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9 Ecology and Nature Conservation

9.1 Executive Summary

1. This chapter reports upon the ecological impacts and effects of the proposed development. The baseline ecological conditions were assessed in two phases:

   - a desk-study of data collected in 2008 for the Viking Wind Farm EIA, 2012 surveys for the proposed development and historical records of ecological features from local recording groups within the vicinity of the proposed development; and
   - targeted 2015 field surveys of important and legally protected ecological features identified from historical data sources.

2. The methods and results of field studies are reported for otters, fish, freshwater invertebrates, Phase 1 Habitat and National Vegetation Classification surveys. Initial survey work was undertaken in August 2012 and updated through October and November 2015.

3. Large parts of the Survey Area were classified as blanket bog or wet modified bog, dominated by ling heather (*Calluna vulgaris*), hare's tail cotton-grass (*Eriophorum vaginatum*), common cotton-grass (*Eriophorum angustifolium*) and wooley hair-moss (*Racomitrium lanuginosum*). Areas of this habitat where wooley hair-moss was common were often characterised by deep hagging, with a high level of associated bare peat. Other habitats present included wet and dry dwarf shrub heath, unimproved and semi-improved acid grassland and a few small areas classified as marsh/marshy grassland.

4. Otter survey work was undertaken in August 2012 with survey results updated in November 2015. [redacted] Signs found during 2015 surveys were limited to six sprainting areas. No otter resting sites were identified during these surveys, although suitable resting and laying up habitat is present in the vicinity of the proposed development. [redacted]

5. Fish and Freshwater Invertebrate surveys of the Burn of Weisdale and Burn of Pettawater found the watercourses to be of a similar status as previously assessed for the original Viking Wind Farm surveys in 2008. Brown trout (*Salmo trutta*), salmon (*Salmo salar*) and eels (*Anguilla anguilla*) were recorded in the Burn of Weisdale. Brown trout, eels and three-spined stickleback were recorded in the Burn of Pettawater but salmon were absent. Habitat suitability surveys of both watercourses found the Burn of Weisdale to contain the most variable habitat, with niches available for all stages of salmonid lifecycles'. Limited spawning habitat was found along the length of the Burn of Pettawater.

6. Freshwater Invertebrate surveys recorded species abundance and diversity consistent with that of the 2008 Viking Wind Farm surveys. Invertebrate communities of the Burn of Weisdale and Burn of Pettawater largely consist of common and widespread species typical of Scottish upland or rural watercourses and no rarities were identified. Both burns were

assessed as 'good' via the Water Framework Directive standard ecological classification method.

7. Without exception, no significant effects are predicted on the important ecological features identified above from proposed development assuming planned and designed mitigation is fully implemented.

9.2 Introduction

8. This chapter reports on the assessment of the ecological impacts and effects of the proposed development. The baseline ecological conditions were assessed in two phases commencing with a desk-study of historical data sources for the area surrounding the proposed development. This included data collected for the Viking Wind Farm EIA in 2008, 2012 protected species and vegetation surveys for the proposed development and through consultation of local records from the Shetland Biological Recording Centre (SBRC). Secondly, targeted field surveys of important and legally protected ecological features identified from historical data sources were conducted in October and November 2015, updating and supplementing data collated during the 2012 field surveys to ensure a comprehensive baseline of features and relevant presence was compiled for the assessment process.

9. The scope of the ecological assessment includes habitats, flora and fauna but excludes potential effects on birds, which are considered separately in Chapter 8 (Ornithology). The 2015 ecological surveys were carried out by RPS Planning and Development, the Shetland Amenity Trust and Waterside Ecology, with the previous 2012 ecology surveys completed by Alba Ecology.

10. Commonly used acronyms are bracketed after the first instance of full words and are then normally used in the text from that point onwards. Technical terms, not commonly used, are defined when used. The term 'feature' is used commonly throughout the EIA process and is usually defined as the element in the environment affected by a development (e.g. a species or habitat in the case of ecology). The term 'impact' is used commonly throughout the EIA process and is usually defined as a change experienced by a feature (this can be positive, neutral or negative). The term 'effect' is commonly used throughout the EIA process and is usually defined as the consequences for the ecological feature of an impact.

9.3 Scope of Assessment

9.3.1 Survey Area

11. For a history of the project and description of the evolving design including changes to the area considered for development refer to Chapter 3 (Site Selection and Alternatives). The Survey Area is centred on Ordnance Survey (OS) grid reference HU410550 in the north of Mainland Shetland. The Survey Area covers the alignment of the proposed development and a buffer of 200m for habitats and 250m for fauna from the existing B9075 as at the time of survey the finalised development route was unavailable. The road upgrade and realignment is planned to take place north of the existing carriageway. All Survey Areas and the alignment of the proposed development can be seen in Figure 9.1.

9.3.2 Scoping and Consultation

12. An environmental scoping exercise was undertaken in July 2013. The Viking Energy Wind Farm (VEWF) submitted the scoping report to Shetland Islands Council (SIC) who then issued it to statutory and non-statutory consultees. Further details are provided in Chapter 6 (Scoping and Consultation). The consultation responses relevant to ecology are summarised in Table 9.1. A subsequent meeting with Scottish Natural Heritage's (SNH) Area Officer (Jonathan Swale) on 22 October 2015 confirmed that they had no additional comment to make in addition to those received in 2013.

Table 9.1: Summary of Ecology Consultation Responses

Consultee	Summary Response	Comment/Action Taken
Scottish Natural Heritage (SNH), letter, 22/08/13	SNH are content with the proposed scope of the EIA as set out in the Scoping Report. In particular, the EIA should address the risk of pollutants and runoff entering the Sandwater SSSI, notified for its mesotrophic loch and for its open water transition fen.	The scoping assessment outlined that the following effects on flora and fauna would be assessed by the ES: • damage to vegetation and plant communities; • habitat loss and fragmentation; • changes to hydrological conditions; • disturbance, injury or mortality to otters; • pollution effects; • potential for species loss; and • indirect effects on Sandwater SSSI.

9.4 Methodology

13. This section describes the methodology used to assess the significance of potential effects of the proposed development upon the ecological features at the site. The approach is set in the context of:

- the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 ('the EIA Regulations') implement European Council Directive No. 85/337/EEC (as amended by Directive No. 97/11/EC) on the assessment of the effects of certain projects (private and public) on the environment;
- the Shetland Islands Council Local Development Plan 2014 Supplementary Guidance on Natural Heritage; and
- the Chartered Institute of Ecology and Environmental Management (CIEEM) 2016 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal'.

14. Whilst considering a range of potential outcomes that could arise from the proposed development, the assessment reports the impacts and subsequent effects considered to be *likely* (as per CIEEM 2016). It is these likely effects that the applicant is obliged to report. The underlying approach comprises:

- identification of the ecological features to be assessed and determination of baseline conditions. These are defined as Important Ecological Features;
- evaluation of the Important Ecological Features identified;

- identifying and characterising activities likely to cause significant effects as a result of the proposed development;
- evaluating the ecological significance of the predicted likely effects on the Important Ecological Feature at an appropriate geographical scale;
- where significant adverse effects are likely, define mitigation, including prevention, reduction and compensation; and
- assessing the ecological significance of likely residual effects (after mitigation has been taken into account).

9.4.1 Baseline Conditions

9.4.1.1 Desk Study

15. Chapter 10 (Ecology and Nature Conservation) of the Viking Wind Farm ES (2009) identified the potentially important ecological features present within the wind farm site (which included the area of the proposed development) and then presented the results of targeted surveys of these.

16. All of Shetland's resident terrestrial non-avian vertebrates are non-native (Table 9.2), having been introduced by humans, either deliberately or accidentally (Laughton Johnston, 1999).

Table 9.2: Potential Important Terrestrial Vertebrate Features in the Survey Area

Species	Status in Shetland	Occurrence in Survey Area
Amphibians: Common frog (*Bufo bufo*) Common toad (*Rana temporaria*)	Common toad was introduced several times but did not become naturalised. Common frog was introduced on at least 3 occasions and has become widely established across mainland Shetland.	Common frog is likely to be present in wet/damp areas within the Survey Area.
Bats (at least 7 species)	Non-breeding vagrants to Shetland.	Unlikely to be present, but could occur as a vagrant in the Survey Area.
Lagomorphs: Rabbit (*Oryctolagus cuniculus*) Mountain hare (*Lepus timidus*)	Both rabbit and mountain hare are widespread across Mainland Shetland.	Rabbit and mountain hare are likely to be present within the Survey Area.

