

## **APPENDIX 7.1: ECOLOGY TECHNICAL REPORT**



# **Viking Wind Farm, Proposed Main Construction Compound Ecology Technical Report**

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# Viking Wind Farm, Proposed Main Construction Compound

## Ecology Technical Report

**Prepared for VEFW**

| Preparation & Authorisation |                   |                          |             |                 |
|-----------------------------|-------------------|--------------------------|-------------|-----------------|
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## 1. INTRODUCTION

### 1.1 Background

- 1.1.1 This Technical Report accompanies the Environmental Report Chapter 7 on Ecology for the proposed Main Construction Compound for Viking Wind Farm, Shetland.

### 1.2 Purpose of this Document

- 1.2.1 The purpose of this document is to report all the background information gathered and used for the ecological impact assessment of the proposed Main Construction Compound.

## 2. METHODS

### 2.1 Introduction

- 2.1.1 The following was undertaken for ecology: a desk study and field surveys for habitats (Phase 1 methodology), National Vegetation Classification (NVC) and otter. The methods used are noted under the headings which follow.

### 2.2 Desk Study

- 2.2.1 Historical documents providing past relevant ecological information for the area of interest were searched and information extracted where relevant. For example, the past Viking Wind Farm Environmental Statement (VEP, 2009), contained both Phase 1 and National Vegetation Classification mapping which overlapped part of the proposed main compound area. While this mapping was completely re-assessed, it was useful to provide context during preparation for these field surveys.
- 2.2.2 The Shetland Biological Records Centre (Paul Harvey, Shetland Amenity Trust) was contacted and asked to provide any relevant ecological data they may hold for the study area (the proposed compound boundary + a buffer of 250m minimum).

### 2.3 Field Surveys

#### Otter

- 2.3.1 Otter are the only native protected mammal species on Shetland that are regularly present on land and therefore have the potential to be present in suitable habitat within the study area.
- 2.3.2 Otters are active all year round, and can therefore be surveyed in Scotland at any time of the year. This otter survey was undertaken in early June 2019.
- 2.3.3 It is recommended that 200m (SNH, 2019a) upstream and downstream of suitable otter habitat are surveyed from any potential sources of disturbance (in this case the future construction and use of a compound). All of the suitable habitat within the 250m buffer zone was surveyed.

#### *Field Survey Methods Used*

- 2.3.4 This otter survey followed a similar approach to that described in the 2003-4 national survey of otter distribution in Scotland (Strachan, 2007). All sections of watercourses and waterbodies were checked carefully for signs of the presence of otter. This included both banks as well as features such as waterfalls, exposed rocks, gravel bars and beaches, and any other debris present in or adjacent to the channels. In addition, areas

of the upper banks/valleys upslope of the watercourses were also searched, for any evidence of otter use and any features which could be used as resting sites by otter.

- 2.3.5 Otter field signs searched for included spraints (faeces), anal gland deposits, feeding remains, holts, couches, slides, prints and tracks. A handheld Global Positioning System (GPS) was used to record the locations of important features and signs (accuracy indicated as  $\pm 3$  m for the whole survey). In practice, the accuracy of GPS recording can be reduced at times due to very thick cloud or steep topography.
- 2.3.6 The otter survey was carried out by a suitably qualified and experienced ecologist. This ecologist (Dr Andy Mackenzie, MBEC Partner) is familiar with all of the relevant field signs and has a detailed understanding of the habitat requirements of otters. He has been a practicing professional ecologist for over 28 years and has held various licences from Scottish Natural Heritage for otter survey and safeguarding.

#### *Survey Limitations*

- 2.3.7 There had been some rain in the previous week, however, the burn was at a summer level and did not appear to have risen much over the previous fortnight. While sprainting activity can be underestimated following heavy rainfall, active resting-up sites (particularly holts and covered couches) could still be fully and accurately surveyed.

#### Habitats and Flora

##### *Phase 1 Habitat Survey*

- 2.3.8 A Phase 1 habitat survey following the standard methodology (JNCC, 2004) was undertaken on Saturday 1<sup>st</sup> June and Sunday 2<sup>nd</sup> June 2019 for the proposed main construction compound area and a 250m buffer surrounding it. There were no limitations to report in relation to this survey. A Phase 1 map of the key habitats using a GPS and Geographical Information System (GIS) was produced. A set of additional target notes and plant species seen were also recorded.

