 6: *Ornithology* (see Section 6.3 *Legislation, Policy and Guidelines*) and, for brevity, is not repeated here. The key instruments, in respect of the non-avian interests of the study, in delivering the Habitats Directive are the amended 1994 Habitats Regulations in combination with the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004.

7.2.4 Additional legislative instruments considered include the Salmon and Freshwater Fisheries (consolidation)(Scotland) Act 2003, which includes provision for the protection of young salmon and spawning beds (Scottish Executive, 2003)

7.2.5 As a result of the Nature Conservation (Scotland) Act 2004 (and in fulfilment of the 1992 UN Convention on Biological Diversity), measures required to protect species and habitats of importance to Scotland were set out in the document “Scotland’s Biodiversity: It’s in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland” (Scottish Executive, 2004); this document, together with “2020 Challenge for Scotland’s Biodiversity” (Scottish Government, 2013a), comprises the Scottish Biodiversity Strategy.

### **Planning Policy**

7.2.6 Scottish Planning Policy (SPP) (Scottish Government, 2014) has also been taken into account through this assessment (see Section 6.3 of Chapter 6: *Ornithology* for further details). The SPP sets out planning policies including those that relate to the protection of biodiversity. Guidance includes that contained within Planning Advice Note (PAN) 60: Planning for Natural Heritage (Scottish Government, 2008). Local planning documents considered included the Shetland Local Development Plan 2014 (Shetland Islands Council, 2014).

### **Biodiversity Lists**

7.2.7 Scottish Ministers created the SBL in 2005 to satisfy the requirements under Section 2(4) of the Nature Conservation (Scotland) Act 2004, assist public bodies in carrying out conservation of biodiversity, as well as to provide the general public with information regarding conservation within

Scotland (the latest update was in 2013; Scottish Government, 2013b). The SBL comprises species and habitats listed using both scientific and social criteria. Only scientific criteria are considered relevant to this report.

- 7.2.8 The Shetland Island's Local Biodiversity Action Plan (LBAP), "The Living Shetland Project" (Shetland Islands Council, 2019), identifies locally important habitats and species and highlights and promotes actions to conserve them. The LBAP was developed with a range of partner organisations to coordinate its development and implementation. See Appendix 7.1 for more detail. The Biodiversity Duty Report 2015-2017 sets out how Shetland Islands Council (2018) has implemented the requirements of the WANE Act 2011 to further biodiversity when carrying out its activities.

### **Guidance**

- 7.2.9 Survey work to inform the assessment has been carried out in accordance with industry standard guidance:

- Handbook for Phase 1 Habitat Survey - a technique for environmental audit (JNCC, 2010);
- National Vegetation Classification Users' Handbook (Rodwell, 2006);
- Monitoring the Otter *Lutra Lutra* (Chanin, 2003);
- Freshwater pearl mussel survey protocol (SNH, undated);
- Restoration of Riverine Trout Habitats: A Guidance Manual (Summers et al., 1996);
- Restoration of Riverine salmon habitats (Hendry & Cragg-Hine, 1997);
- Guidance for applicants on supporting information requirements for hydropower applications (SEPA, 2010a); and
- Scottish Fisheries Co-ordination Centre Training Manual: Team Leader Electrofishing (SFCC, 2014).

- 7.2.10 Guidance used to inform the assessments:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018);
- Good Practice During Wind Farm Construction (SNH, 2015a); and
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012).

## **7.3 Consultation**

- 7.3.1 Scoping opinions relevant to ecology and nature conservation have been obtained from the following consultees:

- Marine Scotland Science (MSS);
- Royal Society for the Protection of Birds (RSPB) Scotland;
- Scottish Environment Protection Agency (SEPA);
- Scottish Natural Heritage (SNH); and
- Shetland Amenity Trust.

- 7.3.2 The scoping opinions from these organisations relevant to the non-avian ecology of the site are summarised in Table 7.1, below. Responses relevant to ornithology are described in Chapter 6: Ornithology of this EIA Report.

**Table 7.1 – Scoping Opinion Relevant to Non-avian Ecology**

Consultee	Summary of opinion	Where addressed
MSS	<p>MSS highlighted the following environmental issues:</p> <p>A number of watercourses drain the Proposed Development site in which salmon and trout populations have been recorded. These salmonids are important for both economic and conservation interests; salmon is listed in the EU Habitats directive as a species of European importance and both salmon and trout are listed in the SBL as priority species for conservation. The presence of these populations within the Proposed Development area necessitates appropriate mitigation and monitoring programmes to be established, as a means of avoiding and/or minimising the potential impacts of the Proposed Development on these valuable fish stocks and to ensure the water quality does not deteriorate; the latter is a requirement of the Water Framework Directive.</p>	<p>Fish habitat and species are identified in Section 7.6 of this chapter. See also Chapter 10: <i>Geology, Peat, Hydrology &amp; Hydrogeology</i></p>
RSPB	<p>The RSPB highlighted the following environmental issues:</p> <p>The presence of (likely active) blanket bog (of consideration as an important habitat-type);</p> <p>The potential for the release of stored carbon from the deep peat during construction works, storage and disposal of excavated peat;</p> <p>The potential for in-combination or cumulative effects with other windfarms (proposed, consented and already constructed) and other developments; and</p> <p>Potential biosecurity risks associated with the use of contaminated plant, other equipment or materials.</p>	<p>The presence of active blanket bog across the Proposed Development site, the potential construction impacts of the Proposed Development and peat management requirements have been taken into account through the iterative design process (see Chapter 2: <i>Design Iteration</i>) and is more fully explored in Chapter 10: <i>Geology, Peat, Hydrology &amp; Hydrogeology</i>. As a habitat, peat is assessed in Section 7.7 of this chapter.</p> <p>Cumulative impacts on the ecology of the Proposed Development site are assessed in Section 7.14 of this chapter.</p> <p>Biosecurity, with regards to plant and equipment is</p>

Consultee	Summary of opinion	Where addressed
		<p>addressed in Section 7.11 of this chapter.</p> <p>See Chapter 6: <i>Ornithology</i> for opinion relating to the avian interests of the Proposed Development</p>
SEPA	<p>SEPA highlighted the following environmental issues:</p> <p>Disruption to groundwater dependent terrestrial ecosystems (GWDTEs); and</p> <p>Disturbance and re-use of excavated peat and other carbon-rich soils.</p>	<p>The GWDTE presence is identified in Section 7.6 of this chapter.</p> <p>Disturbance and re-use of excavated peat is detailed in Chapter 10: <i>Geology, Peat, Hydrology &amp; Hydrogeology</i>.</p>
Shetland Amenity Trust	<p>Shetland Amenity Trust highlighted the following environmental issues:</p> <p>Much of the area is active blanket mire and therefore is a European priority habitat;</p> <p>It needs to be made clear how the 'waste peat' will be stored/disposed of;</p> <p>The proximity of the Proposed Development to surrounding Special Area of Conservation (SAC) sites; and</p> <p>There is no proposal to survey lower plants, notably bryophytes, or invertebrates. Given the habitat quality and northern latitude, it is possible that the mire could hold species of importance in a British context.</p>	<p>The presence of active blanket bog across the Proposed Development site, the potential construction impacts of the Proposed Development and requirements of peat management have been taken into account through the iterative design process (see Chapter 2: Design Iteration) and is more fully explored in Chapter 10: <i>Geology, Peat, Hydrology &amp; Hydrogeology</i>. As a habitat, peat is assessed in Section 7.7 of this chapter.</p> <p>The proximity of designated sites is assessed in Section 7.7 of this chapter.</p> <p>The presence of lower plants is identified when conducting an NVC (i.e. Phase 2 habitat study); the results of the study are summarised in Section 7.6 of this chapter and the full</p>

Consultee	Summary of opinion	Where addressed
		survey presented in Appendix 7.2.
SNH	<p>Ascertained through dialogue (including through meetings), key natural heritage issues highlighted by SNH included:</p> <p>Impacts on peatland and peatland habitats;</p> <p>Cumulative impacts on Natural Heritage Zones; and</p> <p>Potential impacts on otters.</p> <p>All other concerns relate to ornithological interests of the area (see Chapter 6: <i>Ornithology</i>)</p>	Disturbance to peat and peatland habitats addressed in Chapter 10: <i>Geology, Peat, Hydrology &amp; Hydrogeology</i> ; cumulative impacts to non-avian ecological interests are considered in Section 7.14 of this chapter, and impacts to otter are addressed in Sections 7.10 and 7.13 of this chapter.
Marine Scotland	<p>Salmon and trout populations may be affected.</p> <p>Recommends site characterisation surveys of fish populations be undertaken</p>	Watercourses and waterbodies were assessed: see Section 7.5 of this chapter and Appendix 7.6.

## 7.4 Assessment Methodology and Significance Criteria

### **Ecological Desk Study**

- 7.4.1 As described in Appendix 7.1, and following CIEEM (2018) guidelines, a desk study was carried out (information gathered 2016-19) to identify the presence of statutory and non-statutory nature conservation sites within 5 km of the site boundary (N.B. relating to terrestrial ecology only; see Chapter 6: *Ornithology* for avian-related designated site information, which extends to 10 km radius); and areas of ancient woodland, and legally protected or otherwise notable species within 2 km of the Proposed Development site boundary, although this was extended to 5km when assessing for potential bat and otter presence. See Section 7.5 for a note of faunal species scoped-out of the assessment.
- 7.4.2 Each of the targeted field surveys (see Appendices 7.2-7.6) also included a desk study of publicly available historical information and a targeted field survey of potentially important and/or legally protected ecological features.

### **Field Studies**

- 7.4.3 The study area for the species-specific field surveys comprised the Proposed Development site (including an area previously within the site boundary, but removed during the design iteration process) and a survey buffer of up to 250 m radius (access permitting).
- 7.4.4 As presented in Appendices 7.2-7.6, a range of field surveys were undertaken in the survey area:
- Appendix 7.2: Phase 1 habitat and National Vegetation Classification (NVC) surveys – undertaken by Botanæco, in July 2016, using the standard Joint Nature Conservation Committee (JNCC, 2010) methodology and the NVC User’s Handbook (Rodwell, 2006).
  - Appendix 7.3: Additional Phase 1 habitat survey of the access track route – conducted by ITP Energised in August 2018, using the standard Joint Nature Conservation Committee (JNCC, 2010) methodology.



- Appendix 7.4: Otter (*Lutra lutra*) survey, undertaken by ITP Energised, August 2018, following standard survey methodology, as described in Chanin (2003).
- Appendix 7.5: Freshwater Pearl Mussel (*Margaritifera margaritifera*) survey – undertaken by Alba Ecology, September 2018, using an adapted version of the standardised shallow-water survey methodology, as described in Cosgrove and Young (1998) and Young *et al.* (2001).
- Appendix 7.6: Fisheries survey – undertaken by Waterside Ecology, July 2018, with both quantitative and non-quantitative walkovers, based on protocols described by Summers *et al.* (1996), Hendry and Cragg-Hine (1997) and SEPA (2010a).
- Appendix 7.7: Outline Habitat Management Plan, written by ITP Energised, March 2019.

7.4.5 The surveys were undertaken at appropriate times of year, under favourable survey conditions, and with full access to the study areas. As such, no significant limitations were identified.

### ***Evaluation Methods for Ecological Features***

7.4.6 Table 7.2, below, lists the criteria used to determine the value of ecological features in a geographical context.

**Table 7.2 – Geographical Evaluation Criteria**

<b>Value</b>	<b>Criteria</b>	<b>Examples</b>
International	<p>Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of international importance.</p> <p>N.B. For designations, such as a Special Area of Conservation (SAC), this may also include off-site features on which the qualifying population(s) or habitat(s) are considered, from the best available evidence, to depend.</p>	<p>International nature conservation areas:</p> <p>Any SAC;</p> <p>Any candidate SAC (cSAC); and</p> <p>Any Ramsar wetland.</p> <p>Significant numbers of a designated population outside the designated area.</p> <p>A site supporting more than 1% of the EU population of a species.</p>
National (i.e. Scotland)	<p>Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of national importance.</p> <p>N.B. For designations, such as a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR), this may also include off-site features on which the qualifying population(s) or habitat(s) are considered, from the best available evidence, to depend.</p>	<p>National nature conservation areas:</p> <p>Any SSSI or NNR designated for biological feature(s).</p> <p>A site supporting more than 1% of the UK population of a species.</p> <p>Nationally important population / assemblage of a European Protected Species (EPS) or species listed on Schedule 1 and/or Schedule 5 of the WCA.</p>
Council area (Shetland Isles)	<p>Nature conservation resource, i.e. nature conservation designation, habitat or species, of importance on a Council area scale (i.e. the Shetland Islands).</p>	<p>Statutory and non-statutory nature conservation designations:</p> <p>Any Local Nature Reserve (LNR);</p>

Value	Criteria	Examples
		<p>Any Scottish Wildlife Trust (SWT) reserve;</p> <p>Any Local Biodiversity Site (LBS); and</p> <p>Ancient Woodland listed on the SNH Ancient Woodland Inventory (SNH, 2010).</p> <p>A Council-scale important population/area of a species or habitat listed on the Scottish Biodiversity List (SBL) (Scottish Government, 2013) as requiring conservation action.</p> <p>A Council area-scale important population/area of a species or habitat listed on the local Biodiversity Action Plan (local BAP or LBAP).</p> <p>A Council area-scale important population / assemblage of an EPS or species listed on Schedule 1 or Schedule 5 of the WCA</p>
Local (i.e. within 2 km of the Proposed Development site)	Nature conservation resource, e.g. a habitat or species of importance in the context of the local district	<p>A breeding population of a species or a viable area of a habitat that is listed in a local BAP because of its rarity in the locality.</p> <p>An area supporting 0.05-0.5% of the UK population of a species.</p> <p>A breeding population of a species on the SBL.</p> <p>All breeding populations of EPS, Schedule 1 or Schedule 5 species</p>
Less than local	Unremarkable, common and widespread habitats and species of little/no intrinsic nature conservation value	<p>Common, widespread, modified and/or impoverished habitats.</p> <p>Common, widespread, agricultural and/or exotic species.</p>

7.4.7 Where a feature qualifies under two or more criteria, the higher value is applied to the feature. An ecological feature of local or higher value is considered an Important Ecological Feature (IEF).