Species	Status in Shetland	Occurrence in Survey Area
Rodents: Field mouse (*Apodemus sylvaticus*) House mouse (*Mus musculus*) Black rat (*Rattus rattus*) Brown rat (*R. norvegicus*)	No post 1990 records of black rat. Remaining species common across Mainland Shetland.	Field mouse, house mouse and brown rat are likely to be present within the Survey Area.
Carnivores: Stoat (*Mustela ermine*) Ferret-polecat (*M. putorius x M. furo*) Mink (*Neovison vison*) Otter (*Lutra lutra*)	Mink are probably extinct on Shetland with no records present of the species on the National Biodiversity Network Gateway[1]. Stoat and ferret-polecat are widespread across Mainland Shetland. Otters were formerly considered native, but are now considered likely to have been introduced by the Vikings.	Stoat and ferret-polecat are likely to be widespread throughout the Survey Area. Otters are present within the Survey Area [redacted]
Hedgehog (*Erinaceus europaeus*)	Introduced in 1860 and is now common and widespread in Mainland Shetland.	Hedgehog are likely to be present within the Survey Area.

17. Of the above species groups, otters were considered the only potentially important ecological feature within Chapter 10 (Ecology) of the Viking Wind Farm ES. Habitats and vegetation were similarly identified as important due to the known presence of those listed within Annex 1 of the European Habitats Directive (1994, as amended) being common place within the wind farm site. Fish, freshwater invertebrates and freshwater pearl mussels were all similarly assessed within the Viking Wind Farm ES as potential important ecological features and were included within the baseline surveys and subsequent assessments completed for the wind farm development.

18. During 2008, watercourses within the wind farm Survey Area, including the Burn of Pettawater and Burn of Weisdale, were surveyed using a standard methodology for the presence of freshwater pearl mussels by EnviroCentre Ltd, using a team of experienced and licensed freshwater pearl mussel surveyors. No live or dead freshwater pearl mussels were found in any of the watercourse sections surveyed and so this potentially important feature is scoped out of further consideration. For full details of freshwater pearl mussel surveys, refer to Appendix 10.5 of the Viking ES (2009).

19. In additional to a review of the data collated for the Viking Wind Farm EIA, Shetland Biological Records Centre (SBRC) were contacted for records of otters found within the proposed development site and within a 12km^2 area surrounding this. Similarly, a review of the data collated in 2012 for the proposed development was undertaken to provide further background as to the potential activity of otters surrounding with the local area.

[1] https://data.nbn.org.uk/ Accessed February 2016

9.4.1.2 Field Survey

Phase 1 Habitat

20. A Phase 1 Habitat survey was undertaken in November 2015 throughout the Survey Area (Figure 9.1). This survey built on the data collated during 2012 surveys of the same area and included comments on blanket bog habitat, its condition and the likely activity of any peat forming vegetation. The Phase 1 Habitat survey was conducted and vegetation was described and mapped following the methods described in Joint Nature Conservation Committee (JNCC) Handbook for Phase 1 Habitat surveys (JNCC, 2010) using OS maps and aerial photographs.

21. The survey was conducted at a slow pace to accurately map all the habitats present. Ridges and hills were used as vantage points to map boundaries of habitat types. The habitat types were then 'ground-truthed' by walking over the viewed area and assigning or verifying habitat types. Full details of the habitats present, as identified during Phase 1 surveys are provided in Appendix 9.1: Phase 1 Habitat Survey and National Vegetation Classification Report, 2015.

National Vegetation Classification (NVC)

22. An NVC survey was carried out throughout the Survey Area in November 2015. NVC surveys are part of a standard national vegetation classification scheme which is more detailed than Phase 1 surveys of wider habitats categories. Plant communities are identified using plant species abundance as well as presence (using quadrat data). The vegetation was described and mapped in accordance with published standard NVC methodology (Rodwell, 1991a; 1991b; 1992; Rodwell, 2006).

23. The Survey Area was divided into 1km^2 compartments based on OS base mapping. Each compartment was walked at a slow pace ensuring comprehensive coverage and to accurately describe and map all communities. Within each compartment, the ridges and hills were used as vantage points to aid mapping boundaries of the surrounding area. Where this technique was used, the community types were 'ground-truthed' by walking over the viewed area and assigning or verifying community types.

24. Each NVC community was initially assigned in the field by an experienced botanical surveyor with the use of NVC field guides (Cooper, 1997; Elkington *et al.,* 2001; Hall *et al.,* 2004) and subsequently through comparisons with the published NVC communities using the definitions and floristic tables (Rodwell, 1991a; 1991b; 1992; Averis *et al.,* 2004). Each community was described and all higher plants, bryophytes and lichens were identified and their abundance recorded using the DAFOR scale (whether a species was dominant, abundant, frequent, occasional or rare within a community). No attempt was made to designate NVC sub-communities to the vegetation across the survey area. The NVC survey nomenclature was designed for use on mainland UK, and whilst it provides a useful record of the species assemblages' present, vegetation is predominately atypical of the standard sub-communities types and therefore misleading. Details of the habitats present, as identified during NVC surveys are provided in Appendix 9.1: Phase 1 Habitat Survey and National Vegetation Classification Report, 2015.

Ground Water Dependent Terrestrial Ecosystems (GWDTEs)

25. During the course of the habitat surveys, NVC communities, when identified, were assessed for their potential to be classified as a ground water dependent terrestrial ecosystem (GWDTE) (SEPA, 2014). This further assessment of habitats and vegetation would highlight areas of potential sensitivity which the development may affect through disruption to ground water flows.

Otter

26. An otter survey, using standard survey methods (Chanin, 2003), was undertaken in November 2015, [redacted] The survey method used was in line with the recommendations for surveying potential otter habitat and identification of evidence indicative of their presence (Bang & Dahlstrøm, 2001). This involved searching for places otters use for shelter or protection (e.g. couches, lying-up sites and holts) and for signs of activity (e.g. slides, footprints and sprainting sites). Surveys were conducted during suitable weather conditions i.e. dry weather and low water for prolonged periods, so that otter signs from a significant period of time would have accumulated. Full details of the otter survey are provided in Appendix 9.2: Otter Survey Report, 2015.

Fish and Freshwater Macroinvertebrates

27. Fish and macroinvertebrate surveys of both the Burn of Weisdale and Burn of Pettawater were completed through October 2015. Fish habitat surveys followed protocols described by Hendry and Cragg-Hine (1997), SEPA (2010) and Summers *et al.* (1996), fish population surveys protocols described by the Scottish Fisheries Co-ordination Centre (SFCC 2007) for both fully and semi-quantitative methods. Freshwater invertebrate standard kick sampling surveys followed methodologies employed by Scottish Environment Protection Agency (SEPA 2001, UKTAG 2008).

28. Fish and freshwater invertebrate surveys were replicates of those completed in 2008 for the Viking Wind Farm ES and so provide data on temporal variation of fish populations within these watercourses. Full details of fish surveys are provided in Appendix 9.3 (Burn of Weisdale Fisheries Survey Report, 2015) and Appendix 9.4 (Burn of Pettawater Fisheries Survey Report, 2015). Freshwater invertebrate survey details are provided in Appendix 9.5 (Burn of Weisdale Invertebrate Survey Report, 2015) and Appendix 9.6 (Burn of Pettawater Invertebrate Survey Report, 2015).

9.4.2 Assessment of Effects

29. The sections above explain the methods used to identify and assess Important Ecological Features within the Sandwater area (i.e. the baseline). This following section explains how the significance of effects on these wildlife interests is assessed.

30. Assessing the significance of effects on ecological interests is a staged process, drawing on 2016 and previous CIEEM guidelines. A significance matrix is also included in this chapter because it is considered useful, adding clarity and consistency, which compliments professional judgement used to assign significance of effects through reasoned argument.

9.4.2.1 Assigning the Importance of Wildlife Interests

31. Determining the conservation importance of wildlife interests within the Survey Area is the first step in the assessment process, and is undertaken in a systematic way using criteria that determine whether it is of international, national, regional, local or negligible significance.

32. The term for the ecological features affected at the site is 'Important Ecological Features' (or IEFs). The criteria for valuing the nature conservation level of each IEF are outlined in Table 9.3.

9.4.2.2 Magnitude of Impact

33. The potential impact on each Valued Ecological Receptor (VER) are determined through understanding how each of these responds to the proposed development (Table 9.4). The elements used to define the scale of the effect of a development include determining:

- the potential duration, whether short-term (< 5 years), medium-term (5 - 15 years) or long-term (15 – 25 years or longer);
- timing and frequency, whether the impacts will be timed at a sensitive period, or the frequency will alter the impacts;
- reversibility, whether the impacts will be reversible in the short to medium term;
- confidence in predictions, whether the predicted impact is certain/near certain (>95%), probable (50% - 95%), unlikely (5% - 50%), or extremely unlikely (<5%) to occur;
- potentially whether the impact will affect the long-term viability of a habitat or population of species; and
- whether there are any cumulative impacts that may affect the long-term integrity of the ecosystem(s) at the site.

34. Any potential cumulative impacts arising from other development proposals within a distance that may affect the ecological resource or multi-faceted impacts on any single ecological feature are also considered.