##### *NVC Survey*

- 2.3.9 A National Vegetation Classification survey (NVC) to characterise the dominant vegetation communities present within the study area was undertaken on Sunday 2<sup>nd</sup> June and Monday 3<sup>rd</sup> June 2019 for the proposed main construction compound area and a 250m buffer surrounding it. This survey was undertaken by an experienced ecologist (Dr Andy Mackenzie, MBEC Partner) following the standard methodology (Rodwell, 1991 & 1992).
- 2.3.10 There was one limitation noted during the NVC survey and that related to the cold and late spring experienced in 2019. Some plants, particularly the sedges, were not in full flower by early June 2019 and this made identification to species level more difficult. However, the author used his experience of the vegetative characteristics of plants to limit this as much as possible and it was not viewed as a significant impediment to successful survey completion.
- 2.3.11 All vegetation types which were greater than around 30m x 30m in area were mapped and identified. Where smaller but important habitat types were present these were target noted and noted in the accompanying text. It is often the case with plant communities that complex mosaics of different vegetation communities exist together, often due to locally changing topography and physio-chemical conditions. Where these are of approximately similar proportions they are mapped and noted as such. Where one vegetation type is clearly dominant in area of coverage over others then this is mapped but the other vegetation communities present are still noted in accompanying

text. A map of the dominant vegetation communities was produced using a hand held GPS and GIS. Relevant additional/necessary quadrats (following on from the proposed main construction compound NVC close by) were undertaken of homogeneous vegetation stands to ensure the necessary accurate data for later analysis, allowing accurate identification of the communities involved. A set of additional notes and surrounding additional species present was also recorded. For community identification both Rodwell (1991 and 1992) and Averis *et al.* (2004) were used.

### *Invasive Plants*

- 2.3.12 Invasive, non-native plant species were noted, when spotted, during all surveys within the study area and are reported where relevant.

## **3. RESULTS**

### **3.1 Introduction**

- 3.1.1 Important results from the desk study and the ecological surveys undertaken for the proposed Main Construction Compound are reported in this section.

### **3.2 Desk Study**

- 3.2.1 The records available from the Shetland Biological Records Centre for the Sandwater area are mainly at a resolution of 1km. There are 87 records of insects, mainly moths and butterflies and there are 7 records of stoat and mountain hare from the area. These records range in age but are mainly from the last 20 years. While valuable as records, they do not give a great deal of additional information, other than to indicate there are a variety of insects present in the area, reflecting the habitats present. A mountain hare sighting and evidence of their presence was seen during surveying in early June 2019 and stoats are known to be present and fairly common in the area, although they are not native to Shetland. A copy of the desk study records provided by the Shetland Biological Records Centre is provided in Appendix 1.
- 3.2.2 A desk search was undertaken for designated sites in the surrounding area. The Sandwater Site of Special Scientific Interest (SSSI) is partly located within the wider study area (see Figure 1). The boundary of this site within the study area is the shoreline of the loch.
- 3.2.3 The Sandwater SSSI is 36.8ha in size (SNH, 2019b). It has been designated since 1972 and is notified as an example of a mesotrophic loch and for its open-water transition fen (extensive beds of common club-rush (*Schoenoplectus lacustris*) (SNH, 2019b). The SSSI supports a diverse plant community of submerged aquatic plants with six species of pondweed (*Potamogeton spp.*), including the nationally scarce slender-leaved pondweed (*Potamogeton filiformis*). It is the largest and best example in Shetland of club-rush swamp. The loch is relatively shallow and although surrounded by acidic moorland, it is mesotrophic with a pH around neutral (7) because of the strong influence of the underlying geology (a band of crystalline limestone is present). The Sandwater SSSI was assessed by Scottish Natural Heritage (SNH) in 2004 as being in Favourable, maintained condition (SNH, 2019b).
- 3.2.4 There were no other designated sites for ecology in the surrounding area which would be likely to be affected by this proposed main construction compound.