### ***Impact Assessment Methods***

7.4.8 The approach to the Ecological Impact Assessment (EcIA) follows the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (CIEEM, 2018) and considers the factors described below.

### **Ecological Zone of Influence**

7.4.9 The Ecological Zone of Influence (EZoI) is defined as the area within which there may be ecological features subject to effects from the Proposed Development. Such effects could be direct, e.g. habitat loss resulting from land-take or removal of a structure occupied by a protected species, or indirect, e.g. noise or visual disturbance causing a species to move out of the EZoI. The EZoI was determined through:

- review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- identification of sensitivities of ecological features, where known;
- the outline design of the Proposed Development and approach to construction; and
- through liaison with other technical specialists involved in the assessment, e.g. hydrologists and noise specialists.

### **Temporal Scope**

7.4.10 Potential impacts on ecological features have been assessed in the context of how the predicted baseline conditions within the EZoI might change between the surveys and the start of construction. It is anticipated that construction would commence in 2022/23.

### **Characterising Ecological Impacts and Effects**

7.4.11 In accordance with the CIEEM guidelines, the following definitions are used for the terms 'impact' and 'effect':

- Impact – Actions resulting in changes to an ecological feature. For example, construction activities involving the removal of a hedgerow; and
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a species population from removal of a hedgerow.

7.4.12 In accordance with the CIEEM guidelines, when determining impacts on IEFs, reference is made to the following:

- beneficial or adverse – i.e. whether the impact has a beneficial or adverse effect in terms of nature conservation objectives and policy (N.B. CIEEM 2018 characterises impacts as “positive” or “negative”; the terms “beneficial” and “adverse” used here are for consistency throughout this EIA Report);
- magnitude – i.e. the size of an impact, in quantitative terms where possible;
- extent – i.e. the area over which an impact occurs;
- duration – i.e. the time for which an impact is expected to last;
- timing and frequency – i.e. whether impacts occur during critical life stages or seasons; and
- reversibility – i.e. a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible.

7.4.13 Both direct and indirect impacts are considered: Direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. fencing of a development site may cause scrub to invade marshy grassland.

7.4.14 For the purposes of this assessment, the predicted impacts on an ecological feature are categorised as ‘no impact’, ‘barely perceptible’, ‘low’, ‘medium’ or ‘high’, based on the definitions in Table 7.3, below.

**Table 7.3 – Levels of Impact**

<b>Level of impact</b>	<b>Definition</b>
No impact	No detectable impacts on the ecological resource, even in the immediate term
Barely perceptible	Immediately detectable impact but reversible within 12 months. Not expected to affect the conservation status of the nature conservation designation, habitat or species under consideration
Low	Detectable impacts, and may be irreversible, but either of sufficiently small scale or of short-term duration to have no material impact on the conservation status of the nature conservation designation, habitat or species population
Medium	Detectable impact on the status of the nature conservation designation, habitat or species population in the medium term but is reversible / replaceable given time, and not a threat to the long-term integrity of the feature
High	Irreversible impact on the status of the nature conservation designation, habitat or species and likely to threaten the long-term integrity of the feature. Not reversible or replaceable. Will remain detectable in the medium and long term
<p>The following definitions have been applied in respect to timescales:</p> <p>Immediate:      Within approximately 12 months;</p> <p>Short term:      Within approximately 1-5 years;</p> <p>Medium term:    Within approximately 6-15 years; and</p> <p>Long term:       More than 15 years.</p>	

**Determining Ecologically Significant Effects**

7.4.15 An EclA is undertaken in relation to the baseline conditions that would be expected to occur in the absence of a Proposed Development and, therefore, may include possible predictions of future changes to baseline conditions, such as environmental trends and other completed or planned development. Both adverse and beneficial impacts/effects are possible.

7.4.16 A significant effect, in ecological terms, is defined as an effect (whether adverse or beneficial) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area, including cumulative and in-combination impacts. N.B. all described effects are deemed to be adverse, unless stated otherwise.

7.4.17 In accordance with the CIEEM guidelines, the approach adopted in this chapter aims to determine if the effect of an impact is significant or not based on a discussion of the factors that characterise it, i.e. the ecological significance of an effect is not dependent on the value of the feature in question. Rather, the value of a feature that will be significantly affected is used to determine the geographical scale at which the effect is significant.

- 7.4.18 In accordance with the current CIEEM guidelines, effects of impacts are assessed in the presence of standard mitigation measures. Additional mitigation may be identified where it is required to reduce a significant effect.
- 7.4.19 Any significant effect remaining post-mitigation (the residual effect), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.
- 7.4.20 In addition to determining the significance of effects on valued ecological features, this chapter also identifies any legal requirements in relation to wildlife.

### ***Mitigation, Compensation and Enhancement***

- 7.4.21 When assessing impacts, it is important to clearly differentiate between mitigation, compensation and enhancement measures.
- Mitigation measures are used to avoid, reduce or remedy a specific adverse impact *in situ*. Mitigation is only required for adverse impacts assessed as being significant, or where required to ensure compliance with legislation;
  - Compensation (or “offset”) measures are proposed in relation to specific adverse impacts, but where it is not possible to fully mitigate for adverse impacts *in situ*. Compensation is only required for adverse impacts assessed as being significant, or where required to ensure compliance with legislation. This type of mitigation can include restoration of degraded habitats both within and outwith the Proposed Development planning application area; and
  - Enhancement measures are those that will result in beneficial ecological impacts, but which do not relate to either specific significant adverse impacts, or where measures are required to ensure legal compliance.

### ***Residual and Cumulative Effects***

- 7.4.22 The final stage of the project-specific assessment examines the residual impacts expected after application of the described mitigations (see Section 7.11), before considering the potential for cumulative impacts in combination with other developments in the wider area (see Section 7.13).

## **7.5 Ecological Baseline**

### ***Ecological Desk Study***

#### **Statutory Nature Conservation Designations**

- 7.5.1 There are two non-avian international and two non-avian national statutory designations across three sites within a 5 km radius of the Proposed Development site, as summarised in Table 7.4, below. N.B. A further two SACs are located to the south-east, Hascosay (6.4 km) and North Fetlar (8.8 km), but these sites are designated primarily for their habitats (blanket bog and dry heaths, respectively; otter is also a qualifying interest of the Hascosay SAC), have no land connectivity to Yell, being on neighbouring islands, and are therefore scoped-out of consideration. The locations of statutory designated sites within proximity to the Proposed Development site are shown on Figure 7.1 and detailed in Appendix 7.1. Note that where a nature conservation area is designated wholly or in part for birds, this interest is described in Chapter 6: Ornithology.

**Table 7.4 - Non-avian Statutory Nature Conservation Designations within 5 km of the Proposed Development Site**

<i>Site</i>	<i>Distance and Direction from Site</i>	<i>Designation</i>	<i>Designated Features</i>
Fetlar to Haroldswick	Adjacent south-east	Marine Protected Area (MPA)	Circalittoral sand and coarse sediment communities; horse mussel ( <i>Modiolus modiolus</i> ) beds; kelp and seaweed communities on sublittoral sediment; maerl beds; and shallow tide-swept coarse sands with burrowing bivalves
East Mires and Lumbister	1.9 km south	SAC	Blanket bog
		SSSI	Blanket bog
Breckon	1.9 km north-east	SSSI	Eutrophic loch; machair; sand dune; maritime cliff; and bog orchid ( <i>Hammarbya paludosa</i> )

7.5.2 There are no non-statutory nature designations within a 2 km radius of the Proposed Development site. While some woodland relicts were identified during survey of the site, there are no Ancient Woodland Inventory-designated woodlands on the Shetland Islands.

#### **Protected or Otherwise Notable Species**

##### Floral Species

7.5.3 Data received from the Shetland Biological Records Centre (pers. comm., Harvey, 2019) indicated the presence of a range of notable bryophytes (four species) and vascular plants (seven species) of local or national importance, within 2 km of the Proposed Development, identified within the ten-year timeframe, as follows:

- Bryophytes:
  - Great mountain flapwort (*Harpanthus flotovianus*);
  - River thyme-moss (*Pseudobryum cinclidioides*);
  - Dense fringe-moss (*Racomitrium ericoides*); and
  - St Kilda hook-moss (*Sanionia orthothecioides*).
- Vascular plants:
  - Small adder's-tongue (*Ophioglossum azoricum*);
  - Frog orchid (*Coeloglossum viride*);
  - Bog orchid (*Hammarbya paludosa*);
  - Whorl-grass (*Catabrosa aquatica*);
  - Slender-leaved pondweed (*Potamogeton filiformis*);
  - Early orache (*Atriplex praecox*); and
  - Autumn gentian (*Gentianella amarella* subsp. *septentrionalis*).

- 7.5.4 No non-native, invasive species have been recorded within 5 km of the Proposed Development site.
- 7.5.5 Shetland is host to 26 species of Hawkweed (*Hieracium*), 18 of which are endemic and therefore of conservation interest on the islands and subject to a species action plan (Living Shetland, 2004). Hawkweeds on Shetland are all considered to be in decline, due to overgrazing and, as such, hawkweeds only occur in locations that are inaccessible to sheep, or in areas where livestock have been regularly excluded during the summer. Shetland Amenity Trust and Shetland Biological Records Centre have been partaking in a national Grouped Species Action Plan (SAP) for Hawkweeds, in partnership with Scottish Natural Heritage (SNH) and Shetland Conservation Volunteers (Scottish Biodiversity Partnership Network, 2016).

#### Faunal Species

- 7.5.6 It was possible to scope-out badger (*Meles meles*), reptiles and amphibian species, as they are only present on mainland Scotland. A number of mainland mammal species have been introduced over the years, e.g. various mice species likely brought by Norse settlers, rabbit (*Oryctolagus cuniculus*) introduced in the 1600s and present on most of the islands, hedgehog (*Erinaceus europaeus*) introduced in 1860 and now present on most inhabited islands and the most recent, mountain hare (*Lepus timidus*), introduced to Mainland in 1907 (SBRC, 2019). The stoat (*Mustela erminea*), introduced to Mainland in the 1600s, is absent from Yell, as is the brown rat (*Rattus norvegicus*), likely introduced to many of the larger inhabited islands in the 1700s (SBRC, 2019).
- 7.5.7 As detailed in Appendix 7.1, a range of data records for protected or otherwise notable species was identified for the local area. A full list of species recorded is provided in Appendix 7.1. The most pertinent (i.e. those species which could potentially occur on/adjacent to site, based on the habitats present, and those species with the highest legal status) is the European otter (*Lutra lutra*). N.B. Only records from within the last 10 years have been considered as relevant to this study. Notably, there are no recent records for Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*) or European eel (*Anguilla anguilla*), suggesting possible under-recording.
- 7.5.8 No faunal records were noted as part of the non-avian data received from the Shetland Biological Records Centre (pers. comm., Harvey, 2019).

### **Ecological Field Surveys**

#### **Phase 1 Habitat Survey**

- 7.5.9 The Proposed Development site is located in the north-west of Yell, at altitudes ranging from sea level to 112m (on the Hill of Vigon). Wind speeds and rainfall are high across the Shetland Islands, but temperatures and the topography are moderate in both their scale and range. As a result, the vegetation is upland in character, waterlogged and dominated by blanket bog and other mire types, with areas of grassland in the more sheltered valleys and on better-drained slopes. Sheep graze the majority of the site, with the grasslands offering the highest quality grazing habitat.
- 7.5.10 The Phase 1 and NVC studies for the application area were conducted in July 2016 and followed standard guidance (JNCC, 2010 and Rodwell 2006 respectively). Full details of the habitats present, as identified during the extended Phase 1 habitat survey are provided in Appendix 7.2. Table 7.5, below, identifies the habitats present, often as mosaics of one of more habitat types, and their total cover within the Study Area, with the habitats summarised in the sections below.
- 7.5.11 In addition to the Proposed Development application area, a proposed access track route was also studied in August 2018 (following JNCC [2010] standard guidance), the study area for which partially overlaps with the Proposed Development application area. The proposed track route extends 6.86km, running north-east from the A968 in Sellafirth, to the B9082 in Cullivoe but was later removed from the Proposed Development layout (refer to Appendix 7.3 for further details). However, the following assessments are based solely on the Proposed Development application area.
- 7.5.12 Several other habitat categories were noted during the site survey though, as for the calcareous grassland included in the above table due to its intrinsic value, the areas were either too small to map or are adjacent but outwith the site boundary.