9.4.2.3 Significance of Effect

35. The significance of the potential effects on each IEF is determined by considering the value of their conservation value and the degree to which it may be affected (the impact magnitude) by the proposed development, i.e. by using Tables 9.3 and 9.4 below. These are described as Major, Moderate, Minor and Negligible. This is presented as a matrix (Table 9.5).

Table 9.3 Criteria for Valuing the Conservation Importance of Ecological Features on Site

Conservation Value	Examples
International	Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Habitats Directive (Special Areas of Conservation - SACs), the Birds Directive (Special Protection Areas - SPAs) or other international convention (e.g. Ramsar site). A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be

Conservation Value	Examples
	considered as being one of the highest quality examples in an international context such that the site is likely to be designated as an SAC/SPA or proposed SAC/SPA. Presence of habitats or species listed within the EC Habitats Directive on either Annex 1 or 2 respectively, where legislation states that all areas of representative habitat, or individuals of the species should be protected.
National	Habitats or species that form part of the cited interest within a nationally designated site, such as a Special Site of Scientific Interest (SSSI), or a National Nature Reserve (NNR). A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national context for which the site could potentially be designated as an SSSI. Presence of UK Biodiversity Action Plan habitats or species, where that action plan states that all areas of representative habitat, or individuals of the species should be protected.
Regional	Habitats or species that form part of the cited interest of a Local Nature Reserve, or some local-level designated sites depending on specific site conditions. A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being of nature conservation value up to a district or county context. Presence of Local Biodiversity Action Plan habitats or species, where that action plan states that all areas of representative habitat, or individuals the species should be protected.
Local	Habitats or species that form part of the cited interest of a local-level designated site and may be designated as a non-statutory Local Nature Conservation Sites (LNCS) or the equivalent, e.g. Local Wildlife Site, Sites Important for Nature Conservation (SINC). A feature (e.g. habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation.
Negligible	Common place feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

Table 9.4 Defining the Magnitude of Impact on Valued Ecological Features

Magnitude	Definition
Total/Near Total	Would cause the loss of all or a major proportion of a habitat or numbers of a species' population, or cause sufficient damage to immediately affect long-term viability.
High	Major impacts on the feature/population which would have a sufficient effect to alter the nature of the feature in the short-long term and affect its long-term viability. For example, more than 20% habitat loss or long-term damage, or more than 20% loss of a species' population.
Medium	Impacts that are detectable in short and medium-term but which should not alter the long-term viability of the feature/population. For example, between 10-20% habitat loss or 10-20% reduction of a species' population.
Low	Minor impacts, either of sufficiently small-scale or of short duration to cause no long-term harm to the habitat/population. For example, less than 10% loss or damage.
Neutral	A potential impact that is not expected to affect the habitat/population in any way.

36. Table 9.5 Significance of the Effects Defined by the Relationship between the Nature Conservation Value and Effect Magnitude

Impact Magnitude	**Feature Sensitivity**				
	International	**national**	**Regional**	**Local**	**Negligible**
Total/Near Total	Major	Major	Major	Moderate	Minor
High	Major	Major	Major-Moderate	Moderate	Minor
Medium	Major	Major – Moderate	Moderate	Moderate – Minor	Minor
Low	Moderate – Minor	Moderate – Minor	Moderate – Minor	Minor	Minor
Neutral	None/Negligible				

37. The significance of effects can be two-way: either adverse or beneficial. The two extremes are:

- Major adverse effects on a feature of at least national nature conservation value. In this case, mitigation measures to offset the impact would be required; and
- Major benefits for a feature or population.

38. Effects or residual effects are considered to be significant under the Environmental Impact Assessment (Scotland) Regulations 1999 (EIA Regulations) if they are at a level of Moderate or Major (i.e. "a likely significant effect"). These are shaded darkest in Table 9.5 above. Some categories of nature conservation value and effect magnitude may vary in the level of significance effects depending on the circumstances which is why some of the cells in Table 9.5 have two levels within them. This allows for professional judgement to be applied when identifying the level of significance. Effects that are neutral or minor are not considered significant with respect to the EIA Regulations.

9.4.3 Limitations to the Assessment

39. As with any environmental assessment there will be elements of uncertainty; these are identified and reported on in the relevant Technical Appendices along with the measures taken to reduce these. Any assumptions made include a commentary as to the likely extent that such difficulties affect the conclusions.

40. The level of certainty of effect prediction varies depending upon a range of parameters. For some elements, e.g. direct habitat-take, it is relatively straightforward to assess and quantify the area of habitat that will likely be lost to proposed development infrastructure and therefore quantify potential effects of land-take. However, other effects are uncertain because there can be a range of possible scenarios. The current assessment approach is based on 'likely' effects. Adopting a 'worst case' scenario approach for dealing with uncertainty is not advocated within Planning Advice Note (PAN) 1/2013. A worst case effect is not necessarily the most likely effect.

41. The main limitations in this assessment are common to most ecological assessments. Firstly, surveys undertaken were based on sampling techniques so that the results give an indication of numbers and activities of species at the particular times that surveys were carried out. Species occurrence changes over time and therefore the results presented in

this ES are snapshots in time. No gaps were identified in the baseline survey data that would prevent assessments in line with the requirements of the EIA Regulations to be undertaken. Secondly, putting survey results into a wider geographical context is difficult because most species and habitats have not been systematically surveyed beyond the Survey Area. Thus, defining a population as locally or regionally important is difficult because local or regional population estimates do not exist for most taxa and habitats. Wherever such uncertainty exists, professional judgement and published evidence has been used and populations in the Survey Area have been defined upwards to their highest potential level of geographical/ecological importance.

9.5 Baseline Conditions

9.5.1 Desk study

9.5.1.1 Designations

42. There is one designated nature conservation site, adjacent to the south of the proposed development; Sandwater SSSI (35.87ha in size). It is notified as an example of a mesotrophic loch and for its open-water transition fen (extensive beds of common club-rush (*Schoenoplectus lacustris)).* The SSSI supports a diverse community of submerged aquatic plants with six species of pondweed (*Potamogeton spp.*), including the nationally scarce slender-leaved pondweed (*Potamogeton filiformis*), and is the largest and best example in Shetland of club-rush swamp. The loch is relatively shallow, which, though surrounded by dwarf shrub and acid moorland, is mesotrophic with a neutral pH because of the strong influence of an underlying band of crystalline limestone. The Sandwater SSSI condition was assessed by SNH in 2004 as being 'Favourable, maintained'. In their scoping response to the development (Table 9.1), SNH highlighted concerns in relation the risk of pollutants and runoff entering the Sandwater SSSI. The Sandwater SSSI is evaluated as nationally important via Table 9.3, above.

9.5.1.2 Habitats and vegetation

43. The proposed realignment and upgrade of the B9075 Sandwater Road was not fully surveyed as part of the original Viking ES (as final design layout was not available). Phase 1 Habitat survey and NVC surveys of the proposed development were undertaken in 2012 by Alba Ecology. No rare species were identified during these surveys, with habitats and communities identified being typical for the upland environment the proposed development is situated in such as blanket bog, wet modified bog, acid grasslands and dry heaths.

9.5.1.3 Otters

44. The only potentially important mammal species considered likely to be present in the Survey Area was otter. Historical data received from Shetland Biological Record Centre (SBRC) returned only a single sighting of otter within a 12km^2 search area surrounding the proposed development. Records were searched from 2000 to present. The sighting was from the southern shore of the Sand Water Loch approximately 1km south of the proposed development application boundary in 2000.

45. Results from the National Biodiversity Network Gateway (NBNG) database returned no records within 2km of the proposed development, with the closest records from the

outflow of Pettawater from 1995 (c.3.5km to the north of the proposed development), and from the mouth of the Burn of Weisdale where it discharges into the Weisdale Voe in 1995 (c.2.5km to south of the proposed development). Although numerous records of otter are available from across Shetland Mainland, no otters are within proximity to the proposed development.

46. Surveys completed for the proposed development in 2012 by Alba Ecology found signs of the presence of otters, [redacted]

47. [redacted]

48. [redacted]

9.5.1.4 Fish

49. During 2008, watercourses within the Viking Wind Farm Survey Area, including the Burn of Pettawater and Burn of Weisdale, were surveyed using a standard methodology (see section 9.4.1.2) for the presence of fish by Waterside Ecology Ltd, using a team of experienced and licensed electric fishing surveyors.

50. Sea/brown trout and salmon were recorded in the Burn of Pettawater, but it is likely that they spawn downstream (in the Burn of Sandwater) as no suitable habitat is present upstream from Sand Water Loch itself. No obstacles to upstream migration were identified on the Burn of Pettawater. Sea trout and salmon are believed to have access into the Burn of Pettawater, although concern has been expressed regarding the design of the fish pass in the lower catchment at HU408511. Nevertheless, the Burn of Pettawater is considered an important sea trout stream and salmon have been recorded. It should be noted that the Shetland Anglers Association stocked trout fry in the Burn of Pettawater during 2007 (4,000 fry) and 2008 (1,200 fry).