### 3.3 Field Surveys

#### Protected Species

- 3.3.1 No evidence of any recent otter presence was found within the proposed main compound area or the surrounding 250m buffer. The Burn of Crookadale and its tributary offered potentially suitable habitat but a complete search of this area failed to find any evidence. While it is known from a recent survey by the author (January 2019) that otter are present and using the Sandwater loch and both upstream and downstream from it, no evidence of recent otter use was found along the shoreline within 250m of the proposed main compound.

#### Habitats and Flora

##### *Phase 1 Habitat Survey*

- 3.3.2 The mapped results of the Phase 1 habitat survey of the proposed main compound and a surrounding 250m buffer can be seen in Figure 1. This figure is accompanied by Appendix 2 which details Target Notes for the Phase 1 habitat mapping. The locations of the Target Notes are indicated on Figure 1.
- 3.3.3 Figure 1 illustrates that the whole of the proposed main compound area is blanket bog on peat of generally a metre or more in depth. There is one small bog pool within the boundary (Target Note 4 on Figure 1) and there are two areas of modified bog present (Target Notes 5 & 6 on Figure 1). Downslope from the proposed main compound, towards the road, there is drainage from the bog which is mainly caught by an existing road edge cut-off drain. These drainage gullies have localised areas of acid grassland and rush pasture but they are small in extent and hence were not mapped separately. Only one area of marshy grassland (scattered rush pasture) was large enough to map downslope from the proposed main compound boundary (see Figure 1). Table 3.1 below indicates the areas of habitats present within the overall study area (main compound boundary + 250m surrounding buffer) and the percentage of each Phase 1 habitat type present.

**Table 3.1: Phase 1 Habitat Areas and Percentages within the Study Area.**

| Phase 1 Habitat                     | Area (m <sup>2</sup> ) | Area (ha)    | Percentage    |
|-------------------------------------|------------------------|--------------|---------------|
| B12 – Acid grassland, semi-improved | 11308                  | 1.13         | 2.22          |
| B5 – Marsh/marshy grassland         | 3221                   | 0.32         | 0.63          |
| E161 – Blanket bog                  | 442624                 | 44.26        | 86.78         |
| E17 – Wet modified bog              | 6216                   | 0.62         | 1.22          |
| E18 – Dry modified bog              | 156                    | 0.02         | 0.03          |
| G12 – Standing water, mesotrophic   | 37861                  | 3.79         | 7.42          |
| J5 - Other, road                    | 8653                   | 0.87         | 1.70          |
| <b>Total</b>                        | <b>510040</b>          | <b>51.00</b> | <b>100.00</b> |

- 3.3.4 A species list of all plants that were noted during the Phase 1 habitat survey is included as Appendix 3. It is important to note that this is not an exhaustive list, rather those plants noted in passing during surveying. However, an effort was made to record any notable species and particularly any invasive non-native plant species. No invasive plant species were recorded within this study area. The most notable native species found, having a limited oceanic distribution (northern and western), was Spring squill



(*Scilla verna*). One plant was found in the eastern road verge at National Grid Reference HU 41970 54842. While this plant is fairly common on Shetland it would be expected to be found in exposed coastal habitats, rather than a relatively inland road verge.

#### NVC Survey

3.3.5 The mapped results of the NVC survey of the proposed main compound and a surrounding 250m buffer can be seen in Figure 2. This figure is accompanied by Appendix 4 which details the quadrat data collected to assist with the classification mapping and overall assessment of plant community condition. Nine quadrats (2m x 2m) were undertaken within the area surveyed and their locations are indicated on Figure 2.

3.3.6 The vegetation communities present within the study area are described below.

3.3.7 **H10c - *Calluna vulgaris*-*Erica cinerea* heath, *Festuca ovina*-*Anthoxanthum odoratum* sub-community.** This was present as a small area within the proposed main compound boundary. While the vegetation type was that of a dry heath it was located on deep peat and appeared to be the result of preferential grazing and dunging, over a long time period by sheep and mountain hares. It was also on a south facing slope which may have contributed to the localised drying of the bog surface.