Other - Bare peat (E4)

- 7.5.13 Bare peat habitat is rare across the site and confined to moderate slopes and vertical faces within areas of peat hagg, although some was noted above the Gossa watershed contains some erosion gullies. These areas resist recolonisation due to their drying and rewetting cycles and low albedo. Common bog-cotton (*Eriophorum angustifolium*) is able to colonise some of these areas but is usually inundated for at least a part of the year and is therefore mapped as M3 bog pool vegetation.
- 7.5.14 Where peat is present within waterbodies, it is seen to be highly humified with a plate-like structure suggesting that it has arisen through drying and cracking of the peat surface before transportation to lochs and lochans.

Other - Acid/neutral natural rock (I1.4)

- 7.5.15 Rock exposures are frequent across the site as low crags, or more extensively, in the south-west in proximity to the coast. Here the vegetation is influenced by exposure, as indicated by the presence of wind-clipped heath, for example. This exposure is presumed to be responsible for the numerous low, unvegetated outcrops of rock on exposed mounds and ridges.
- 7.5.16 Vegetation associated with the exposures of rock is confined to crustose lichens. Where there is some degree of shelter, the lichen *Ramalina siliquosa* and moss *Ultoa phyllantha* can be frequent to abundant.

Other – Intertidal (H1.1)

- 7.5.17 The extreme north-east of the study area and a small area to the south-east were recorded as a intertidal habitat. Both areas are outwith, but immediately adjacent to, the application boundary.

Other - Hard Standing/Gravel Track (J4)

- 7.5.18 The site follows the route of a gravel track for much of its length, the gravel track is flanked on either side by man-made ditches and verges containing typical blanket bog and grassland species as described earlier.



**Table 7.5 - Area and Percentage Cover of Site Phase 1 Habitats**

Phase 1 Habitat	Description	Phase 1 Code	Percentage of application area (%)
<i>Grassland and grassland-dominated mosaics</i>			
Unimproved acid grassland	Acid grassland is associated with the flanks and bases of the small valleys of the watercourses, or the edges of lochs and lochans	B1.1	2.57
Unimproved acid grassland/marshy grassland		B1.1/B5	0.38
Unimproved acid grassland/ dry dwarf shrub heath (acid)		B1.1/D1.1	0.47
Unimproved acid grassland/blanket bog		B1.1/E1.6.1	0.03
Unimproved acid grassland/acid/neutral flush/spring		B1.1/E2.1	0.03
Unimproved calcareous grassland	The influence of basic substrates was evident in the presence of well-drained calcareous grassland in one of the gorges, at the head of Gloup Voe, in the north of the site	B3.1	n/a
Semi-improved acid grassland	Acid grassland is associated with the flanks and bases of the small valleys of the watercourses, or the edges of lochs and lochans. It is also strongly associated with the abandoned settlements on the western and eastern boundaries in the north of the site. Evidence of improvement is also associated with these areas that continue to be grazed by sheep	B1.2	0.01

Phase 1 Habitat	Description	Phase 1 Code	Percentage of application area (%)
Marshy grassland/unimproved acid grassland	Marshy grassland is associated with the flanks and bases of the small valleys of the watercourses, or the edges of lochs and lochans	B5/B1.1	0.05
<i>Heath and heath-dominated mosaics</i>			
Dry dwarf shrub heath (acid)	Dry heath is associated with the flanks and bases of the small valleys of the watercourses, or the edges of lochs and lochans, especially in the larger, well-defined valleys in the north of the Site. Wind-clipped dry heath was also recorded along the south-western coastal boundary, amongst areas of coastal grassland associated with the salt spray and exposure above the sea cliffs	D1.1	1.62
Dry dwarf shrub heath (acid)/unimproved acid grassland		D1.1/B1.1	1.66
Dry dwarf shrub heath (acid)/unimproved acid grassland/marshy grassland		D1.1/B1.1/B5	0.33
Dry dwarf shrub heath (acid)/unimproved acid grassland/ blanket bog		D1.1/B1.1/E1.6.1	0.06
Dry dwarf shrub heath (acid)/blanket bog		D1.1/E1.6.1	0.13
<i>Blanket bog and blanket bog-dominated mosaics</i>			
Blanket bog	The relatively gentle topography of the site and the prevailing climate conditions have resulted in the widespread presence of blanket bog. Blanket bog occurs in over 75% of the 1679 ha site and dominates habitat mosaics in a further 14% of the site. The condition of the blanket varies across the site, but good quality bog, with numerous pool complexes occurs in several areas across the site, and they are identified as locations with bog pool	E1.6.1	75.4
Blanket bog/unimproved acid grassland		E1.6.1/B1.1	0.34
Blanket bog/dry dwarf shrub heath (acid)		E1.6.1/D1.1	0.09
Blanket bog/bare peat		E1.6.1/E4	0.96

Phase 1 Habitat	Description	Phase 1 Code	Percentage of application area (%)
Blanket bog/bare peat/dystrophic standing water	<p>complexes on Figure 10.6a of Chapter 10: <i>Geology, Peat, Hydrology &amp; Hydrogeology</i>.</p> <p>There is some haggling locally, mainly in the east central area north of Gossa Water, and Scottish Water notes that the Gossa watershed is partly degraded, with the water quality being characterised by a high amount of organic material as a consequence of hags and erosion gullies being present (Scottish Water, personal communication, meeting on 09 January 2019)</p>	E1.6.1/E4/G1.4	0.45
Blanket bog/oligotrophic standing water		E1.6.1/G1.3	0.90
Blanket bog/oligotrophic standing water/bare peat		E1.6.1/G1.3/E4	3.25
Blanket bog/dystrophic standing water		E1.6.1/G1.4	7.07
Blanket bog/dystrophic standing water/bare peat		E1.6.1/G1.4/ E4	0.23
<i>Flush and flush-dominated mosaics</i>			
Acid/basic/neutral flush/spring	Acid/neutral flush is associated with the flanks and bases of the small valleys of the watercourses, or the edges of lochs and lochans	E2.1	0.08
Acid/neutral flush/spring/blanket bog	Some influence from base-rich substrates is evident in the south-western coastal area, in the occurrence of basic flushes, just beyond the site boundary	E2.1/E1.6.1	0.06
<i>Aquatic habitats</i>			
Oligotrophic standing water/dystrophic standing water	A number of oligotrophic and dystrophic waterbodies are to be found, concentrated in the north-east and south of the site, varying from small 'dubh lochans', based in peat, to larger lochs, based on rock.	G1.3/4	3.45

Phase 1 Habitat	Description	Phase 1 Code	Percentage of application area (%)
	The smaller lochans are usually mapped in a mosaic with blanket bog (and minor areas of other habitats). Lochs, lochans and pools are present across the Site, especially towards the south where the largest waterbodies are located. With only one oligotrophic exception, these waterbodies are dystrophic		
Running water	A number of small watercourses were recorded throughout the Study Area. These watercourses are also oligotrophic to dystrophic. They are small (up to 1m wide); prone to drought and spates; and widely lost from view within slits and pipes in the peat of the blanket bog; otherwise, they are associated with shallow valleys with acid flush, and acid and marshy grassland habitats	G2	0.09
<i>Other</i>			
Broadleaved woodland	Woodland relicts persist in the gorges at the head of Gloup Voe. These habitats are very limited in extent.	A1.1.1	<0.01
Hardstanding	Hardstanding comprising track infrastructure is present in the eastern part of the site.	J5	0.24
Total			100.00

### Invasive Non-native Species

7.5.19 No evidence of invasive non-native plant species was recorded during the field survey.

### Notable species

7.5.20 An unidentified hawkweed (*Hieracium* spp.) was recorded at one location at the head of Gloup Voe that may be of note, as Hawkweed is listed on the LBAP and 19 species of the genus are included on the SBL.

### **National Vegetation Classification (NVC) survey**

7.5.21 A total of nine communities, comprising 29 sub-communities, were identified during the survey:

- Blanket bog – M17b, M17c, M1, M2 and M3;
- Acid grassland – U4a, U4b, U5a, U5b, U5c, U5d, U5e, U6a and U6d;
- Calcareous grassland – CG10a;
- Marshy grassland – M23b;
- Acid dry dwarf shrub heath – H12c and H14;
- Flush and spring: acid/neutral – M6a, M6c, M29 and M32a;
- Flush and spring: basic – M10a;
- Oligotrophic/dystrophic lochs and lochans – A9a, A14, A16a, A22b and A24b; and
- Maritime cliff and slope: coastal grassland – MC10a.

7.5.22 For brevity, the above communities are summarised below; see Figure 7.3a-e; full descriptions are provided in Appendix 7.2.

### Blanket bog

7.5.23 M17b *Trichophorum caespitosum-Eriophorum vaginatum* blanket mire, *Cladonia* spp. sub-community (deergrass-hare's-tail bog-cotton blanket mire) community is the single-most dominant community and is identified across the site by the predominance of deergrass and common bog-cotton; and frequency (to local abundance) of *Sphagnum* mosses (especially *Sphagnum capillifolium* and *Sphagnum papillosum*). Low, frequent hummocks of the moss *Racomitrium lanuginosum* indicate the M17b *Cladonia* (lichen) sub-community, although lichens (nearly always *Cladonia impexa*) are never more than frequent.

7.5.24 M17c *Trichophorum caespitosum-Eriophorum vaginatum* blanket mire, *Juncus squarrosus-Rhytidiadelphus loreus* sub-community is located in an area of enclosed blanket bog on the northern boundary of the site, above Gloup Voe. It is distinguished by the prominence of heath rush and the frequency of hypnaceous mosses in association with species typical of the M17 community.

7.5.25 M1 *Sphagnum denticulatum* bog pool community - All three of the bog pool communities are readily identified by the dominance of the nominative species. The M1 *Sphagnum denticulatum* (bog-moss) community is occasionally present in permanent bog pools and lochans across the site, where there is always a depth of water. There are no sub-communities.

7.5.26 M2 *Sphagnum cuspidatum/fallax* bog pool community occurs frequently within bog pools and small lochans that dry over the summer. It is also present in the base of water tracks across peat or through common bog-cotton-rich vegetation in the base of regenerating haggis. This ability to tolerate drying of semi-aquatic habitats distinguishes the M2 community from the more fully aquatic M1 and more xeric M3 bog pool communities.

7.5.27 M3 *Eriophorum angustifolium* bog pool community. Areas of bare peat populated by scattered or more abundant stems of common bog-cotton indicate the M2 *Eriophorum angustifolium* (common bog-cotton) bog pool community. It occupies impermanent bog pools that dry over the summer and

areas of regenerating, de-vegetated peat. Both situations are frequent and widespread across the site.

#### Acid grassland

- 7.5.28 Acid grassland is widespread across the site, generally associated with the watercourses. A large area is associated with Gloup Voe and the watercourses flowing into Mare's Pool.
- 7.5.29 U4a *Festuca ovina-Agrostis capillaris-Galium saxatile* (sheep's fescue-common bent-heath bedstraw) grassland community is readily recognised by its mid-green colouration and tightly grazed sward of bents, fescues, heath bedstraw, sweet vernal grass and tormentil. Its typical sub-community is recognised within the Site is by the species-poverty and moderate cover of mosses.
- 7.5.30 U4b *Holcus lanatus-Trifolium repens* (Yorkshire fog-white clover) sub-community is also present but is included as 'improved, acid grassland' habitat because of the presence of common mouse-ear, white clover and Yorkshire fog.
- 7.5.31 U5a *Nardus stricta-Galium saxatile* grassland, species-poor sub-community. An extremely uneven and species-poor composition indicates the U5a, 'species-poor' sub-community. Mat-grass and its litter accumulations predominate over large areas together with occasional *Dicranum scoparium*, eyebright, heath bedstraw, heath woodrush, *Polytrichum commune*, tormentil and wavy hair-grass. *Aulacomnium palustre*, common bog-cotton, *Plagiothecium denticulatum* and *S. papillosum* are rare in their appearance. This community is most extensively present on the steep slopes above Gloup Voe in the north of the Site. Here it may include some distinctive species along its coastal edge that are also associated with the calcareous grassland habitat (NVC: CG10a). They include eyebright, selfheal and wild thyme. Otherwise, it is confined to small patches in a mosaic with other acid grassland vegetation types in the riparian zone.
- 7.5.32 U5b *Nardus stricta-Galium saxatile* grassland, *Agrostis canina-Polytrichum commune* sub-community. A high cover of *Polytrichum commune* and other mire associates, including *Sphagnum*, in the sward of mat grass is indicative of the U5b *Agrostis canina-Polytrichum commune* (velvet bent-moss) sub-community. This reflects the association of this acid grassland sub-community with marginal lengths of blanket bog and the riparian zone.
- 7.5.33 U5c *Nardus stricta-Galium saxatile* grassland, sub-community. A flushed area of grassland receiving overspill from a lochan along a linear depression and rill is the habitat of the U5c *Carex panicea-Viola riviniana* (carnation sedge-heath violet) sub-community (refer to Target Note 90, Appendix 7.2). Mat grass is abundant in the sward with frequent carnation sedge, sea plantain and sheep's fescue. Common yellow sedge, common-dog violet, lesser clubmoss, pill sedge and tormentil are occasional; and ribwort plantain and selfheal are rare. This species assemblage that includes mildly mesotrophic herbs especially, carnation sedge and common-dog violet, is collectively indicative of the U5c *Carex panicea-Viola riviniana* sub-community. The influence of salt spray is apparent in the uncharacteristic frequency of sea plantain.
- 7.5.34 U5d *Nardus stricta-Galium saxatile* grassland, *Calluna vulgaris-Danthonia decumbens* sub-community. Within one area of M17b blanket bog vegetation in the north of the Site there are patches of mat grass grassland that approach the composition of U5d *Calluna vulgaris-Danthonia decumbens* (heather-heath grass) acid grassland. Mat grass is dominant with frequent to locally abundant heather; and frequent to occasional: common bent, carnation sedge, common bog-cotton and purple moor-grass. This assemblage probably reflects the presence of thin peat and selective grazing by livestock within the M17b blanket bog vegetation.
- 7.5.35 U5e *Nardus stricta-Galium saxatile* grassland, *Racomitrium lanuginosum* sub-community. Extensive open lawns and low hummocks of *Racomitrium lanuginosum* within the sward of mat grass distinguish this sub-community. It is associated with transitions from blanket bog, in which the cover of *Racomitrium lanuginosum* is also high and heather abundant, to exposed areas of bedrock. As such, the sub-community is present on thin, organic soils.
- 7.5.36 U6a *Juncus squarrosus-Festuca ovina* grassland, *Sphagnum* spp. sub-community. U6 communities are identified by the dominance of heath rush in association with a variety of species assemblages. Within the site, U6a and U6d are present, the former having a number of mire-related associates;

and the latter, associates typical of U4 or U5 acid grassland vegetation. These associates reflect the differing environmental conditions that also distinguish the two sub-communities.