51. Surveys in 2008 recorded three species of fish in the Burn of Pettawater; European eel (*Anguilla Anguilla),* sea/brown trout and three-spined stickleback (*Gasterosteus aculeatus*). The mean density of trout fry and parr was defined as 'good' and 'fair-poor' respectively at the sampling locations surveyed.

52. Sea/brown trout and salmon have been recorded in the Burn of Weisdale and it is considered to be an important sea trout spawning stream. A weir is present at Weisdale

Mill (downstream of the proposed development at grid reference HU394530) and although visually assessed as not likely to cause problems to upstream fish migration, downstream fish migration may be constrained by the weir. The weir was therefore identified for further consideration by VEWF as a potential habitat enhancement opportunity. Surveys in 2008 recorded two species of fish in the Burn of Weisdale; European eel and sea/brown trout. The mean density of trout fry and parr was defined as 'abundant-good' at the sampling locations surveys.

9.5.2 Field Studies

9.5.2.1 Phase 1 habitat survey

53. Full details of the habitats present, as identified during Phase 1 surveys (Figure 9.2), are provided in Appendix 9.1: Phase 1 Habitat Survey and National Vegetation Classification Report, 2015. The Survey Area comprised primarily of blanket bog and wet heath, with smaller areas of both semi-improved and unimproved acid grassland present. A summary of the areas all habitats identified across the survey area is provided in Table 9.6, below. Evidence of sheep grazing and historical peat cutting was noted across the survey area.

Table 9.6: Phase 1 Habitat Categories Present in the Survey Area

Phase 1 Habitat Type	Phase 1 Alphanumeric Code	Area (ha)	Percentage Coverage of Survey Area
Blanket Bog	E1.6.1	42.4	46.0
Wet Modified Bog	E1.7	18.8	20.4
Semi – Improved Acid Grassland	B1.2	8.0	8.7
Unimproved Acid Grassland	B1.1	6.7	7.3
Roads and Buildings	J3	4.9	5.4
Standing Water	G1	4.6	5.0
Dry Dwarf Shrub Heath	D1.1	1.6	1.7
Semi-Improved Neutral Grassland	B2.2	1.6	1.7
Wet Dwarf Shrub Heath	D2	1.3	1.4
Marshy Grassland	B5	0.6	0.7
Running Water	G2	0.5	0.6
Basic Flush	E2.2	0.4	0.4
Acidic Flush	E2.1	0.3	0.4
Wet Heath/Acid Grassland Mosaic	D6	0.1	0.1
Tall Ruderal Herbs	C3.1	0.1	0.1
Exposed Rock	I1.4.1	0.1	0.1
Notes: Total survey area is approximately 92ha			

54. No rare or protected plant species were recorded during Phase 1 surveys.

9.5.2.2 NVC survey

55. Full details of the NVC communities present across the survey area, the species recorded and their relative abundance as identified during NVC surveys are provided in Appendix 9.1: Phase 1 Habitat Survey and National Vegetation Classification Report, 2015. Figure 9.3 visually represents the coverage of these communities across the proposed development area. There were seventeen different NVC communities found within the Survey Area. The most common vegetation community was modified bog M17 (*Trichophorum cespitosum-Eriophorum vaginatum* blanket mire), covering over a third of the Survey Area. No rare or protected plant species were recorded during NVC surveys. Table 9.7 below summarises the communities identified and their aggregate abundance across the survey area.

56. As detailed in Appendix 9.1: Phase 1 Habitat and National Vegetation Classification Survey Report, 2015, a number of NVC communities were identified within the survey area as containing moderate or high potential to be reliant on ground water influences. These communities and their potential are given in Table 9.7, below, with their location throughout the survey area shown in Figure 9.4.

Table 9.7: NVC Communities Present in the Survey Area

NVC Community	NVC Alphanumeric Code	GWDTEs Potential (High/Moderate / None)	Area (ha)	Percentage Coverage of Survey Area
M17 *Trichophorum cespitosum – Eriophorum vaginatum* blanket mire	M17	None	43.7	47.4
U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland community	U4	None	12.1	13.1
M15 *Trichophorum cespitosum – Erica tetralix* wet heath community	M15	Moderate	9.1	9.9
M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire	M19	None	6.6	7.2
U6 *Juncus squarrosus – Festuca ovina* grassland	U6	Moderate	5.3	5.7
N/A	Water	None	5.2	5.6
N/A	Roads	None	4.9	5.4
H10 *Calluna vulgaris – Erica cinerea* heath	H10	None	1.6	1.7
M23 *Juncus effusus / acutiflorus – Galium palustre* rush-pasture	M23	High	1.6	1.7
U2 *Deschampsia Flexuosa* grassland	U2	None	0.7	0.7
M10 *Carex dioica – Pinguicula vulgaris* mire	M10	High	0.4	0.4
M28 –*Iris pseudacorus – Filipendula ulmaria* mire	M28	Moderate	0.4	0.4
M6 *Carex echinata – Sphagnum recurvum/auriculatum* mire	M6	High	0.3	0.4
U5 *Nardus stricta – Galium saxatile* grassland	U5	None	0.1	0.1
OV25 – *Urtica dioica – Cirsium arvense* community	OV25	None	0.1	0.1
N/A	Rocks	None	0.1	0.1

9.5.2.3 Otter survey

57. Otter survey results are detailed in Appendix 9.2 with Figure 9.5 showing all signs found during the 2015 survey. In summary, six areas of sprainting were found along the length of the Burn of Pettawater and the Burn of Weisdale within the designated survey area. Although suitable resting habitat for the species was identified during the course of the surveys, no couches, holts, shelters or resting places were found.

9.5.2.4 Fish surveys

58. Fish habitat and population surveys of both the Burn of Weisdale and Burn of Pettawater were conducted during October 2015. Detailed survey results for these are provided in Appendices 9.3 and 9.4 of this Chapter.

59. In summary, within the Burn of Weisdale:

- The lower reaches recorded the greatest variability of habitat type with no one habitat dominating.
- Population surveys within the Burn of Weisdale were repeat surveys of the locations previously assessed in 2008 (WE1 – WE3 on Figure 1 of Appendix 9.3). Trout were recorded at all locations surveyed. An adult sea trout was caught at WEI1, the most upstream site, demonstrating that all three survey sites are accessible to migratory salmonids.
- Salmon were present only at WEI3 with two year classes present.
- Despite the limited quantity of suitable habitat for eels, individuals were captured at all locations during the 2015 surveys.
- WIE3 had the greatest number of eels present and this is likely to reflect the greater amount of stable cover present at this location.

60. Fish habitat surveys of the Burn of Pettawater assessed the watercourse in six sections; P1-6 running south to north (Figure 1 of Appendix 9.4):

- Section P1 is located below the existing B9075 and is an extension of Sand Water Loch with habitats within the section classified as a deep pool. Little spawning habitat is present within this section.
- Sections P2-3 were slow flowing containing a mixture of deep pool and glide habitat. Habitats within these sections are best suited to adult salmonids but poor for juveniles.
- Section P4 contained a predominance of deep pool habitats with little discernible flow present. Abundant overhead vegetation cover was noted, with the section best suited to trout parr and adult age classes.
- Section P5 and P6 contain run, riffle, glide and shallow pool habitats. Instream cover within these sections is provided by boulders and large macrophytes. Habitats through these sections are most suited to juvenile salmonids. Throughout all sections spawning habitat is scarce.

61. Fish population assessments were completed at three locations within the Burn of Pettawater (Table 2 of Appendix 9.4).

- Trout fry were caught at all survey locations whilst trout parr only at locations PW2/3.

- Large fish were scarce with few individuals caught of an age >1+.
- No salmon were caught during the surveys.
- Eels were caught at locations PW2/3 with numbers most abundant at location PW3 (the most downstream of the survey locations).
- Three-spined sticklebacks were caught at all survey locations.