**Table 3.2: NVC Plant Community Areas and Percentages within the Study Area.**

| National Vegetation Classification   | Area (m <sup>2</sup> ) | Area (ha)    | Percentage    |
|--|------------------------|--------------|---------------|
| <b>H10c - <i>Calluna vulgaris</i>-<i>Erica cinerea</i> heath, <i>Festuca ovina</i>-<i>Anthoxanthum odoratum</i> sub-community.</b>       | 156                    | 0.02         | 0.03          |
| <b>M17b - <i>Trichophorum cespitosum</i>-<i>Eriophorum vaginatum</i> blanket mire, <i>Cladonia</i> sub-community.</b>                    | 263580                 | 26.36        | 51.68         |
| <b>M19b - <i>Calluna vulgaris</i>-<i>Eriophorum vaginatum</i> blanket mire, <i>Empetrum nigrum</i> ssp. <i>nigrum</i> sub-community.</b> | 179044                 | 17.9         | 35.10         |
| <b>M20a - <i>Eriophorum vaginatum</i> blanket and raised mire, species-poor sub-community.</b>   | 6216                   | 0.62         | 1.22          |
| <b>MG10a - <i>Holcus lanatus</i>-<i>Juncus effusus</i> rush-pasture, typical sub-community.</b>  | 3221                   | 0.32         | 0.63          |
| <b>U4a - <i>Festuca ovina</i>-<i>Agrostis capillaris</i>-<i>Galium saxatile</i> grassland, typical sub-community.</b>                    | 11308                  | 1.13         | 2.22          |
| <b>Open water (mesotrophic)</b>  | 37861                  | 3.79         | 7.42          |
| <b>Artificial (Road)</b>   | 8653                   | 0.87         | 1.70          |
| <b>Total</b>   | <b>510040</b>          | <b>51.00</b> | <b>100.00</b> |

3.3.8 **M17b - *Trichophorum cespitosum*-*Eriophorum vaginatum* blanket mire, *Cladonia* sub-community.** This vegetation community accounted for just over half of the total area surveyed (see Table 3.2 for the areas and percentages of the study area). While this community is classified as blanket bog it was seen to be largely inactive with a paucity of *Sphagnum* species. It was verging on “wet modified bog” under the Phase 1 terminology and was dominated by the moss *Racomitrium lanuginosum*. Areas showed large-scale erosion features with regular bare peat between the vegetation. M17b is

the lichen sub-community, however Averis *et al.* (2004) note that, “The *Cladonia* species sub-community M17b occurs on slightly drier peats, for example where the surface has been dried out by burning. Like the *Cladonia* sub-community of *Trichophorum-Erica* wet heath M15c, its name is deceptive, as in many places it is the moss *Racomitrium lanuginosum*, rather than *Cladonia* lichens, that defines this sub-community.” While there was no evidence of burning in this area, the peat surface was clearly relatively dry. Although this was the dominant vegetation type there were small areas of better quality blanket bog within it, in a few places where less peat erosion had occurred and those equated to M19b. Bog pools were rare within this community with only one recorded within the study area (see Appendix 4: Quadrat 5 for further details of the M2 bog pool community recorded).

- 3.3.9 **M19b - *Calluna vulgaris-Eriophorum vaginatum* blanket mire, *Empetrum nigrum* ssp. *nigrum* sub-community.** This vegetation community accounted for just over 35% of the survey area (see Table 3.2 for further details) and occurred within the west of the proposed main compound area and study area. This was good quality active blanket bog, if sparser in *Sphagnum* species and lower in higher plant species diversity than would be expected when compared to further south in Scotland. It was particularly noticeable in this area that *Sphagnum papillosum* was a lot less common than would be expected and *Sphagnum capillifolium* (both subspecies but *rubellum* appeared to be more frequent) was the dominant *Sphagna* present. The areas of M19b were more intact and lacked the amounts of peat erosion seen in the M17b community. This community type was more uniform as well and there were only small differences in species and cover between widely separate vegetation stands. As well as some variation in *Sphagna* cover there was some variation in *Calluna vulgaris* cover but this could have been partly related to the relative exposure of different stands.
- 3.3.10 **M20a - *Eriophorum vaginatum* blanket and raised mire,** species-poor sub-community. This vegetation community only accounted for just over 1% of the study area, with a small proportion inside the proposed boundary of the main construction compound (see Figure 2). This area had been artificially disturbed due to repeated vehicle tracking over a wide area; assumed to be due to fairly recent wood pole electricity line works. This had resulted in an almost bare peat surface in places and while it was *Eriophorum angustifolium* that was the main initial coloniser of the barest areas, M20a was the closest matching NVC community and had a lot of the other characteristics expected.
- 3.3.11 **MG10a - *Holcus lanatus-Juncus effusus* rush-pasture,** typical sub-community. Figure 2 illustrates that this vegetation community was only present outside of the proposed main construction compound, to the west of the study area. It represented under 1% of the study area. The identification of this community as MG10a was only made because there is no NVC community which represents *Juncus effusus* over an acid grassland habitat. Therefore, the quadrat data (see Appendix 4 : Quadrat 9) indicated that in this area MG10 was the most representative, although it was not a good match. Averis has categorised this community as Jex. This community was not very species rich and consisted of typical common species. As well as the two mapped areas there were much smaller patches of this community present just above the road on the east side (outside of the proposed main compound boundary) and these were due to bog drainage running downslope in vegetated gullies to the road. It appeared that this drainage was mainly surface run-off.
- 3.3.12 **U4a - *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland,** typical sub-community. This vegetation type all occurred on the other side of the road from the proposed main compound location i.e. it was all located in the wider study area. In terms of coverage within the area it occurred in just over 2% of the study area (see