- 7.5.37 U6d *Juncus squarrosus-Festuca ovina* grassland, *Agrostis capillaris-Luzula multiflora* sub-community. Small changes in topography define the areas occupied by the U6a and U6d sub-communities; with the former occupying damp depressions and the latter occupying better-drained slopes and ridges. U6d is also more productive, with its typical, grass sward of frequent to locally abundant mat grass, sweet vernal grass, velvet bent, tormentil and wavy hair-grass amongst the dominant rosettes of heath rush. Heath bedstraw and heath woodrush are frequent; and common bog-cotton, common mouse-ear, common sedge, marsh horsetail, pill sedge, sheep's fescue, soft-rush, sorrel, tufted hair-grass and wavy hair-grass are occasional. Mosses are of a high cover in the short, grazed, open sward of grasses and heath rush and they include abundant *Hylocomium splendens* and *Rhytidiadelphus squarrosus*; and occasional *Dicranum scoparium*, *Mnium hornum*, *Peltigera* sp., *Polytrichum juniperinum*, *S. capillifolium* and *S. papillosum*.

#### Calcareous grassland

- 7.5.38 A small area of calcareous grassland was recorded by the Burn of Hildigill, at the head of Gloup Voe. The CG10a *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland, *Trifolium repens-Luzula campestris* (white clover-heath woodrush) sub-community is recognised according to the frequency of heath woodrush, sweet vernal grass and white clover; and the low number and cover of sedges.

#### Marshy grassland

- 7.5.39 Within the Proposed Development site, higher quality M23b marshy grassland is rare and confined to small areas of four of the watercourses (the burns of Glipapund, Amframires, Tongafield and Kedillsmires. Lower quality rush pasture is also present in mosaic with unimproved acid grasslands, particularly associated with the Burn of Tongafield.
- 7.5.40 M23b *Juncus effusus/acuteiflorus-Galium palustre* rush-pasture, *Juncus effusus* sub-community is similar to M6 mire vegetation, but beneath its sward of rushes there is little or no *Sphagnum* and herbs are prominent instead. The M23b *Juncus effusus* (soft-rush) sub-community is distinguished by its sward of dominant soft-rush.

#### Acid dry dwarf shrub heath

- 7.5.41 H12c *Calluna vulgaris-Vaccinium myrtillus* heath, *Galium saxatile-Festuca ovina* (heather-blaeberry) sub-community has an extensive canopy of heather that may be associated with other sub-shrubs, especially blaeberry. However, this latter plant is rare within the site so that most stands are dominated by heather alone. Beneath the heather's canopy, there are large pleurocarpous mosses, especially *Hylocomium splendens*. Grazing has broken up the heather canopy, so there is a grass-rich sward which distinguishes the H12c *Galium saxatile-Festuca ovina* (heath bedstraw-sheep's fescue) sub-community.
- 7.5.42 H14 *Calluna vulgaris-Racomitrium lanuginosum* heath: Swollen mounds of the silver-grey *Racomitrium lanuginosum* amongst prostrate heather shrubs in exposed situations (next to the coast) indicate the H14 *Calluna vulgaris-Racomitrium lanuginosum* (heather-moss) community's composition and habitat. Within the site, such stands are very species-poor so that the community is ascribed in the absence of any of the sub-communities' distinctive associates. Other than the dominant heather and *Racomitrium lanuginosum*, common bog-cotton, crowberry, deergrass, sheep's fescue and tormentil occur occasionally or rarely. Common bog-cotton and cross-leafed heath also become present in transitions to blanket bog.

#### Flush and spring: acid/neutral

- 7.5.43 M6a *Carex echinata-Sphagnum recurvum/auriculatum* mire, *Carex echinata* sub-community. All of the M6 *Carex echinata-Sphagnum recurvum/auriculatum* (star sedge-bog moss) mire sub-communities are identified by their sward of sedges or rushes over a wet lawn of mosses, and *S. fallax*, in particular. The M6a sub-community is distinguished by the presence of star sedge over a lawn of *S. fallax* (formerly *S. recurvum*). Other sedge species may also be frequent or completely

replace the star sedge as dominant. This is the case within the Site where common sedge is more usually the most prominent sedge

- 7.5.44 M6c *Carex echinata-Sphagnum recurvum/auriculatum* mire, *Juncus effusus* (soft-rush) sub-community community is distinguished by its sward of soft-rush. Beneath this, the species composition is uneven and species-poor. In addition to the dominant soft-rush and *S. fallax* there is occasional bog stitchwort, common sedge, common bog-cotton, cuckoo flower, heather, lesser spearwort, *S. denticulatum*, *S. palustre* and/or *S. papillosum*. No particular polygon had all of these species at the time of survey.
- 7.5.45 M29 *Hypericum elodes-Potamogeton polygonifolius* (marsh St John's-wort-bog pondweed) community is very similar to the M1 (*Sphagnum denticulatum*) community but is distinguished by its habitat (running rather than stagnant water) and a small number of consistent associates. However, it remains a species-poor and uneven vegetation community. It also lacks the nominative *Hypericum elodes* that is not present this far north.
- 7.5.46 M32a *Philonotis fontana-Saxifraga stellaris* (moss-starry saxifrage), *Sphagnum denticulatum* sub-community, is a springhead community identified by the habitat and presence of a moss/liverwort mat with scattered, small vascular species. Any of a number of species may be present. Within the Proposed Development site, the species-richness is low and *S. denticulatum* is abundant – this identifies the M32a sub-community.

#### Flush and spring: basic

- 7.5.47 M10a *Carex dioica-Pinguicula vulgaris* mire, *Carex demissa-Juncus bulbosus/kochii* sub-community. The character of the habitat already described distinguishes the M10 *Carex dioica-Pinguicula vulgaris* (dioecious sedge-common butterwort) mire community – an open, patchy sward and cover of sedges and mosses with rosettes of butterwort. The absence of montane species and yellow saxifrage is also characteristic, especially in relation to the similar M11 mire community. The M10a *Carex demissa-Juncus bulbosus/kochii* (common yellow sedge-bulbous rush) sub-community is distinguished according to the presence of acidic mire species, such as bog asphodel, bulbous rush and common bog-cotton.

#### Oligotrophic/dystrophic lochs and lochans

- 7.5.48 A9a *Potamogeton natans* community, species-poor sub-community. The floating leaves of bog pondweed (*Potamogeton polygonifolius*) or, more rarely, broad-leaved pondweed (*P. natans*), indicate the presence of this community. It is most frequent in black (dubh) lochans, but it occurs in all types of waterbody across the Proposed Development site, including the slow-moving water of rills and burns. The amphibious nature of bog pondweed means that it can also occupy marginal situations that dry out periodically. In deeper water (0.5 m to 1.0 m) it is frequently associated with the linear, floating leaves of floating bur-reed.
- 7.5.49 A14 *Myriophyllum alterniflorum* community. Finely-branched stems arising from the bed of the loch or lochan indicate the presence of monospecific stands of alternate water-milfoil (A14). It often occurs in the same areas and moderate water depths (0.5m to 1.0m deep) as the A9a sub-community.
- 7.5.50 A16a *Callitriche stagnalis* community, *Callitriche* spp. sub-community. Dense, medium green wefts in the shallow margins of lochs or more usually, slow-flowing sections of watercourse indicate the habitat of the A16a, species-poor *Callitriche* (water-starwort) sub-community. It is recognised from the presence of monospecific stands of water-starwort.
- 7.5.51 A22b *Littorella uniflora-Lobelia dortmanna* community, *Myriophyllum alterniflorum* sub-community. Where the margins of the lochs and larger lochans incorporate a high proportion of sand, rosettes of shoreweed and/or water lobelia can be frequent. This indicates the A22b *Littorella uniflora-Lobelia dortmanna* (shoreweed-water lobelia) community, *Myriophyllum alterniflorum* (alternate water-milfoil) sub-community of which both species are indicative and nominative. Associates are limited in their number and cover but locally include alternate water-milfoil and bulbous rush.



7.5.52 A24b *Juncus bulbosus* community, *Sphagnum denticulatum* sub-community. Monospecific stands of bulbous rush are the commonest vegetation type within the lochs and lochans, especially where water depths are less than c. 0.5 m. It is usually present in its sterile (non-flowering) form. Associates include any of the other species/vegetation communities described above from the lochan habitat. *S. denticulatum* is a common associate in dubh lochans and occasionally, bog pools, but it is generally absent from the larger lochs.

Maritime cliff and slope: coastal grassland

7.5.53 MC10a *Festuca rubra-Plantago* spp. maritime grassland, *Armeria maritima* sub-community. The dominance of sea plantain is indicative of the MC10 maritime grassland community even though red fescue is rare in the sward. This species-poverty and unevenness of the vegetation is indicative of the MC10a sub-community, even though the nominative sea pink is absent. As such, the MC10a vegetation within the site represents the less distinctive and species-rich end of the MC10 vegetation community spectrum.

**Groundwater Dependent Terrestrial Ecosystems (GWDTEs)**

7.5.54 Potential GWDTEs were identified through an analysis of the NVC results, using current guidance (SEPA, 2017). Seven of the NVC communities recorded within the application area are classified as being potentially groundwater dependent (see Figure 7.4a-e and Appendix 7.2):

- CG10 *Festuca-Agrostis-Thymus praecox* grassland, *Trifolium repens-Luzula campestris* sub-community;
- M6: *Carex echinata-Sphagnum fallax* mire, *Carex nigra-Nardus stricta* sub-community and *Juncus effusus* sub-community
- M10: *Carex dioica-Pinguicula vulgaris* mire, *Carex demissa-Juncus bulbosus/kochii* sub-community;
- M23: *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, *Juncus effusus* sub-community;
- M29: *Hypericum elodes-Potamogeton polygonifolius* soakway;
- M32: *Philonotis fontana-Saxifraga stellaris* spring, *Sphagnum denticulatum* sub-community; and
- U6: *Juncus squarrosus-Festuca ovina* grassland, *Agrostis capillaris-Luzula multiflora* sub-community.

7.5.55 Of these, six (CG10, M6, M10, M23, M29 and M32) are of potentially high dependence; the U6 sub-community is potentially of moderate dependence. The six high-dependence communities represent 14 areas of various size, primarily on the watercourse valley sides (see Figure 7.4a-e).

7.5.56 The dominance of blanket bog clearly demonstrates the influence of a high precipitation/evaporation ratio across the site, and blanket bog communities are by their nature not groundwater dependent. Significant volumes of surface water are stored within pools, lochans and lochs; and yet more water moving across the mire within rills and burns. The minor rills of the headwaters are associated with the wettest depressions and saddles within the blanket bog covered areas; and they drain from M1, M2 & M3 bog pools along narrow channels (<2m wide) lined with M29, to small burns flanked by M6, M23 & U6. As such, a majority of the potential GWDTEs have low to no groundwater dependency, being dependent instead upon precipitation and surface waters.

7.5.57 Dependency upon groundwater is only attributed to the M32 springhead community in one of its locations, by the Burn of Tongafield. Here it is associated with the M10 mire community where the M32's acid/neutral waters irrigate a base-rich substrate. As a result, the latter is also, but indirectly, associated with groundwater; see Appendix 7.2 for more details. A second, very small area of M32 and M10 springhead community, located at the south-western end of Gloup Voe was also determined to be groundwater dependent.