9.5.2.5 Freshwater invertebrates

62. Freshwater invertebrate surveys conducted of the Burn of Weisdale and Burn of Pettawater in association with the proposed development found the following key points. Full results of the surveys can be found in Appendices 9.5 and 9.6:

- Invertebrate communities of the Burn of Weisdale and Burn of Pettawater largely consisted of common and widespread species typical of Scottish upland or rural watercourses and no rarities were identified.
- The invertebrate community, dominated by *Ephemeroptera, Plecoptera* and *Trichoptera* indicates that the water quality is good within the Burn of Weisdale and moderate in the Burn of Pettawater.
- Abundance and diversity of freshwater invertebrates as measured by taxon richness, was generally moderate within both watercourses. Freshwater invertebrate communities may be depauperate (lacking in diversity or numbers of species) as a result of Shetlands geographic isolation.
- The Average Score Per Taxon (ASPT) index indicated fair to good water quality with no significant organic pollution in both watercourses. This index may be affected by the low diversity of Shetland freshwater macro-invertebrates.
- The Water Chemistry Status was Class 1 indicating circum-neutral water chemistry and the Index of Acidity was Class II indicating slightly acidic conditions. Buffering is moderate and the watercourses are not significantly acidified.
- All watercourses reach the Water Framework Directive (WFD) required standard of good for both the ASPT and the number of differing taxa (NTAXA) parameters of the WFD ecological status class.
- Overall the invertebrates, environmental variables and indices were similar in 2015 to the previous survey of 2008. Invertebrate communities are considered stable, and the water quality, invertebrate communities and productivity of the watercourses in proximity to the proposed development area should support sustainable salmonid populations if other environmental factors are suitable.

9.6 Potential Effects

63. For full details of the proposed development refer to Chapter 4 (Description of Development). The main elements of the proposed road realignment works which have the potential to impact on the IEF's identified are outlined in Table 9.8, below. Potential impacts included in Table 9.8 do not imply that they will occur, or that effects will be significant. The following sections will assess those potential impacts to IEF's in detail to determine the significance of any effect and the requirement for mitigation to address these if required.

Table 9.8: Summary of Potential Road Realignment Effects to IEFs

Development Phase	Activity	Potential Effect to VERs
Construction	Mobile plant operations and associated construction traffic	Temporary habitat loss. Temporary noise. Vibration, movement, vegetation disturbance and habitat fragmentation. Pollution and sediment release into watercourses. Otter and/or fish mortality.
	Road foundations and watercourse crossings. The design includes 1530m of realigned (new) road, 730m of upgraded existing road and new watercourse crossings.	Permanent habitat loss. Temporary noise. Vibration, movement, vegetation disturbance and habitat fragmentation. Pollution and sediment release into watercourses. Changes in hydrology and chemistry leading to vegetation changes. Otter and/or fish mortality.
Operational	Operational maintenance of carriageway	Habitat loss and pollution through maintenance works. Disturbance to otters if watercrossing structure repairs are required. Alterations to potential for road related fatalities to otters.

9.6.1 Construction Phase

9.6.1.1 Evaluation of Effects to Designated Sites

64. The Sandwater SSSI is notified as an example of a mesotrophic loch and for its open-water transition fen including its extensive beds of common club-rush. For both of the notifying interests, the loch when last assessed in 2004 was found to be in a Favourable condition. Given the area's designation as a SSSI, as per Table 9.3 above, the conservation importance of the area for the purposes of assessing the effects of the proposed development to IEFs is national.

65. The northern boundary of the loch is situated in very close proximity to the exisiting B9075. The proposed development will run to the north of the existing B9075, with the existing B9075 creating a buffer between construction works and the SSSI. As such construction of the proposed development will not require land take from the SSSI and there will be no loss of habitat associated with its designating features.

66. Potential effects to the SSSI and its designating features are from pollution associated within the construction works which might include increased silt loading and sedimentation caused through earthworks, hydrocarbon and oil pollution from machinery working on site, or pollution from materials used in construction of the carriageway and ancillary infrastructure (e.g. concrete).

67. Given the buffer of the existing B9075 and the limited number of watercourses passing from the construction area to the SSSI, the likelihood of pollutants entering the Sand Water Loch are low. Furthermore, given the volume of the body of water it is unlikely that the quantity of pollutants, if they were to enter the waterbody, would be sufficient to have a detrimental effect either to the pH (and therefore mesotrophic status of the loch), or the flora associated with the transition fen habitats. Consequently, the magnitude any effect caused by construction of the proposed development would be low with the significance of the effect assessed as Moderate/Minor, however through professional judgement this has been increased to Moderate to reflect SNH's concerned regarding pollution to the SSSI and the sensitive nature of the site with regards to the proximity of the proposed development. Further details are provided in Chapter 10 (Geology, Hydrogeology and Hydrology).

9.6.1.2 Habitats

68. For the purposes of assessing effects of the proposed development on habitats during the construction phase, the quantity of habitat affected either through direct loss beneath the footprint of the development and the associated earthworks, or through wider indirect measures such as alterations to the hydrological integrity of the habitat must be considered.

69. For the purpose of this assessment the following criteria and terminology have been applied:

- Permanent Habitat Loss – this is defined as the footprint of the carriageway (running surface of 6m plus a metre either side of verge to give 8m) and the predicted associated earthworks. Although the earthwork will be reseeded and spoil from construction works will follow good practice guidance in terms of reinstatement, in reality the vegetation will be at best highly degraded and so, for the purposes of this assessment, will be defined as permanently lost.
- Permanent Effect – this is defined as where the 8m footprint of the carriageway is within 15m of the surrounding vegetation and the earthworks are not present within this area, the track will have a direct impact on the vegetation. This will be through draw down of the watertable associated with the surrounding habitats and vegetation and will likely cause a permanent alteration in the species able to tolerate the altered environmental conditions.
- Temporary Effect – this is defined as areas outwith the earthworks or 15m buffer surrounding the footprint of the carriageway where a 5m buffer has been applied to take into account potential temporary effects to the habitats surrounding the development. This will include but is not exclusive to tracking of vehicles to access construction areas and storage of materials prior to reinstatement. With time it is expected that habitats within this buffer area will recover to their pre-construction state.

70. Table 9.9 below shows the predicted impact of construction of the proposed development to habitats, their conservation value, the predicted magnitude of the potential impact and the overall unmitigated significance of the effect to the habitat, as defined by Tables 9.3 to 9.5.

Table 9.9 – NVC communities present in the proposed development's survey area, their predicted direct and indirect habitat loss and the predicted effect of the track to these

NVC Community	Permanent Habitat Loss (ha)	Area of Permanent Effect (ha)	Area of Temporary Effect (ha)	Total Habitat Loss (ha)	% of Survey Area Lost	Conservation Status of Habitat	Magnitude of Potential Impact	Predicted Unmitigated Significance of Effect
M17 *Trichophorum cespitosum – Eriophorum vaginatum* blanket mire	0.49	1.51	0.90	2.90	7	International	Low	Moderate/Minor (professional judgement Moderate)
U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland community	0.52	1.33	0.85	2.70	22	National	Low	Moderate/Minor (professional judgement Minor)
M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire	0.30	0.61	0.50	1.40	21	International	Low	Moderate/Minor (professional judgement Minor)
U6 *Juncus squarrosus – Festuca ovina* grassland	0.25	0.22	0.24	0.70	13	National	Low	Moderate/Minor (professional judgement Minor)
M15 *Trichophorum cespitosum – Erica tetralix* wet heath community	0.19	0.14	0.21	0.54	6	International	Low	Moderate/Minor (professional judgement Minor)

NVC Community	Permanent Habitat Loss (ha)	Area of Permanent Effect (ha)	Area of Temporary Effect (ha)	Total Habitat Loss (ha)	% of Survey Area Lost	Conservation Status of Habitat	Magnitude of Potential Impact	Predicted Unmitigated Significance of Effect
H10 *Calluna vulgaris – Erica cinerea* heath	0.01	0.12	0.08	0.21	13	International	Low	Moderate/Minor (professional judgement Minor)
M23 *Juncus effusus acutiflorus – Galium palustre* rush pasture	0.08	0.07	0.05	0.20	13	National	Low	Moderate/Minor (professional judgement Minor)
M6 *Carex echinata – Sphagnum recurvum/auriculatum* mire	0.06	0.06	0.03	0.15	49	National	Low	Moderate/Minor (professional judgement Minor)
OV25 *Urtica dioica – Cirsium arvense community*	0.00	0.05	0.03	0.08	79	Local	Neutral	Negligible
U2 *Deschampsia Flexuosa* grassland	0.00	0.00	0.01	0.01	1	National	Neutral	Negligible
Totals	**1.9**	**4.1**	**2.9**	**8.9**	-			
Notes: Habitat loss calculations similarly predict an area of 0.12ha will be lost from the watercourses in the development area. In reality this is the area which will be spanned by watercrossings and consequently is not included within the above assessment. In addition, it is predicted 1ha of the existing B9075 will be incorporated into the new carriageway.								

71. For a number of the predicted unmitigated effects of significance, professional judgement has been applied where two separate categories are available. This is based on the quality of the habitat present (as described in Appendix 9.1: Phase 1 Habitat and National Vegetation Classification Survey Report, 2015), many of which are poor due to impacts from historical and current anthropogenic influences.