Table 3.2 for further details). Given the generally disturbed nature of this area next to the road this acid grassland, which was semi-improved in places, was quite mixed. There was variation in species/dominance within it and in some places there were indications that it was locally verging towards neutral grassland, although overall it was dominated by acidic grassland. There were a range of common plant species present, with some bog species as well as the more typical grassland ones. This area was on deep peat, despite being a grassland. In a few places there were small patches of soft rush although, other than the marked area of MG10a within it, this was only in small patches where small amounts of water were moving down the slope to the loch edge.

- 3.3.13 **Open water** (mesotrophic). The loch edge of Sandwater contained a stony splash zone. This loch is a Site of Special Scientific Interest due to its mesotrophic nutrient status. The key vegetation of interest for the designation is not located close to this section of shoreline within the study area. Within the loch itself it could be seen that rooted aquatic plants were present out from the shoreline. These were not identified or assessed further.
- 3.3.14 While Table 3.2 gives the NVC plant community areas and percentages for the whole study area, Table 3.3 gives the same data specifically for the proposed Main Compound area only. This table indicates that the majority of the proposed development area is blanket bog (approximately 62% is M17b and 36% is M19b, with the rest being altered blanket bog plant communities).

**Table 3.3: NVC Plant Community Areas and Percentages within the Proposed Main Compound Boundary.**

| National Vegetation Classification   | Area (m <sup>2</sup> ) | Area (ha)   | Percentage of the Compound Area |
|--|------------------------|-------------|---------------------------------|
| <b>H10c - <i>Calluna vulgaris</i>-<i>Erica cinerea</i> heath, <i>Festuca ovina</i>-<i>Anthoxanthum odoratum</i> sub-community.</b>       | 156                    | 0.01        | 0.25                            |
| <b>M17b - <i>Trichophorum cespitosum</i>-<i>Eriophorum vaginatum</i> blanket mire, <i>Cladonia</i> sub-community.</b>                    | 38675                  | 3.87        | 61.78                           |
| <b>M19b - <i>Calluna vulgaris</i>-<i>Eriophorum vaginatum</i> blanket mire, <i>Empetrum nigrum</i> ssp. <i>nigrum</i> sub-community.</b> | 22588                  | 2.26        | 36.09                           |
| <b>M20a - <i>Eriophorum vaginatum</i> blanket and raised mire, species-poor sub-community.</b>   | 1176                   | 0.12        | 1.88                            |
| <b>Total</b>   | <b>62596</b>           | <b>6.26</b> | <b>100.00</b>                   |

#### *Groundwater Dependent Terrestrial Ecosystems*

- 3.3.15 SEPA require information on Groundwater Dependent Terrestrial Ecosystems (GWDTEs) to be provided. This can be provided by using the NVC data (Appendix 4) and NVC mapping with area analysis (Figure 2, Table 3.2 and Table 3.3).
- 3.3.16 There are no groundwater sensitive vegetation communities within the boundaries of the proposed main construction compound. However, there is one community present within the wider study area which can have a level of groundwater dependency at a Moderate sensitivity and that is the **MG10a - *Holcus lanatus*-*Juncus effusus* rush-pasture**, typical sub-community (see Appendix 4). As noted above, this is not strictly relevant because this was a poor match and it was Je<sub>x</sub> (Averis) i.e. rushes with acid

grassland below it. There are two small stands of this vegetation to the west and south west of the proposed main construction compound near the road (Figure 2). Looking at this vegetation and the topography on the ground, it appeared that both stands of this vegetation were more reliant on regular surface drainage spreading over the local peat surface than groundwater influence. The small areas and percentage of this plant community compared to the total study area are detailed in Table 3.4 below.