### **Otter Survey**

7.5.58 As noted in 7.4, above, otter surveys were conducted in August 2018, following the methodology described in Chanin (2003). Signs of otter presence were recorded throughout the Proposed Development site (see Figure 7.5a-e), including spraints, holts, runs, tracks (footprints) and feeding evidence. The majority of evidence was noted to the south-west and north-east of the site (associated with the Gossa Water and Kussa Waters/Burn of Firth catchments, respectively), though spraints were also recorded in the centre of the study area (Burn of Amframires/River Burn, part of the Burn of Gossawater catchment). Details and locations can be found in Appendix 7.4 and are displayed on Figure 7.5.

7.5.59 A total of 47 spraints were recorded throughout the surveyed area, comprising different food sources including: fish remains, insects, crustaceans, feathers and hair. Within 250m of the application boundary of the Proposed Development, there were six potential holts, two runs from the water, eight tracks and feeding evidence identified during the survey. Only three of the potential holt records are within the Proposed Development site boundary: one to the west of the area, north-west of Gossa Water and close to the western side of the application boundary for the Proposed Development; one on the Burn of Gossawater, on the southern edge of the site; and one on the Burn of Kedillsmires/Burn of Tongafield, east of the centre of the Proposed Development site.

### **Freshwater Pearl Mussel Survey**

7.5.60 Surveys were conducted in September 2018, following standard guidance (SNH, no date). As noted in the report (see Appendix 7.5), given that there are no known historical records of freshwater pearl mussels within the planning application boundary, survey site selection was directed towards establishing the status (presence or absence) of freshwater pearl mussels and habitat suitability within potentially suitable watercourses in the study area containing salmonids that might be affected by the works. This resulted in the selection of 12 watercourses for survey. N.B. following design iterations and the resultant final application boundary, the South Burn of Dalsetter and Muskra Burn are wholly outwith the site and potential disturbance zone:

- Burn of Gossawater;
- River Burn/Burn of Amframires;
- Burn of Dalsetter;
- South Burn of Dalsetter;
- Burn of Firth;
- Burn of Tongafield;
- Burn of Kedillsmires;
- Burn of Rulesgill;
- South Burn of Vigon;
- North Burn of Vigon; and
- Muskra Burn.

7.5.61 No live freshwater pearl mussels or empty/dead freshwater pearl mussel shells were recorded within the Proposed Development site. However, areas of potentially suitable 'in-stream' habitats were present in some of the reaches surveyed.

7.5.62 The relative abundance and status of all surveyed study area watercourses was classified as E 'Absent'. The sample based survey methodology used does not search every square metre of river bed, so it is conceivable that a small number of freshwater pearl mussels may have remained undetected somewhere within the survey reaches e.g. perhaps hidden under boulders or in deep, dark peaty pools or underground in peat pipes. However, the use of experienced surveyors meant that potentially suitable habitats were thoroughly searched. It is highly unlikely (although

hypothetically possible) that freshwater pearl mussels occur in the surveyed reaches where no mussels were found.

7.5.63 These limitations would apply to any freshwater pearl mussel survey carried out using the standard methodologies because it is a sample-based survey and not a complete census. Such a census would require the destructive searching of all loose substrate, including all potentially suitable habitats to search for hidden mussels. Census work of this nature is not carried out in Scotland due to the endangered status of the species and its legal protection, as well as Health and Safety considerations.

7.5.64 There is therefore no evidence that freshwater pearl mussels are present within the study area. Consequently, there are no particular freshwater pearl mussel sensitivities that need to be considered.

### **Fisheries**

7.5.65 Full details of the fisheries survey, conducted in July 2018, are presented in Appendix 7.6 and summarised below.

#### Habitat Surveys

7.5.66 The habitats throughout the survey area provide suitable areas of moderate to good quality habitat for salmonids and areas of suitable spawning habitat. In some instances, upstream habitats become unsuitable and inaccessible, due to barriers.

#### Electrofishing Surveys

7.5.67 In the Burn of Gossawater catchment area, brown trout (*Salmo trutta*) fry and parr were present at all six survey sites; Atlantic salmon (*Salmo salar*) were absent and eel (*Anguilla anguilla*) were widespread and most abundant in the lower reaches of the burn. Of a total area of 6,247 m<sup>2</sup> of productive juvenile salmonid habitat identified in the catchment, most of the productive habitat is located in Burn of Gossawater itself (total of 3,084 m<sup>2</sup>) or in River Burn/Burn of Amframires (2,703 m<sup>2</sup>). These watercourses are accessible to migratory fish. Spawning habitats are widespread in both watercourses and are particularly abundant in the lower and middle reaches of River Burn/Burn of Amframires. Small areas of productive habitats are also present in Burn of Dalsetter, Burn of Rimminamartha and Burn of Culligmires. Electric fishing found that trout are widespread in the Gossawater catchment, but that densities are rather low by national standards. European eel was the only non-salmonid species encountered.

7.5.68 The Burn of Firth catchment area had trout in almost all reaches accessible from the sea; salmon were absent; and eel were present at two sites. Approximately 3,743 m<sup>2</sup> of the surveyed area was classified as productive juvenile salmonid habitat; and spawning habitats were found to be distributed throughout the accessible reaches and are most abundant in the Burn of Firth itself. Trout were found to be widespread in all accessible and suitable habitats, including headwater areas, but are absent upstream of waterfalls on the Burn of Glipapund and the Burn of Rulesgill. European eel was the only non-salmonid species encountered.

7.5.69 North Burn of Vigon and Burn of Riggadale appear to provide suitable habitats for salmonid fish along approximately 2.5 km of channel in the reaches closest to the sea. However, no fish were seen during the habitat survey and none were captured by electric fishing. Access from the sea is difficult, due to the presence of obstacles. It was concluded that the catchment may be fishless.

7.5.70 South Burn of Vigon is relatively small and potential habitat for salmonid fish is of poor quality and restricted to the lower 600 m of stream. Access from the sea is difficult, due to obstacles. No fish were seen during the habitat survey, or caught during electric fishing and it was therefore concluded that the catchment may be fishless.

7.5.71 The surveyed reaches of the Burn of Sandwater and the Burn of Skedigill extended approximately 0.5 km downstream of the Proposed Development site. Little productive fish habitat was recorded; however, some productive habitats may be present downstream of the survey reaches.

7.5.72 Little suitable habitat for salmonids or other fish was identified in the Burn of Hildigill or the Burn of Grudale. Migratory access in the Burn of Hildigill is restricted to the lower 150 m by a waterfall and habitat quality for salmonids, or other fish in the accessible reach, is very poor. Burn of Grudale is entirely inaccessible, due to the cliffs where it enters the sea. Both watercourses were considered likely to be fishless.

7.5.73 Atlantic salmon are listed on Annex II of the Habitats Directive (European Commission, 2019); Atlantic salmon, brown trout and European eel are all listed as priority species on the Scottish Biodiversity List; and due to population declines, European eel is considered of increasing conservation concern and therefore protected under both EU and Scottish legislation (see Appendix 7.6 for more details).

## 7.6 Evaluation of Recorded Features

7.6.1 The evaluation of recorded ecological features is presented in Table 7.6, below.

**Table 7.6 - Evaluation of Ecological Features**

Feature	Evaluation Reasoning	Level of Importance
Fetlar to Haroldswick MPA	Circalittoral sand and coarse sediment communities; horse mussel beds; kelp and seaweed communities on sublittoral sediment; maerl beds; and shallow tide-swept coarse sands with burrowing bivalves.  The level of value follows that of the level of designation	International
East Mires and Lumbister SAC & SSSI	Blanket bog; a European Annex I habitat.  The level of value assigned follows that of the highest level designation	International
Breckon SSSI	Eutrophic loch; machair; sand dune; maritime cliff; and bog orchid.  The level of value follows that of the level of the designation	National
Unimproved acid grassland (U5a and U6a sub-communities)	Two sub-communities are identified on the SBL as being of national importance and are more biodiverse than the other areas of unimproved grassland: the U5a <i>Nardus stricta-Galium saxatile</i> and U6a <i>Juncus squarrosus-Festuca ovina</i> grasslands. However, due to their limited extent and grazing-retarded diversity, they are both assessed as of <b>Local</b> level importance	Local area
Unimproved acid grassland	While this type of habitat is relatively more biodiverse than semi-improved grassland, with the exception of the U5a and U6a sub-communities, the unimproved acid grasslands are of relatively limited biodiversity value, due to limited extent and grazing pressure and therefore considered of importance at the <b>Less than Local</b> level	Less than Local

Feature	Evaluation Reasoning	Level of Importance
Semi-improved U4b acid grassland	This U4b <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland, <i>Holcus lanatus-Trifolium repens</i> sub-community habitat is less species-rich, due to grazing and is a commonly found habitat type in the wider area. Assessed as having relatively limited biodiversity value, due to grazing pressure and land management, it is therefore assessed as important at the <b>Less than Local</b> level	Less than Local
Unimproved CG10a calcareous grassland	A European Annex I and SBL-listed habitat, the single, small area of the CG10a <i>Festuca ovina-Agrostis capillaris-Thymus praecox</i> grassland, <i>Trifolium repens-Luzula campestris</i> (white clover-heath woodrush) sub-community, at the head of Gloup Voe, is assessed as important at the <b>Council area</b> level, due to its limited extent	Council area
M23b marsh/marshy grassland	Marshy grassland is a generally widespread and common habitat type within the wider area. Though M23b <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture, <i>Juncus effusus</i> sub-community is an SBL habitat, the site component is assessed as important at the <b>Less than Local</b> level, where it is not a GWDTEs (see below), due to the highly limited extent and poor quality identified	Less than Local
H12c and H14 dry dwarf acidic shrub heath	This habitat type is represented particularly by the Annex I H12c <i>Calluna vulgaris-Vaccinium myrtillus</i> heath, <i>Galium saxatile-Festuca ovina</i> (heather-blaeberry) and <i>Galium saxatile-Festuca ovina</i> (heath bedstraw-sheep's fescue) sub-communities and H14 <i>Calluna vulgaris-Racomitrium lanuginosum</i> , which are also listed on the SBL as part of the Upland Heathland category; however, this is assessed as important at the <b>Less than Local</b> level owing to the limited extent and condition, comprising species-poor, uneven and indistinctive assemblages	Less than Local
M17b, M1, M2 and M3 Blanket bog	The relatively gentle topography of the site and the prevailing climate conditions have resulted in the widespread presence of blanket bog (M17b and M17c sub-communities, with M1, 2 and 3 bog pool communities), although there were some small sections of the access track route that are heavily eroded. As an internationally (Annex I) and nationally (SBL) important habitat, it has also been assessed in relation to the local area, where it is very common and wide-spread across the Shetland Islands. As a habitat type which covers	National

Feature	Evaluation Reasoning	Level of Importance
	much of the site and with many areas in stable/recovering condition, this is considered important at the <b>National</b> level.	
Bare peat	Bare peat habitat is rare across the site and confined to moderate slopes and vertical faces within areas of peat hagg and also within a section of peat cutting on the access track route. Due to their poor condition, these areas are considered important at the <b>Less than Local</b> level	Less than Local
M6a, M6b, M6c, M29 and M32a acid/neutral flush and spring	Listed on the SBL under the Upland flushes, fens and swamps category (and also on the LBAP), the site component (found as the M6a, b and c; M29; and M32a sub-communities) is of limited extent, generally species-poor, uneven and has an indistinctive assemblage; it is therefore assessed as important at the <b>Less than Local</b> level, where not considered a GWDTE (see below)	Less than Local
M10a basic flush and spring	Included under the SBL Upland flushes, fens and swamps category (and on the LBAP), this habitat is very limited in extent, being present in only two small areas; though a moderately species-poor M10a sub-community, uneven and indistinctive, it is classed as important at the <b>Local</b> level	Local
G1.3 and G1.4 oligotrophic and dystrophic standing waters	"Oligotrophic to mesotrophic standing waters" are Annex I habitats and included in the SBL as "Oligotrophic and dystrophic lakes"; they also come under the LBAP "Freshwater" action plan. These G1.3 and G1.4 standing waters are widespread across the site, are moderately species-poor (a feature of nutrient poor waterbodies), but unusual in being relatively untouched by human activity; they are therefore assessed as important at the <b>Council area</b> level	Council area
Running water	Widespread and an important feature of the Site drainage pathways; "Rivers" is an SBL-listed habitat and falls into the "Freshwater" action plan of the LBAP. The small site watercourses are therefore assessed as important at the <b>Local</b> level.	Local
Running water - fish habitat	Fish habitat within the burns is generally widespread across Shetland; suitable fish habitats are found throughout the Site, providing moderate to good quality habitat for salmonids and areas of suitable salmonid	Local