72. Surveys similarly noted the potential for NVC communities to be reliant on groundwater influences. Figure 9.4 shows those with the potential to be moderately or highly reliant on these. The alignment of the proposed development has sought to minimise the effect to these, and the presence of the existing B9075 means that severance of ground water flow throughout the area has already occurred and many of those communities with the potential to be reliant on groundwater flow are in fact existing in isolation from the development area. The M10 *Carex dioica – Pinguicula vulgaris* mire community known to be highly ground water dependent and was noted at a number of locations within the Habitat Survey Area. These are of high conservation value in the context of Shetland, however these are located to the south of the exisiting B9075 and so are hydrologically independent from the proposed developement area.

73. Two areas of NVC community M6 *Carex echinata – Sphagnum recurvum/auriculatum mire* will be lost during the course of the development totalling 0.14ha. This is likely to be the limit of the loss of potential GWDTEs as all other areas of such habitat are up slope from the development and so any ground water flow is unlikely to be affected. Furthermore, the location of these areas of M6 community is such they are unlikely to be reliant on ground water influences and the species present exist due to collection of surface water run-off from the surrounding mire habitats into areas of low lying topography.

74. The unmitigated effect significance as stated in Table 9.9 for all communities therefore takes into account the potential impact on GWDTEs, and no loss of such habitat is predicted.

75. More generally only the M17 *Trichophorum cespitosum – Eriophorum vaginatum* blanket mire community is predicted to have a significant unmitigated effect (moderate) under the Environmental Impact Assessment (Scotland) Regulations 1999 (EIA Regulations).

9.6.1.3 Otters

76. Construction of the proposed development has the potential to negatively impact otter directly or indirectly in the following ways:

- physical injury or death of individuals;
- loss of feeding sites;
- loss of shelters including holts, couches and resting site;
- damage to routes used by otters while crossing the proposed development site;
- damage to watercourses by runoff, pollution and blocking of streams; and
- disturbance caused by noise of construction.

77. Construction of the proposed development will result in a permanent loss of a small area of riparian habitat (unlikely to exceed 20m in length at each watercourse crossing). The

survey recorded no evidence of any otter holts or resting places within 250m of the proposed development.

78. Severance describes the loss of connectivity between habitats which ultimately results in the isolation or fragmentation of discrete populations of species. The construction of new bridges has the potential to disrupt otter movements if incorrectly designed.

79. Any discharges of sediment or reduction in water quality (e.g. fuel spills) could also indirectly damage catchment fish populations, which might indirectly affect otters and their ability to forage in the area. However, it is unlikely that a pollution event would impact significantly on otter foraging ability because numerous other foraging sites and opportunities exist within the wider area.

80. Using Table 9.3 above, otters on Shetland are assessed as being of international importance

9.6.1.4 Watercourses, Fish and Macroinvertebrates

81. Fish species identified as present within the Burn of Weisdale, Burn of Pettawater and their associated tributaries are sea trout, salmon, European eel and three-spined stickleback (Appendices 9.3 and 9.4). Both sea trout and salmon are listed within Annex 2 of the EC Habitats Directive (1994, as amended) and so for the purpose of this evaluation are assessed as of international importance via Table 9.3 above.

82. Eels are not listed within the EC Habitats Directive, however due to historic persecution there has been a widespread decline in numbers throughout Europe. As such, all member states were required to produce an Eel Recovery Plan in 2007 (Council Regulation no 1100/2007). Marine Science Scotland completed this in 2008. Given this European interest in the species, for the purpose of this evaluation the species are assessed as of international importance via Table 9.3 above.

83. The three-spined stickleback is not listed within any international, national or local legislation and are commonplace throughout watercourses of the UK. As such their conservation importance for the purposes of this evaluation is assessed as negligible.

84. Populations of all species appear to be stable with data collected in 2008 for the Viking Wind Farm's planning application consistent with that of the 2015 surveys. The watercourse within the survey area and a number of their associated tributaries contain suitable habitats for all stages of the life cycles of the fish species present, with the exception of eels where suitable habitat was limited.

85. Potential impacts of the proposed development to watercourses and their associated biota include disruption to stream beds during construction of water crossings, sedimentation and silt loading, or pollution caused by machinery such as oil spills.

86. Disruption to streambeds and habitat loss during watercrossing construction has the potential to decrease habitat suitability for the species present, particularly within the Burn of Weisdale, where spawning habitats are present. This in turn may decrease the abundance of the species present and their utilisation of the watercourses.

87. Construction related pollution events similarly have the potential to affect fish species present both through discharge of sediment/silt to the watercourse from construction works or via hydrocarbon pollutants from machinery. Such pollution events have the potential to affect both prey abundance in terms of freshwater invertebrate availability, and viability of eggs within the watercourses from increased silt loading and decreased oxygenation. Both factors may reduce the abundance of fish species present in the watercourses or their ability to utilise them.

88. Given the potential impacts described above, the unmitigated impacts to fish are predicted at worst to be of a low magnitude as habitat loss (if any occurred) would be localised and of a small scale. Similarly, pollution events would be short in duration and unlikely to affect the overall nature of the watercourse or freshwater invertebrate population.

89. Given the international status of the fish species and the predicted low magnitude of any construction related impact, the overall significance of the unmitigated effect of the development during the construction phase is assessed as Moderate/Minor, however through professional judgement is downgraded to Minor given the low magnitude of the construction impacts and the limited habitat suitability for a number of the species currently present.

9.6.2 Operational Phase

9.6.2.1 Evaluation of Effects to Designated Sites

90. Effects to the Sandwater SSSI for the majority of the operational lifespan of the proposed development are assessed as being comparable or lower than that for the existing B9075. When compared to the existing B9075, the proposed development is a greater distance from the nearest boundary of the designated site so creating a greater buffer between potential pollutants and the designated area.

91. There is the limited potential for increased traffic levels during the initial 18 month operational phase of the proposed development from the Viking Wind Farm construction traffic which may elevate potential pollutant levels from the carriageway. It is anticipated that following this initial 18 month period, traffic flows will mirror that of the existing B9075 and effects to the SSSI (which designating features exist in the Favourable condition) will be of a similar magnitude and significance (negligible). During the initial 18 month operational period, although there is an increased risk of pollution to the SSSI, there are few watercourses to carry these pollutants to the Sand Water. Similarly, the distance of the B9075 from the SSSI would be increased when compared to the existing B9075 and the body of water contained in the SSSI is such that any pollution incident is likely to be of a low magnitude if it can reach the area. As such, it is assessed that the significance of any effect to the SSSI is predicted in a worst case scenario to be Minor.

9.6.2.2 Habitats

92. Operational effects to habitats surrounding the proposed development are predicted to be limited to minor maintenance works or a limited quantity of pollution from vehicles using the carriageway.

93. The area of habitat which is likely to be lost or altered on a permanent or temporary basis through operational activities, including those with the potential to be classified as a

GWDTE, is minimal. Although some potential pollution in the form of surface water runoff containing hydrocarbons will increase in the area of the proposed development, this will be no greater than that of the existing B9075. Habitats surrounding the proposed development are predominately listed on Annex 1 of the EC Habitats Directive and as such are of international importance. Any effects to habitats caused during maintenance works or from pollution from vehicles using the carriageway are predicted to be of a low magnitude. Consequently, the significance of any effect caused to habitats during the operational phase of the access track is assessed as Moderate / Minor. Through professional judgement this has been downgraded to Minor due to the limited and short term effects these small amounts of pollutants are likely to have to the modified habitats surrounding the carriageway following the construction period.

9.6.2.3 Otters

94. Operational effects on the otter population associated with the surrounding area are thought to be minimal. Otters by their nature are crepuscular or nocturnal and as such will be utilising the watercourses in vicinity of the proposed development during periods when the carriageway carries a limited amount of traffic. Similarly, the level of traffic associated within the proposed development once returned to public use is not predicted to increase over and above that which the existing B9075 currently carries. Consequently, disturbance to the species and the potential for road related fatalities is deemed as that for the existing B9075 and therefore the magnitude of effect to the species is assessed as neutral during this phase of the development.

95. Maintenance of the realigned carriageway and associated watercrossings will be required occasionally during the life time of the proposed development. Such activities will predominately be away from areas of otter activity (with exception of watercrossings) and will predominately be completed during daylight hours. It is highly unlikely maintenance will be required to watercrossing structures, however if required, the disturbance to any individual utilising the area is likely to be of a short duration.

96. Otters are listed on Annex 2 of the EC Habitats Directive and are a designating feature of the Yell Sound Coast Special Area of Conservation (SAC) approximately 15km to the north of the proposed development; the species for the purposes of this assessment is therefore noted as of international importance. The magnitude of effect of any operational maintenance work to the access track upon otters is predicted to be, at a worst case, low due to their short duration. Consequently, the overall significance of the effect to the species during the operational period of the road is assessed as Moderate/Minor. Through professional judgement this has been downgraded to Minor to reflect the likely limited impact that the new carriageway will have in comparison to the existing B9075.