**Table 3.4: GWDTE Plant Communities Present, Total Area and Each Stand Area.**

| <b>GWDTEs</b>  | <b>Area (m<sup>2</sup>)</b> | <b>Area (ha)</b> | <b>% of Total Study Area</b> |
|--|-----------------------------|------------------|------------------------------|
| MG10a J <sub>ex</sub> /Moderate Sensitivity <b>Total Area</b>      | 3221                        | 0.32             | 0.63                         |
| MG10a J <sub>ex</sub> /Moderate Sensitivity <b>West Area</b>       | 1248                        | 0.12             | 0.24                         |
| MG10a J <sub>ex</sub> /Moderate Sensitivity <b>South West Area</b> | 1973                        | 0.2              | 0.39                         |

#### 4. NATURE CONSERVATION EVALUATION

- 4.1.1 Nature conservation evaluation (often referred to as sensitivity) is required for further consideration and impact assessment. It is included here for the important ecological receptors surveyed.
- 4.1.2 No evidence of otter use/presence was found although it is known that they are present in the Sandwater area to the west. While other mammal species are present they are not viewed as important from a nature conservation perspective. For the proposed development it is considered unlikely that any mammal of any particular nature conservation value would be affected.
- 4.1.3 The Sandwater SSSI is evaluated as being nationally important for nature conservation due to its notified features and the quality of those features.
- 4.1.4 Blanket bog was the most important vegetation type surveyed within the study area. Blanket bog is generally regarded to be of international importance due to the importance of Scottish bogs in a world context. The M17b and M20a blanket mire present within the study area and covering c. two thirds of the proposed main compound site is degraded and contains large areas that are inactive (not actively forming peat at present), however, these areas are capable of recovery. This is evaluated as nationally important from a nature conservation perspective. The M19b area to the west side of the proposed main compound and the west side of the wider study area is largely intact active blanket bog and is of a greater value for nature conservation. It is assessed as being of up to international importance for nature conservation.