Feature	Evaluation Reasoning	Level of Importance
	spawning habitat. As central to supporting important fish species, such habitats are assessed as of <b>Local</b> value	
Acid/neutral natural rock	Rock exposures are common and frequent across the Site and wider area; exposure to higher wind speed conditions (as demonstrated by presence of H14a wind-clipped heath, in places) is presumed to be responsible for the numerous low, unvegetated outcrops of rock on exposed mounds and ridges and are assessed as important at the <b>Less than Local</b> level	Less than Local
Other - woodland	Due to their rarity and inclusion on both the SBL and the LBAP “Woodlands” Action Plan, these limited areas of woodland and relicts are considered important at the <b>Local</b> level	Local
Other – hard standing, etc.	The gravel track is not of any conservation value and is therefore assessed as important at the <b>Less than Local</b> level	Less than Local
GWDTE	<p>Seven habitat types identified, but only two areas within the application boundary were confirmed to be fully groundwater fed.</p> <p>As a consequence of the ombrogenous character of the site, with only a small number of exceptions, the potential GWDTEs have low to no groundwater dependency, being dependent instead upon precipitation and surface waters (see Chapter 10: Geology, Peat, Hydrology &amp; Hydrogeology for further details). The only exception is one area of the M32 springhead community that is associated with M10 mire, where the M32’s acid/neutral waters irrigate a base-rich substrate. As a result, the latter is also, but indirectly, associated with groundwater; see Appendix 7.2 for more details. Due to the limited extent of GWDTEs on site (see Figure 7.4a-e and Figure 10.7), these features are assessed as important at the <b>Local</b> level</p>	Local
Hawkweed	Hawkweed was identified outwith, but immediately adjacent to, the Proposed Development site boundary; it has the potential to be more widespread within the site. The species was not definitively identified; however, as hawkweed is listed on the LBAP and 19 species of the genus are included on the SBL, and taking a precautionary approach and assuming the identified	Local

Feature	Evaluation Reasoning	Level of Importance
	plants to be one of those species listed, hawkweed is assessed as of <b>Local</b> value	
Otter	Otter is important as an EPS and SBL priority species, but is considered sufficiently common across the Shetland Islands not to be included on the LBAP. No active holts were identified within the Proposed Development site boundary or the study area, though evidence of presence was recorded within the application area. Due to the generally common and wide-spread presence and favourable status of otter across the wider area, this species is considered important at the <b>Local</b> level only	Local
Freshwater pearl mussel	Though an EPS, as fresh water pearl mussels were not identified in the survey, they are considered important at the <b>Less than local</b> level	Less than Local
Fish species	Salmonids and eel are present within the Site watercourses.  Atlantic salmon is listed on Annex II of the Habitats and Species Directive (European Commission, 2019); Atlantic salmon, brown trout and eels are all listed as priority species on the Scottish Biodiversity Action Plans, i.e. all three are listed on the SBL. Owing to population declines, eel is considered of increasing conservation concern and is therefore protected under both EU and Scottish legislation (EC No 1100/2007 and Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008; see Appendix 7.6 for further details). Based on the presence of important/notable fish species within the Study Area, fish are considered important at the <b>Local</b> level	Local

### **Future Baseline**

- 7.6.2 The Proposed Development site is currently used as grazing land, the majority of which comprises blanket bog. Waterbodies are present in the form of bog pools through to small lochs and numerous small burns drain the land. This land management is unlikely to change, and the habitat baseline and wildlife use of the area are therefore likely to remain at similar levels to those assessed for this EIA Report.

## **7.7 Receptors Brought Forward for Assessment**

- 7.7.1 As noted under Section 7.4, above, ecological features of local and higher value are considered Important Ecological Features (IEFs). Due to a range of factors, some of these IEFs can be scoped-out of further consideration:



- Designated sites:
  - Fetlar to Haroldswick MPA – while located adjacent to the south, the application of standard mitigations will remove the potential for impacts to the designation;
  - East Mires and Lumbister SAC & SSSI – At c.2 km from the Proposed Development site boundary, this nature conservation area designated for blanket bog habitat is considered outwith the Proposed Development EZoI; and
  - Breckon SSSI – At c.1.9 km distant, there is no direct linkage to the Proposed Development site boundary; this nature conservation area designated for habitats and plant species is also considered to be outwith the Proposed Development EZoI.
- Habitats:
  - CG10a calcareous grassland. A very small area of this habitat type was identified close to the relict woodland of the Burn of Hildigill. This is outwith the disturbance zone of the Proposed Development;
  - Flush habitats (M6a, M6b, M6c, M29 and M32a acid/neutral flush and spring and M10a basic flush and spring). These are associated with the watercourse valley sides, two of the potential GWDTEs and also drainage between lochans in several locations and are therefore avoided by the Proposed Development site infrastructure; watercourse crossings have also been located to avoid these areas;
  - Woodland. Two areas of relict woodland are within the Proposed Development site boundary at the head of Gloop Voe (i.e. lining Burn of Rulesgill and Burn of Hildigill). These two areas are downstream of track infrastructure, outwith the direct disturbance zones, within deep cleughs; and
  - GWDTEs – the cluster of potential GWDTE habitats to the south-west of Gossa Water are now at least 800 m beyond the Proposed Development site boundary and are beyond the EZoI of the Proposed Development. The remaining potential GWDTE areas, at the head of Gloop Voe and on the eastern side of Hill of Bakkanalee, are more than 500 m from the nearest proposed infrastructure and therefore also considered to be outwith the EZoI. The only habitat areas identified as a GWDTE, are an area of M32 springhead community located by the Burn of Tongafield and in excess of 450 m from the closest Proposed Development infrastructure; and a similar M32 springhead community at the southern end of Gloop Voe, over 700 m from the closest Proposed Development infrastructure within the same side of the catchment area.
- Species:
  - Hawkweed – Located near the Burn of Hildigill, at the head of Gloop Voe, the identified plant is in excess of 150 m from the indicative access track to T29. This is considered sufficient distance from the working area of the Proposed Development (including final micro-siting allowance) to ensure they are not disturbed.

7.7.2 The remaining IEFs of interest to this assessment, and therefore taken forward for further assessment, are:

- habitats:
  - unimproved acid grassland (i.e. the U5a *Nardus stricta-Galium saxatile* and U6a *Juncus squarrosus-Festuca ovina* sub-communities);
  - blanket bog, present as M17 and as a variety of mosaic components, including M1, 2 and 3 bog pool communities; Oligotrophic and dystrophic standing water. Design iteration has

reduced the number of standing water bodies within the Ecological Zone of Influence, however, a number of the larger pools are still within 100 m of the track and turbine locations; and

- Running water and fish habitat. Fourteen burn crossings are required for the track works.
- species:
  - otter; and
  - fish species.

## 7.8 Standard Mitigation

7.8.1 As already noted, following CIEEM guidance, the assessment process assumes the application of standard mitigation measures. A range of measures have already been applied as part of the iterative design process (see below and Chapter 2: Design Iteration), to avoid the higher value areas of blanket bog, waterbodies and watercourses. Standard mitigation also includes the following, some of which will be submitted in outline as part of this application:

- Adherence to current environmental protection policies and guidance, including but not limited to:
  - Good Practice During Wind Farm Construction (SNH, 2015a)
  - Constructed tracks in the Scottish uplands (SNH, 2015b);
  - WAT-SG-75 (SEPA, 2018);
  - A Practical Guide to the CAR Regulations (SEPA, 2019); and
  - LUPS-GU31 (SEPA, 2014).
- Development of a Site Construction Environmental Management Plan (CEMP), in consultation with stakeholders (i.e. SEPA, SNH and Shetland Islands Council) to include:
  - Appointment of a suitably qualified and experienced Ecological Clerk of Works (ECoW) to oversee application of the CEMP;
  - Site Water Management Plan (SWMP);
  - Peat Management Plan (PMP); see Appendix 10.3;
  - Materials Management Plan (MMP; to include a Waste Policy/Management Plan); and
  - Habitat Management Plan (HMP); see **Appendix 7.7** for the Outline HMP.
- Preconstruction ecological survey programme of habitats and watercourse crossing points, to identify any changes to otter or fish use of the channels, to feed into the final micro-siting process;
- Use of Method Statements during construction, to include current good practice and prescribed use of low noise and vibration plant to limit fish avoidance behaviours when working near watercourses;
- Development of an Operational Site Management Plan, (OSMP) to include an HMP and maintenance task Method Statements.

### ***Mitigation through Design Iteration***

7.8.2 As described in **Chapter 2** (Design Iteration), the Proposed Development has gone through ten major iterative design changes (A to J), from November 2017 to the design being taken forward for this

2019 application. Commencing from an initial design aimed at maximising capacity, design development has included:

- reduction of the site application area to avoid conflicts with the RSPB Lumbister nature reserve (see Chapter 6: *Ornithology for more details*) and the majority of the north-eastern and south-western lochs and lochans, including avoidance of the Gossa Water catchment watershed;
- reduction of the number of turbines from an initial 68 (Layout A) to 50 (Layout B), then to 31 (Layout C) and then finally to 29 (Layout D onwards), in order to reduce the loss of peatland and avoid bog pool complexes;
- creation of turbine-free “passages” for commuting birds (see Chapter 6: *Ornithology for more details*);
- routing of the site tracks and turbine locations to minimise impacts to the deeper peat deposits and limit the number of watercourse crossings;
- rotation of crane pad locations to avoid deeper peat deposits;
- relocation of the substation to reduce the access track connection; and
- re-defining of the temporary borrow pit search areas to reduce size, avoid deeper peat deposits, reduce transport requirements (by locating close to the access tracks) and/or to follow hill contours.

7.8.3 Other considerations have included avoidance (where possible), through micro-siting, of watercourses and gullies, wet peat and deep peat (deposits of over 2m depth), the settlements at Gloop and Cullivoe; avoidance of Gossa Water Catchment area and key sensitive areas, including some of the more visually important landscape character areas (e.g. the south-west coastline at Gerherda and the open headland at North Neaps and the coastal edge at Vignon and Burgi Geos).

## 7.9 Potential Effects

7.9.1 The main elements of the Proposed Development which have the potential to impact on IEFs, both during construction and operation are:

- cut (3 km) and floating (19 km) track construction, including bridging/culverting of watercourses and mobile plant traffic movements;
- temporary borrow pit operations;
- met mast installation;
- turbine foundation creation (including excavation, pile-driving of anchors, etc.);
- crane pad construction;
- cable-laying and grid connection infrastructure (including substation);
- temporary lay-down and site compound areas;
- temporary materials storage (peat);
- site water management; and
- site restoration (temporary lay-down areas, track batters, compounds, etc.).

7.9.2 The above activities have the potential to cause the following construction impacts to the IEFs identified for the site:

- direct loss of habitat;
- direct loss of foraging habitat and/or breeding habitat for protected species;

- indirect loss of foraging habitats and/or breeding habitat for species, through displacement; and
- disturbance to habitats and species (including noise, vibration, pollution), due to track and turbine base construction, as well as turbine erection, heavy machinery, noise and human activity on the site. Disturbance of vegetation will affect a 5 m zone around all infrastructure.

7.9.3 The potential operational impacts have been identified as:

- habitat change (modification) over time (N.B. operation phase drying of peat may affect up to 5m around cut track);
- direct and indirect loss of foraging or breeding habitat due to displacement or avoidance; and
- cumulative impacts of the Proposed Development in the context of other nearby wind farms (operational and consented)

### **Construction**

7.9.4 In accordance with the CIEEM guidelines, effects of impacts are assessed in the presence of standard mitigation measures (as described above); design iteration has ensured avoidance of the highest quality and most sensitive areas of habitat.

### **Habitat Loss**

7.9.5 Habitat lost to the Proposed Development has been calculated using the NVC codes (see Table 7.8, below). Assumptions made for this series of calculations are:

- Permanent loss:
  - all habitat under permanent floated and dug track/hardstanding will be lost;
  - 2 m radius of habitat from all permanent floated track and substation will be lost (due to embankments); and
  - 3 m radius of habitat from all dug track will be lost (due to embankments and drainage ditches).
- Temporary loss (habitats lost during construction but re-instated subsequently):
  - all habitats under temporary floated infrastructure (e.g. floating hardstanding, temporary floated roads, temporary floated construction compounds); and
  - all habitats under temporary dug infrastructure (e.g. temporary borrow pit search areas).
- Temporary disturbance of peatland habitat (overlaps with 'degradation' category below but is a construction phase impact):
  - 2 m radius from all permanent and temporary lost habitat.
- Degradation (drying) of wet peat during operation (overlaps with 'temporary disturbance' category above but is an operation phase impact):
  - 2 m radius from all permanent and temporary lost habitat.
- Disruption of water flows in wetland habitats:
  - 3 m radius from the degenerated habitats.

7.9.6 The access track, to be constructed for the Proposed Development, is assumed as being 5 m wide. Floated tracks will comprise a geotextile membrane on existing topography with aggregate placed in layers as per design. Depending on ground conditions, two or more layers of geotextile will be placed in layers of 300 mm to 500 mm. Roads will be capped with a layer of Type 1 (a granular

aggregate material to a maximum of 63mm in size) or similar material. Cut tracks will require surface stripping of existing surface measures to a suitable bearing or the designed formation, a filter membrane placed and/or geotextile reinforcement membrane (depending on site conditions). Aggregate is to be placed as per design. Roads will be capped with a layer of Type 1 or similar material.