9.6.2.4 Watercourses, Fish and Macroinvertebrates

97. Operational effects on the watercourses surrounding the proposed development may include the release of hydrocarbon and silt/sedimentation from traffic using the carriageway or maintenance of the carriageway or watercrossing structures. During the initial 18 month period of operation of the carriageway when the Viking Wind Farm is being constructed, there is the potential for an increase in the volume of traffic using the carriageway (see Chapter 14: Traffic and Transport for further details).

98. Following this initial 18 month period, traffic flow is not predicted to be over and above that required for the existing B9075 and so the magnitude of any effect is assessed as neutral. As such, no effect is predicted above the current baseline which exists with the current carriageway in place and the significant of any effect assessed as Negligible.

9.7 Mitigation

99. PAN 1/2013 and CIEEM guidelines identify a hierarchy of mitigation for potential impacts that seeks to:

- avoid negative ecological impacts, especially those that could be significant to important features;
- reduce negative impacts that could be avoided; and
- compensate for any remaining significant effects.

100. No significant effects on designated sites, habitats or species are predicted through the construction or operational phases of the proposed development. However, despite these predictions it is important that suitable mitigation measures relating to the overall design of the planned works and the Method Statements prepared for construction are implemented fully to reduce the effect to features further. For example, these will include ensuring that there are no insurmountable physical barriers to otters and fish movements on important watercourse crossings, as well as detailed pollution prevention measures, including contingency plans (which are included as part of the outline Construction Environment Management Plan (CEMP) in Appendix 4.1) the contractor will be required to implement.

101. Low magnitude, non-significant effects on all habitats are predicted to occur with the exception of blanket bog which is assessed as a moderate significant effect. Negative construction land-take impacts ar predicted to ultimately result in a permanent loss of 6.0ha of all habitats with an additional temporary effect to a further 1.9ha of habitats.

102. The mitigation measures outlined in this section will reduce the potential impacts of the proposed development further. Detailed mitigation measures will be included in the revised CEMP (pre-construction version), based on the information contained in this ES, and taking into account any additional requirements as part of consent conditions and findings of e.g. pre-construction surveys (see below). A suitably qualified and experienced Ecological Clerk of Works (ECoW) will provide input into the CEMP prior to the start of construction.

9.7.1 Pre-construction Surveys

103. Pre-construction surveys will be carried out to mitigate against the potential destruction of, or disturbance to, otter resting places (offences under the Habitat Regulations 1994 (as amended) and the Wildlife and Countryside Act 1981 (as amended)). This is the only specially protected and important ecology species potentially likely to be affected by the proposed development work. Otters use a large number of holts and resting places within their ranges and may use new breeding and resting holts between the time of the 2015 survey and construction works. A targeted otter survey will therefore be carried out prior to commencement of construction works within a 250m buffer zone around proposed watercourse crossing locations.

104. Should any structure or place used for shelter or protection by otters be discovered during the survey, SNH will be consulted and if necessary an appropriate European Protected Species licence will be applied for prior to works commencing. The licence application will detail suitable mitigation or compensation works to be agreed with SNH.

9.7.2 Work Programming and Raising Contractor Awareness

105. Construction work programmes can take into account periods of high sensitivity for protected species and where practical, some work tasks may be scheduled to avoid specific periods. Additional pre-construction surveys will be undertaken as required.

106. As part of the CEMP requirements, the ECoW will provide basic ecological constraints training and raise construction staff awareness of specific ecological issues through site induction and toolbox talks. All new staff will undergo an ecological induction as part of a wider site induction and be made aware of the ecological sensitivities on the site and (legal) implications of not complying with agreed working practices. To avoid and/or reduce the likelihood of otter mortality and injury during construction and operation, provision will be made for on-site speed limits for construction and maintenance traffic and protection from entrapment in open excavations, pipes etc. when they are not in use.

9.7.3 Control of Pollution and Sedimentation

107. The high sensitivity of the Sandwater SSSI feature immediately downstream of the proposed development is fully recognised. Mitigation including best practice techniques outlined in Chapter 10 (Geology, Hydrogeology and Hydrology) and the outline CEMP (Appendix 4.1) will be adopted for all construction and operational works to ensure that water quality within the Survey Area is maintained, and to control pollution and sedimentation risk as far as is possible. Implementation of a more detailed pre-construction CEMP should ensure that direct pollution and sedimentation impacts on watercourses and their associated species are avoided.

9.7.4 Watercourse Crossings

108. Watercourse crossings have been carefully designed to consider the following important sensitivities:

- otter foraging habitat;
- otter movements across the site;
- to reduce the risk of otter road traffic injury or mortality;
- trout spawning and nursery areas; and
- fish movements within catchments.

109. Best practice will be followed for any construction works, combined with appropriate hydrological mitigation (Appendix 4.1: Outline CEMP and Chapter 10: Geology, Hydrogeology and Hydrology). Best practice design for otters is being taken forward at all important watercourse crossings (i.e. Burn of Pettawater and Burn of Weisdale). The appropriate 'otter friendly' engineering works described in the Design Manual for Roads and Bridges (Highways Agency, 2008) will be adopted. This includes allowing for the easy and safe passage of otters under rather than over roads by leaving spaces for ledges and

providing ramps at either end of bridges or culverts. Their design should allow for plenty of air space above water during times of flood, or if this is not possible, alternative and parallel tunnels to provide an alternative route for otters to move. The site-based construction and maintenance vehicle speed limit will be controlled. This will substantially reduce any potential impact for construction related otter road traffic injuries and mortalities.

110. Watercourse crossings will be designed to allow free passage of all fish. Both migratory and non-migratory trout undergo spawning migrations and require access to spawning areas, this is particularly relevant to the Burn of Weisdale. Watercourse crossing and culvert design will ensure that fish access to these areas will not be restricted.

9.7.5 Micro-siting of Infrastructure and Demarcation of Exclusion Zones

111. To comply with relevant protected species legislation (specifically otter), the potential for temporary disturbance to protected species during construction will be minimised as far as possible, even though no significant impacts are predicted. As a matter of course, a 50m marked exclusion zone will follow all at-risk watercourses and water bodies, whenever possible. Where exclusion is not possible, such as at crossing points, access to the watercourses by personnel and machinery will be kept to an absolute minimum and will follow agreed plans and methods.

112. The presence of a suitably experienced independent ECoW during construction will help to ensure that opportunities to avoid any unexpected ecological sensitivities during construction are also identified and taken. Any micro-siting required to avoid such areas will be undertaken in consultation with the ECoW.

9.7.6 Habitat Reinstatement

113. Best practice techniques for vegetation and habitat reinstatement will be adopted and implemented in areas of disturbed vegetation. Early reinstatement of all disturbed areas will be undertaken where possible to minimise the effects of soils and peat exposure erosion. Any plant material used in reinstatement techniques will be of local provenance, where practical, and be appropriate for locations being reinstated. Reinstatement techniques, appropriate to the proposed development, will follow those techniques outlined and approved in the CEMP, and will be implemented in consultation with the site ECoW.

9.8 Monitoring

114. During construction, monitoring of otters will take place. To ensure the full implementation of appropriate mitigation measures and monitoring requirements, an independent and fully qualified ECoW will be employed for the pre-construction and construction phase of the planned development. The ECoW will monitor ES/CEMP compliance of the proposed mitigation measures.

9.9 Residual Effects

9.9.1 Impacts Evaluation on Designated Sites

115. The Sandwater SSSI is an important mesotrophic loch located outwith but immediately south of the proposed development area. No realignment construction work will take place within the SSSI, and no potential land-take effects are predicted on the site or its designated features i.e. open water transition fen. Therefore, habitat loss associated with the proposed development will have no significant effects on the nationally important Sandwater SSSI.

116. Although no construction work is planned within the SSSI itself, it will take place in the upstream Burn of Pettawater catchment. The only potential interaction between the proposed development and the Sandwater SSSI concerns potential pollution/runoff from the upstream proposed realignment work, which could end up in the Sand Water Loch. Unmitigated significant effects for both construction and operation phases of the proposed development are predicted to be moderate (sections 9.6.1.4 and 9.6.2.4 above).

117. Taking into account standard guidance and best practice pollution prevention measures (outlined in Chapter 10 (Geology, Hydrology and Hydrogeology) and Appendix 4.1: Outline CEMP), it is considered highly unlikely that a serious pollution incident would occur during construction or operation of the carriageway which would enter the SSSI. The CEMP will outline how suitable pollution prevention measures will be adopted in and around the proposed development site. The measures are considered to be sufficient to prevent pollution of the Sandwater SSSI (Chapter 10: Geology, Hydrology and Hydrogeology). Consequently, the magnitude of effects of a pollution incident for Sandwater SSSI is assessed as low and significance of the effects are predicted as Minor and not significant under EIA legislation.

Table 9.10: Summary of Potential Residual Construction and Operational Impacts on Sandwater SSSI

Parameter	Habitat loss	Pollution/runoff
Extent	None	Downstream of any event
Mitigation	None	CEMP and Pollution Prevention Guidance
Duration	N/A	Event = short term Recovery = short term
Reversibility	N/A	Non-Reversible but likely to be of short duration following which recovery will be of a short term nature
Frequency	N/A	Unknown
Probability	Certain	Highly unlikely
Magnitude	Zero	Low
Effect Significance	**None**	**Minor/Negligible (Minor if professional judgement is applied)**

9.9.2 Impacts Evaluation on Habitats

118. Impacts on terrestrial and aquatic habitats have been determined by overlaying the proposed development layout on to the NVC habitats map. Both the direct and indirect habitat loss anticipated during the construction phase has been calculated as per section 9.6.1.1 and Table 9.9.

119. Severance of peatland habitats, in particular blanket bog, has the potential to negatively affect hydrological integrity and so not only the footprint of the proposed development but the wider surrounding area. It should be noted that terrestrial habitat severance already exists as regards the existing B9075, and the impacts associated with this will have altered habitats surrounding the proposed development in many locations. The design of the proposed development has sought to reduce impacts by remaining in close proximity to the existing B9075 wherever possible to minimise the construction footprint and associated habitat impacts and loss.

120. Predicted habitat loss for key habitats are detailed in Table 9.9, above. The unmitigated impacts of these key habitats have been assessed as minor with the exception of blanket bog which is assessed as moderate. Blanket bog restoration as detailed in the Viking Wind Farm Habitat Management Plan will ensure appropriate mitigation is undertaken to compensate for the loss of these key habitats. The proposed HMP will manage the restoration of some 260ha of blanket bog habitat, well above both the predicted cumulative habitat loss for both the wind farm and upgrade of the B9075.

121. Operational impacts as detailed in section 9.6.2.1 will be limited to maintenance works or small scale pollution from surface water runoff from the carriageway surface. Unmitigated effect significance is predicted (at worst) as minor to the habitats present. Adherence to good practice guidance whilst undertaking maintenance works will decrease this effect further.

Table 9.14: Summary of Residual Potential Construction and Operational Impacts on Habitats

Parameter	Habitat loss	Severance	Pollution/runoff	Soil/hydrology changes
Extent	Site wide	Site wide, but localised	Site wide in downstream areas of any event	Site wide
Mitigation	Demarcation of work zone, reinstatement of habitats following good practice techniques to limit habitat take.	Use of appropriate construction techniques. Siting of development to avoid key habitats.	Implementation of suitable pollution prevention guidance and CEMP.	Use of appropriate construction techniques. Siting of development to avoid key habitats.
Duration	Long-term	Long-term	Event = short term Recovery = medium term	Long term
Reversibility	Mainly irreversible	Reversible	Reversible	Reversible
Frequency	One-off	Single event	Unknown	Gradual change
Probability	Certain	Possible	Unlikely	Likely
Magnitude	Blanket bog = moderate	All habitats –	Low/Neutral	Low

Parameter	Habitat loss	Severance	Pollution/runoff	Soil/hydrology changes
Construction land-take figure, operational figure in parenthesis	Modified bog = low Unimproved acid grassland = low Semi-improved acid grassland = low Wet dwarf shrub heath = low All other habitats = <1ha – negligible	Neutral		
Effect Significance	**Minor Negative**	**Minor Negative**	**Minor Negative**	**Minor Negative**

9.9.3 Impacts Evaluation on Protected Species

9.9.3.1 Otters

122. Taking into account the mitigation outlined in section 9.7 including the implementation of standard guidance and good practice pollution prevention measures, it is considered very unlikely that disturbance to the species or a serious pollution incident, effecting otters, would occur during construction of the proposed development. During operation, fatalities are predicted to be of a level consistent with the existing B9075, as such the magnitude of this effect is assessed as neutral (Table 9.4) and the significance negligible. However, improvement in the passage of otters beneath new bridges and culverts spanning watercourses in comparison to the old structure may achieve a decrease in road fatalities and a minor positive effect. Operation maintenance will follow standard guidance and best practice to minimise disturbance to the species.

123. During both construction and operation of the proposed development, the significance of effects to otters via various mechanisms are predicted, at worst, to be minor. A summary of these are provided in Table 9.11, below.

Table 9.11: Summary of Potential Construction and Operational Impacts on Otter

Parameter	Habitat loss	Severance	Pollution/runoff	Disturbance	Mortality
Extent	At Burn of Pettadale and Burn of Weisdale watercourse crossings	At Burn of Pettadale and Burn of Weisdale watercourse crossings	Downstream areas of any event	At Burn of Pettadale and Burn of Weisdale watercourse crossings	At Burn of Pettadale and Burn of Weisdale watercourse crossings
Mitigation	None	Design of watercrossings allowing passage of otter during all flow conditions	CEMP and pollution prevention guidance to be followed	Good practice guidance followed. An ECoW to be employed during construction works and pre-construction surveys to be undertaken.	Design of watercrossings allowing passage of otter during all flow conditions will improve passage of otters compared with current structures.

Parameter	Habitat loss	Severance	Pollution/runoff	Disturbance	Mortality
Duration	Long-term	Short-term	Event = short term Recovery = medium term	Short term, mainly during construction	Long term, mainly during operation. Potential benefits to the species
Reversibility	Irreversible	Reversible	Reversible	Reversible	Irreversible
Frequency	One-off	Single event during construction	Unknown	Intermittent	Unknown
Probability	Certain	Possible	Very unlikely	Possible	Possible
Magnitude	Low	Low	Low-Neutral	Low	Neutral/ minor benefit
Effect Significance	**Minor Negative**	**Minor Negative**	**Minor Negative – Negligible**	**Minor Negative**	**Neutral – Minor Positive**

9.9.3.2 Watercourses, Fish and Macroinvertebrates

124. Construction work has the potential to negatively impact fish directly or indirectly damaging habitats and causing severance at watercourse crossings (blocking migration routes) or pollution. Damage to watercourses/bodies by runoff/pollution may potentially kill fish or their freshwater invertebrate prey and damage key habitats. The fish species present in the watercourse, with the exception of three-spined stickleback, are assessed as of international importance as detailed in Table 9.3.

125. Taking into account standard guidance and best practice pollution prevention measures (outlined in Chapter 10: Geology, Hydrogeology and Hydrology and Appendix 4.1: Outline CEMP), it is considered unlikely that a serious pollution incident would occur during construction. Detailed design of watercrossings will enable passage of fish during all flow conditions so as not to inhibit migration of key species. Bridges will be designed to span watercrossings without the requirement to lose key habitats within the watercourse.

126. Taking the above mitigation into account, effect magnitude to fish species, in a worst case scenario, are assessed as low, therefore any effect significance is predicted to be Moderate/Minor. Given the protection afforded to watercourses through the above documents this has been downgraded through professional judgement to Minor.

127. Operational activities of the proposed development are not predicted to differ from that of the existing B9075. Unmitigated effects are not predicted to arise at a magnitude above the current baseline, however this assumes that relevant pollution prevention good practice guidance will be adhered to when maintenance of the proposed development is undertaken.

Table 9.12: Summary of Potential Construction and Operational Impacts on Fish

Parameter	Habitat loss	Severance	Pollution/runoff
Extent	Localised at watercourse crossings	Localised at watercourse crossings	Downstream of any event
Mitigation	Design of watercrossings to avoid loss of habitat within watercourses	Best practice in design of watercrossing to ensure passage to fish species during	Implementation of CEMP and pollution prevention guidance.

Parameter	Habitat loss	Severance	Pollution/runoff
		all flow conditions	
Duration	Long-term	Long-term	Event = short term Recovery = medium term
Reversibility	Irreversible	Reversible	Reversible
Frequency	One-off	Single event	Unknown
Probability	Certain	Possible	Very unlikely
Magnitude	Low	Neutral	Low
Effect Significance	**Minor Negative**	**None**	**Minor Negative**

9.10 Cumulative Effects

128. The above sections have considered the implications of the proposed development and its potential effects in conjunction with the Viking Wind Farm development. The EIA Regulations state that proposed large scale developments should be assessed cumulatively with other relevant plans or projects. SNH 2012 guidance on cumulative impacts of wind farms (the only cumulative guidance available) states that "*we only seek cumulative impact assessments where it is considered that a proposal could result in significant cumulative impacts which could affect the eventual planning decision*". Without exception, no significant effects are predicted on the important ecological features of the proposed road realignment development, which are relatively widespread upland habitats and species that are common across Shetland. Consequently, there are no ecological features where significant cumulative impacts are likely.

9.11 Statement of Significance

129. No significant residual effects are predicted for any of the ecological features in the Survey Area. This assessment does not predict any residual effects considered significant in the context of the EIA Regulations. There is no requirement for an appropriate assessment of any European site.

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