**Table 7.7 - Summary of Habitat Lost to Proposed Development Footprint (IEFs shown in bold)**

General habitat (Phase 1 code)	NVC code (or Phase 1 code where NVC could not be undertaken)	Permanent loss during operation (m <sup>2</sup> )	Temporary loss during construction (m <sup>2</sup> )	Construction disturbance (m <sup>2</sup> )	Operational degradation of peat (m <sup>2</sup> )	Disruption of water flows (m <sup>2</sup> )
<i>Grassland and grassland-dominated mosaics</i>						
<b>Unimproved acid grassland (B1.1)</b>	U5	2867	0	435	n/a	n/a
<b>Unimproved acid grassland (B1.1)</b>	U5b	370	0	149	n/a	n/a
<b>Unimproved acid grassland (B1.1)</b>	U6a	0	1334	48	n/a	n/a
<b>Unimproved acid grassland (B1.1)</b>	U6a/U6d	776	0	385	n/a	n/a
<b>Unimproved acid grassland/ acid dry dwarf shrub heath mosaic (B1.1/D1.1)</b>	U6a/U6d/H12c/D1.1	510	0	215	n/a	n/a
<b>Unimproved acid grassland</b>	U6d/U4a	0	0	1	n/a	n/a
<b>Unimproved acid grassland/ acid dry dwarf shrub heath mosaic (B1.1/D1.1)</b>	U6d/H12c/D1.1	1213	0	497	n/a	n/a
<b>Unimproved acid grassland/ marshy grassland (rush pasture) mosaic (B1.1/B5)</b>	U6d/U6a/M23b	285	0	120	n/a	n/a
<b>Unimproved acid grassland/ marshy grassland</b>	U6d/U6a/M23b/U5a/U5b	131	0	60	n/a	n/a

General habitat (Phase 1 code)	NVC code (or Phase 1 code where NVC could not be undertaken)	Permanent loss during operation (m <sup>2</sup> )	Temporary loss during construction (m <sup>2</sup> )	Construction disturbance (m <sup>2</sup> )	Operational degradation of peat (m <sup>2</sup> )	Disruption of water flows (m <sup>2</sup> )
<b>(rush pasture) mosaic (B1.1/B5)</b>						
Marshy grassland (rush pasture)/ unimproved acid grassland mosaic (B5/B1.1)	M23b/U6a/U6d	183	0	89	n/a	n/a
<i>Heath and heath-dominated mosaics</i>						
Acid dry dwarf shrub heath (D1.1)	D1.1	2209	154	889	n/a	n/a
Acid dry dwarf shrub heath (D1.1)	H12c	125	0	57	n/a	n/a
Acid dry dwarf shrub heath/ unimproved acid grassland (D1.1/B1.1)	D1.1/U6d	1694	10961	1267	n/a	n/a
Acid dry dwarf shrub heath/ unimproved acid grassland/marshy grassland (rush pasture) mosaic (D1.1/B1.1/B5)	D1.1/U6d/U6a/U5a/M23b	452	0	192	n/a	n/a
Acid dry dwarf shrub heath/ unimproved acid grassland (D1.1/B1.1)	D1.1/U6d/U6c	344	17527	844	n/a	n/a
<i>Blanket bog and blanket bog-dominated mosaics</i>						
<b>Blanket bog (E1.6.1)</b>	M17b	274936	214806	91113	91113	133333

General habitat (Phase 1 code)	NVC code (or Phase 1 code where NVC could not be undertaken)	Permanent loss during operation (m <sup>2</sup> )	Temporary loss during construction (m <sup>2</sup> )	Construction disturbance (m <sup>2</sup> )	Operational degradation of peat (m <sup>2</sup> )	Disruption of water flows (m <sup>2</sup> )
Blanket bog/bog pool mosaic (E1.6.1)	M17b/M3/M2/M1	2698	518	437	437	695
Blanket bog/bog pool mosaic (E1.6.1)	M17b/M3/M2	17144	1164	4776	4776	7132
Blanket bog/bog pool mosaic (E1.6.1)	M17b/M3	0	972	165	165	257
Blanket bog/bog pool/bare peat/oligotrophic open water mosaic (E1.6.1/G1.3)	M17b/M2/M3/E4/G1.3	3598	7826	1985	1985	2918
Blanket bog/bog pool/dystrophic open water mosaic (E1.6.1/G1.4)	M17b/M2/M3/G1.4	1186	0	429	429	804
Blanket bog/bog pool/dystrophic open water mosaic (E1.6.1/G1.4)	M17b/M3/G1.4	671	0	235	235	367
Blanket bog/unimproved acid grassland mosaic (E1.6.1/B1.1)	M17b/U5a	3310	941	360	360	518
Blanket bog/unimproved acid grassland mosaic (E1.6.1/B1.1)	M17b/U5b	2375	5798	1135	1135	1600
Bog pool	M2	206	0	63	n/a	88

General habitat (Phase 1 code)	NVC code (or Phase 1 code where NVC could not be undertaken)	Permanent loss during operation (m <sup>2</sup> )	Temporary loss during construction (m <sup>2</sup> )	Construction disturbance (m <sup>2</sup> )	Operational degradation of peat (m <sup>2</sup> )	Disruption of water flows (m <sup>2</sup> )
Blanket bog/bog pool/bare peat mosaic (E1.6.1/E4)	M17b/M2/M3/E4	0	532	145	145	233
Blanket bog/acid dry dwarf shrub heath mosaic (E1.6.1/D1.1)	M17b/D1.1	0	0	7	7	70
<i>Other</i>						
Hardstanding (J5)	J5	4804		n/a	n/a	n/a
<b>Total</b>		<b>322088</b>	<b>262534</b>	<b>106098</b>	<b>100787</b>	<b>148015</b>

#### Hydrological change

7.9.7 A variety of habitats, primarily blanket bog, will be impacted due to permanent habitat loss (see Table 7.8) and/or severance by the access tracks, temporary borrow pits and turbine foundations; and the cabling works – the areas surrounding these elements of the Proposed Development will experience changes in hydrological conditions (e.g. interrupted drainage pathways through the peat acrotelm and catotelm horizons); see **Chapter 10** (Geology, Peat, Hydrology & Hydrogeology) for further details. Floating tracks are to be used for the majority of the Proposed Development infrastructure, in order to minimise impacts to the hydrological conditions of the blanket bog. Impacts are considered within the below assessments.

#### Unimproved acid grassland

7.9.8 Areas of locally valuable unimproved acid grassland habitat (i.e. the U5a *Nardus stricta-Galium saxatile* and U6a *Juncus squarrosus-Festuca ovina* sub-communities), are more vulnerable to construction disturbance, due to their limited extent and location at watercourse crossings.

7.9.9 A total of c.58.8 ha of U5a and U6a grassland is present, including as the dominant component of mosaic habitats.

7.9.10 Following the assumptions listed in Section 7.9.5 of this chapter, above, and taking a precautionary approach by including all ‘pure’ stands of U5a and U6a grassland as well as habitat mosaics dominated by these communities, a total of c.0.62 ha is expected to be lost to the Proposed Development footprint (i.e. c.1.05% of the habitat type within the Proposed Development site boundary). This permanent loss will be immediate **low** impact and therefore a **significant** effect at the Local area scale.

7.9.11 A further c.0.13 ha (c.0.23% of the habitat type within the Proposed Development site boundary) will be subject to temporary land-take. In addition, c.0.19 ha surrounding the infrastructure will be likely subject to disturbance (i.e. 0.32% of the acid grassland in the application area). This is considered a temporary, **barely perceptible** impact at a Local area scale and the effect is therefore **not significant**.



### Blanket bog

- 7.9.12 A total of c.1,499 ha of blanket bog is present as 'pure' M17 vegetation or as the dominant component in mosaic with other habitats, including bog pools. Following the assumptions listed in 7.9.5, above, a total of c.30.61 ha of blanket bog, including the bog mosaics (see Table 7.8, above), is expected to be permanently lost to the Proposed Development footprint (i.e. c.2.04% of the habitat type within the Proposed Development site boundary), while c.23.26 ha will be temporarily taken (i.e. c.1.55% of the habitat type within the Proposed Development site boundary). In addition, c.10.04 ha surrounding the infrastructure will be likely subject to disturbance (i.e. 0.67% of the blanket bog in the application area). With the predicted degradation and disturbance to the nationally valuable resource determined for an area larger than that expected to be lost, this change is also considered to be a long-term **medium** adverse impact and therefore a **significant** effect at the National area scale.
- 7.9.13 While a limited extent of the application area resource is to be lost to the Proposed Development, this habitat type is considered of particularly high value. This permanent loss will be immediate **medium** adverse impact and the effect therefore **significant** at the National area scale (N.B. degradation is considered an operational impact; see below).
- 7.9.14 Temporary materials lay-down areas construction compounds and temporary borrow pits, which are to be restored (i.e. the c.33.71 ha noted above), are assessed as likely to have a short-term, **barely perceptible** adverse impact as they will be floated. The impact of the use of these areas is therefore considered to be short-term, temporary and the effect **not significant**.

### Standing and running water

- 7.9.15 Habitat loss is of particular relevance to fish habitat (and salmonid spawning habitat, in particular). Design iteration has been used to identify crossing points to ensure fish habitat is not severed and potential spawning habitats are avoided. A mix of bridge and arch culverts will be used for the larger watercourses, leaving the channel bed unaffected, with pipe culverting used on the minor channels. Any such losses of habitat due to use of pipe culverts would be limited to loss of a very small section of bed substrate. Fish habitat lost to pipe culvert installation would be an immediate **barely perceptible** adverse impact and the effect would therefore be **not significant**.

### **Species**

#### Otter

- 7.9.16 Otters rely on the aquatic environment, although they will also track across watercourse catchments within their territories. The potential noise and vibration impacts of constructional activities could potentially change behaviours and cause avoidance of areas within their ranges for the duration of the disturbance event. Once the disturbance is complete, or the animals concerned have habituated to the disturbance, use of the habitat will likely resume at the same level. These effects would be immediate and adverse **barely perceptible** impact and likely only locally **significant** on an immediate, very temporary timescale.
- 7.9.17 Otters are also potentially vulnerable to mortality or injury due to collision with construction traffic or construction methods (i.e. large mobile plant stripping the surface and deep excavations). The probability of collisions occurring is considered to be low, therefore an immediate, **low** adverse impact is therefore possible, which would constitute a **significant** effect at the local scale.

#### Fish

- 7.9.18 Fish species are vulnerable to pollution incidents, with the severity of an incident dependent upon the materials involved and the scale of the incident. For example, silt discharges can cause damage to fish gills (potentially resulting in suffocation if the particle size is sufficiently large). However, watercourse buffers and standard mitigation measures will prevent the potential for both silt and toxic chemical releases to the aquatic environment and the effect is therefore considered **not significant**.

## **Operation**

### **Habitats**

- 7.9.19 With habitat loss included under the construction phase of the Proposed Development, the primary effect of the operational phase will relate to the long-term changes of peatland habitats only, due to changes in the hydrological conditions immediately adjacent to the Proposed Development infrastructure. In the presence of standard mitigation, impacts on habitats on mineral soils as well as aquatic habitats are considered unlikely.

#### Blanket bog

- 7.9.20 Excavated bases and sections of cut track will interrupt or deflect the water flow through adjacent peat, which will cause relatively minor changes and generally result in localised drying-out of the peat and the development of more heath-like communities along track batters and around the turbine bases (with changes likely be within to c.2-3 m; see habitat loss “assumptions” Section 7.9.5 of this chapter, above).
- 7.9.21 Flows of water along the cable routes may result in both localised drying and localised pooling of water. Such ongoing processes would result in a long-term **less than local** level change; however, this operational transitioning into a different habitat type, for a very small component of the overall area, is considered a **not significant** effect.
- 7.9.22 Following the assumptions listed in 7.9.5, above, c.10.08 ha surrounding the infrastructure will be likely subject to degradation (i.e. 0.67% of the blanket bog in the application area) and a further 15.56 ha beyond this could be subject to disruptions in flows (i.e. 1.04% of the blanket bog in the application area). With the predicted degradation and disturbance to the nationally valuable resource determined for an area larger than that expected to be lost, this change is also considered to be a long-term **medium** adverse impact and therefore a **significant** effect at the National area scale.

### **Species**

- 7.9.23 Potential operational impacts to the notable animal species of the Proposed Development site relate to changes in use of the area as a result of the installation, i.e. avoidance behaviour, and as a result of maintenance activities.

#### Otter

- 7.9.24 Avoidance behaviour is not expected to be an issue, as otter will become accustomed to the new watercourse crossings and background levels of vibration caused by turbine operation (i.e. the new Proposed Development site baseline conditions). Operational impacts of the Proposed Development on the behaviour of otter in this area are considered to be **not significant**.

#### Fish

- 7.9.25 Maintenance activities have the potential to cause pollution incidents. In the absence of the construction mitigation measures, maintenance activities will be controlled through the standard mitigation of detailed Method Statements and spill kits will be maintained both on the maintenance vehicles and on the Proposed Development site at the locations requiring maintenance. The potential for pollution of ground and waters is therefore considered unlikely and therefore **not significant**.

### **Decommissioning**

- 7.9.26 Decommissioning impacts are generally regarded as similar to those experienced during the construction phase, albeit less intrusive. A decommissioning assessment is likely to be required at the end of the Proposed Developments lifecycle and so decommissioning is not considered further in this is assessment.

## 7.10 Additional Mitigation

7.10.1 Specific habitat and species mitigation measures for the construction and operational phases of this Proposed Development are defined within the HMP documentation. Additional mitigation measures include:

### **Habitats**

- Identification of appropriate exclusion zones around sensitive features, to prevent construction vehicle tracking through these areas.
- Careful strip and retention of turves (with particular reference to both peatland and grassland vegetation), for re-use in the restoration of track and turbine batters.
- Operative awareness education, in the form of toolbox talks, to ensure the value of the habitat is understood.
- Careful wash-down of plant and other equipment will be mandatory prior to access to or egress from the Proposed Development site, to prevent potential biosecurity risks associated with plant movements; potentially contaminated materials will be identified and the handling of such strictly controlled.
- Exclusion of livestock from the restored temporary borrow pit areas, to permit habitat recovery free from grazing pressure (which otherwise has the potential to degrade the surface).

### **Otter**

- Development of an otter-specific protection plan.
- Driver awareness and 10mph speed controls within the Proposed Development site to limit the risk of road traffic accident mortality.
- Avoid creating any obstructions to established otter pathways or access to open water as instructed by the ECoW.
- An exclusion zone of at least 30m to be implemented around any holt or resting place.
- Avoid working in the vicinity of identified otter habitat (i.e. the watercourses and waterbodies) during the hours of darkness and within two hours after sunrise and two hours before sunset. This can be reduced to one hour between November and February due to limited daylight.
- Cap any exposed pipe systems when not being worked and provide exit ramps for any exposed trenches or excavations (to prevent otters entering and becoming trapped).

### **Fish**

- Development of a fish species protection plan.
- A site water quality management plan (SWMP, see Chapter 10: Geology, Peat, Hydrology & Hydrogeology) will be developed prior to construction in order to ensure that stream habitats and fauna are protected during construction.
- Where possible, any stream crossings should avoid areas of salmonid spawning habitat.
- Given the demonstrable presence of trout in relatively small headwater streams (e.g. Burn of Kedilsmires), crossings should not create new barriers to migration, unless clearly upstream of potentially productive fish habitat.
- If substantial instream work is required, or there is likely to be significant disturbance (i.e. disturbance/removal of bed substrates for channel culverting) to the riverbed, SEPA may

require that works avoid periods when eggs are in the gravel or fry are emerging. This would typically cover the period between October and May (SEPA 2010b).

- Avoidance of working on crossings within the same catchment at the same time: crossing works are to be sequenced to avoid multiple habitat severance event occurring simultaneously to the same system.
- Regular monitoring of turbidity and suspended solids will be required during construction. Any such monitoring should include a responsive element, with an on-site ECoW checking areas where active works are taking place and areas where sediment run-off may be a concern during periods of high rainfall. If stream hydrochemistry is to be monitored during construction, determinants should include iron and other potentially toxic metals, since some evidence of iron leaching was apparent during the current survey and this may be exacerbated by soil exposure during construction of tracks and turbine bases.
- A programme of water quality and aquatic bio-monitoring, including of salmonid fish, during the construction period.

## 7.11 Residual Effects

7.11.1 See Table 7.9, below, for a summary of the effects identified within this assessment.

### **Construction**

#### **Habitats**

##### Unimproved U5a and U6a acid grassland

7.11.2 Careful removal and retention of turves will permit restoration of track sides at the watercourse crossing points. It may be possible to create similar conditions on the track side-slopes as present prior to removal, in which case a change in species mix, due to condition changes, may be minimal. Any residual changes would be expected to be **barely perceptible** over the long-term for both permanent and temporary habitat losses, i.e. **not significant** at the Local area scale.

##### Peatland

7.11.3 Despite careful storage of turves for restoration purposes, particularly for the reinstatement of track batters and around bases, the loss of blanket bog cannot be mitigated; the residual impact is therefore assessed to remain at least a **low** level, long-term **significant** effect at a National scale.

7.11.4 Temporary habitat loss would remain a **barely perceptible** and **not significant** effect on a Local scale.

##### Standing and running water

7.11.5 Method statements, pollution controls and management plans and mitigation applied to protect the Proposed Development site's fish species will ensure protection of the site water resource from pollution. Therefore **no impact** and **no effects are** expected.

7.11.6 A **barely perceptible** and **not significant** Local scale residual habitat loss is expected, as a very small amount of bed substrate will be lost to culvert pipes.

#### **Species**

##### Otter

7.11.7 With the application of additional measures to avoid conflict with otter during the construction phase, disturbance, resulting in avoidance behaviour would still be expected as **barely perceptible**, immediate, very temporary **significant** (locally) impact

7.11.8 With reference to traffic collision and works-related mortality, an assessment of **barely perceptible** residual impact at a **Local** level and therefore **not significant**, is considered appropriate.

#### Fish

- 7.11.9 Given the presence of a range of mitigation measures, construction related pollution incidents are not expected; therefore **no impacts** and no effects are anticipated.

### **Operation**

#### **Habitats**

##### Peatland

- 7.11.10 Hydrological changes to limited areas of habitat as a result of cabling diverting some water flows would be unlikely to be more than a **barely perceptible** long-term and therefore **not significant** impact
- 7.11.11 Despite careful storage of turves for restoration purposes, particularly for the temporarily used areas, the loss of blanket bog is not possible to mitigate; the residual effect therefore remains **low level significant** at the National area level.

#### **Species**

##### Otter

- 7.11.12 With the application of additional measures to avoid conflict with otter during the operation phase, a **barely perceptible** and therefore **not significant** residual effect at a Local level is concluded.

##### Fish

- 7.11.13 No residual effects are expected for fish species using the Proposed Development site.

## **7.12 Compensation**

- 7.12.1 As noted in Section 7.4 above, where it is not possible to mitigate the loss of a feature, it may be possible to compensate for this loss, creating a long-term beneficial effect, either within or off the Proposed Development site.
- 7.12.2 The permanent loss of 30.61 ha of blanket bog (significant at the National area level) to the Proposed Development will be compensated through peatland restoration elsewhere on Yell. This is described in Appendix 7.7: Outline Habitat Management Plan, which is intended as a precursor to a detailed plan, which will be agreed with the Shetland Islands Council, SEPA and SNH. As described in in Appendix 7.7, several locations are currently being investigated as potential off-set mitigation locations, with excess peat being used to restore areas of damaged/degraded peatland.

## **7.13 Cumulative Assessment**

- 7.13.1 It should be noted that there is no published SNH guidance for cumulative impact assessment on terrestrial ecological receptors. SNH *Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments* (SNH, 2012) is confined to landscape and visual impacts and to those affecting birds. The key principle of SNH's cumulative impact assessment guidance for birds is to focus on any significant effects and, in particular, those that are likely to influence the outcome of the consenting process. Application of the outlined principles to terrestrial ecological features leads to a focus on the potential cumulative impacts to the Proposed Development's IEFs, i.e. peat habitats, open water, watercourses, fish and otter.
- 7.13.2 At time of writing, there are a number of wind farms projects on the Shetland Isles to take into consideration. However, due to the limits of connectivity between terrestrial ecological features, this assessment has considered a 10km radius to be appropriate: this rules-out consideration of developments located on different landmasses and also the Beaw Field development, located approximately 15km to the south of the Proposed Development. Single turbine developments (or small turbine developments) are also scoped-out, as there are no pathways to provide connectivity to the Proposed Development (i.e. consideration has been given to catchments/watersheds). The installations considered for this cumulative assessment were therefore limited to:

- Garth: five turbines operational since 2017; closest at c.1.5 km east of the Proposed Development site boundary; and
- Hill of Lussetter: approximately 8.5 km to the south, east of Mid Yell, on the southern shore of Mid Yell Voe. No details were available at time of writing, beyond a recording of “scoping” against the status (SNH, 2019).

7.13.3 Due to their physical separation, these installations are not considered to have any direct impact on the Important Ecological Features within the Proposed Development site (peat habitats, open water, watercourses, fish and otter). The closest Garth turbine is just over 1.5 km to the east of the application boundary and these five Garth turbines have no direct connectivity with the Proposed Development, being located within a different catchment and therefore outwith the Ecological Zone of Influence of the Proposed Development. Following the same logic, the potential Hill of Lussetter development, at 8.5 km south, will also be sufficiently distant to have no potential to cause impacts in combination to the Proposed Development.

7.13.4 For this Proposed Development, there are considered to be no significant cumulative effects from the wind farms in combination, assuming that all proposed mitigation measures are implemented.

## 7.14 Summary

7.14.1 The site identified in northern Yell for the Proposed Development is upland in character, waterlogged and dominated by blanket bog and other mire types, with areas of grassland in the more sheltered valleys and on better-drained slopes. Habitats of particular value to the natural resource of the area were identified as blanket bog, including a mosaic of bog pools and other standing and running waters, small areas of marshy and calcareous grassland and components of the unimproved grassland found in the watercourse valleys. Additionally, relict woodland is present along two cleughs, associated with the head of Gloup Voe. No non-native, invasive plant species were identified and only one area was noted as supporting a potentially locally notable hawkweed (*Hieracium* spp.), though this was outside of the development area.

7.14.2 Seven plant community types were identified as having potential to be groundwater dependent; however, the dominance of blanket bog clearly demonstrates the influence of a high precipitation/evaporation ratio across the Proposed Development site and blanket bog communities are by their nature not groundwater dependent. Only two small areas within the Proposed Development were identified as Ground Water Dependent Terrestrial Ecosystems, both are of the M32 springhead community, associated with M10 mire.

7.14.3 Otter (*Lutra lutra*) presence was found across the Proposed Development area, but no evidence of freshwater pearl mussel (*Margaritifera margaritifera*) was found within the Proposed Development site during surveys. The fish study identified widespread presence of trout (*Salmo trutta*) within the Proposed Development site, likely in both brown and sea trout forms, given the access of a number of catchments to migratory salmonids; however, no Atlantic salmon (*Salmo salar*) were identified during electrofishing surveys, though European eel (*Anguilla anguilla*) was identified to be present. Suitable fish habitat is widely available across the Proposed Development site, though not all catchments are fully accessible to migratory fish species: several burns were identified as inaccessible from the sea and electrofishing indicated that fish were likely to be absent.

7.14.4 Following the evaluation process, non-avian Important Ecological Features (IEFs) taken forward to full assessment were three habitats (the U5a *Nardus stricta-Galium saxatile* and U6a *Juncus squarrosus-Festuca ovina* unimproved acid grassland sub-communities); blanket bog, present as M17 and as a variety of mosaic components, including M1, 2 and 3 bog pool communities; Oligotrophic and dystrophic standing water; and Running water and fish habitat); and two species/groups (otter; and fish species).

7.14.5 In addition to design iteration and application of industry standard impact mitigations, a range of habitat and species-specific measures have been presented to minimise the overall impact of the Proposed Development. This includes careful strip and storage of turves to permit restoration of temporary work areas and track batters; biosecurity and operative education; otter and fish protection measures, including avoidance of the salmonid breeding, incubation and emergence

season. Additionally, it is proposed to implement a potential beneficial off-set mitigation (i.e. compensation), restoring areas of degraded peatland elsewhere on Yell.

- 7.14.6 Residual impacts were assessed as generally barely perceptible adverse impacts and therefore **not significant**, with the exception of impacts to the valuable peatland habitats, assessed as a long-term low adverse impact (an unmitigatable impact within the site); and no impacts are expected to fish species. No cumulative impacts are anticipated in combination with the other five wind farms that either consented or at development stage on the Shetland Isles.

**Table 0.9 – Summary of Effects**

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
<b>Construction</b>					
Permanent loss of habitat: U5a and U6a unimproved acid grassland	Low impact, significant on Local area scale	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP	Barely perceptible, not significant on Local scale	Adverse
Temporary loss of habitat: U5a and U6a unimproved acid grassland	Barely perceptible, not significant on Local area scale	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP	Barely perceptible, not significant on Local scale	Adverse
Permanent loss of habitat: blanket bog	Medium impact, significant on National area scale	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP; off-set mitigation through compensation by restoration of off-site areas	Long-term low impact, significant on National area scale	Adverse
Temporary loss of habitat: blanket bog	Barely perceptible, not significant	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP; exclusion of livestock	Barely perceptible, not significant at a Local area scale	Adverse



Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Standing and running water - habitat loss	Barely perceptible, not significant	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP	Barely perceptible, on a Local scale	Adverse
Otter - disturbance	Barely perceptible, immediate, very temporary significant (locally)	Adverse	Implementation of CEMP, with particular reference to a SWMP and pollution controls; use of low noise plant and low vibration construction techniques	Barely perceptible, immediate, very temporary significant (locally)	Adverse
Otter – mortality (vehicles, construction works)	Low impact, significant on a Local area scale	Adverse	Implementation of CEMP,	Barely perceptible, on a Local scale	Adverse
Fish – mortality (pollution)	Unlikely, not significant	Adverse	Implementation of CEMP, with particular reference to a SWMP and pollution controls	No impact	n/a
<b>Operation</b>					
Hydrological change – cable routes in blanket bog	Long-term less than Local, not significant	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP	Barely perceptible, not significant	Adverse
Degradation and disturbance of habitat: blanket bog	Long-term medium impact, significant on a	Adverse	Design iteration; micro-siting; implementation of CEMP, including HMP; off-set mitigation through compensation by restoration of off-site areas	Low level impact,	Adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
	National area scale			significant at a National area	
Otter - disturbance	No significant impact	n/a	Operational method statements, operator awareness	Barely perceptible, not significant	n/a
Fish – maintenance mortality	Unlikely, not significant	Neutral	Operational method statements, operator awareness	No impact	n/a
Decommissioning					
To be assessed in the future					

**Table 0.10 – Summary of Cumulative Effects**

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Habitats	Habitat loss and degradation	Garth and Hill of Lussetter	No effects	N/A
Otters and fish	Disturbance and mortality			

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