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## FIGURES





## MAIN CONSTRUCTION COMPOUND

**FIGURE 1**  
Phase 1 Habitat Survey

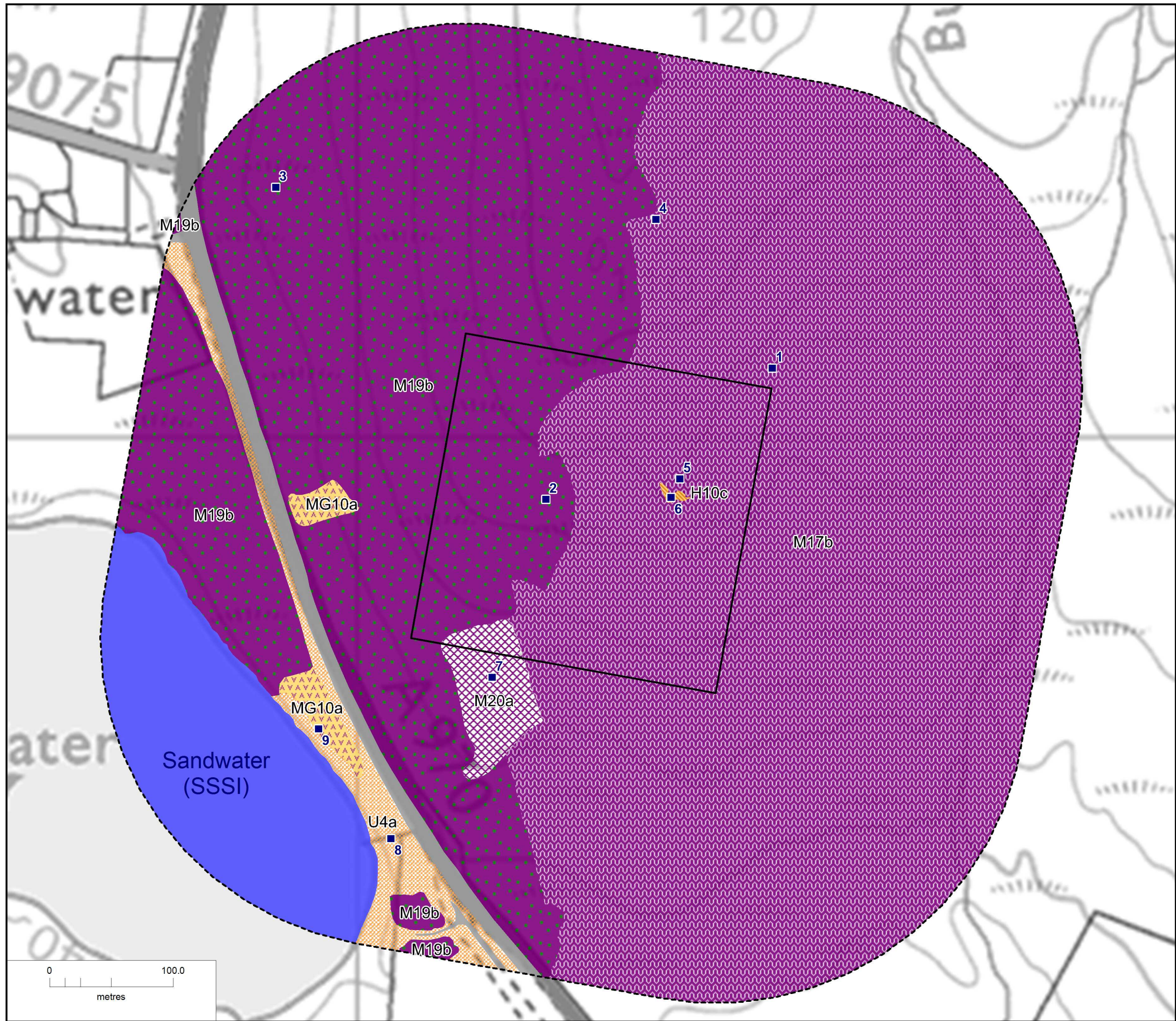
- Proposed construction compound  
Proposed construction compound 250 m buffer
- Phase 1 Habitat**
- SI Semi-improved acid grassland
  - Marsh / marshy grassland
  - Blanket bog
  - Wet modified bog
  - Dry modified bog
  - Open water
  - Road
  - Target note

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**Original A3 plot scale**  
**1:3,000**

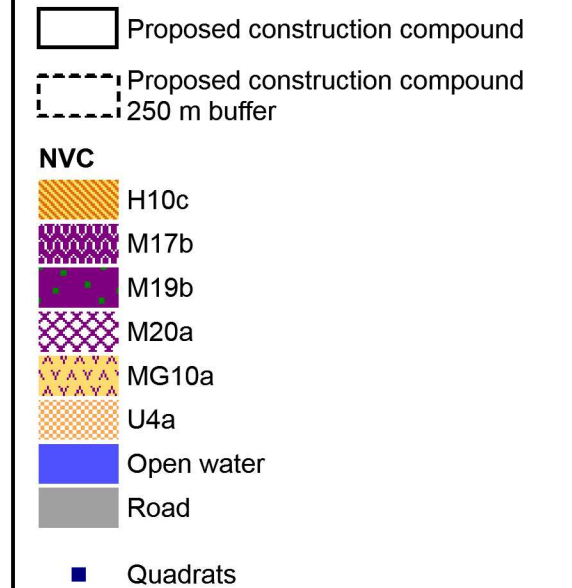
|                      |    |               |            |                 |
|----------------------|----|---------------|------------|-----------------|
| Client / Project No. |    | SSE / 005.070 |            | <b>Figure 1</b> |
| Rev. By              | CR | Drg. No.      | N/A        |                 |
| Chk. By              | AM | Date          | 13/06/2019 |                 |
| Appr. By             | AM | Layout        | N/A        |                 |





## MAIN CONSTRUCTION COMPOUND

**FIGURE 2**  
National Vegetation  
Classification Communities



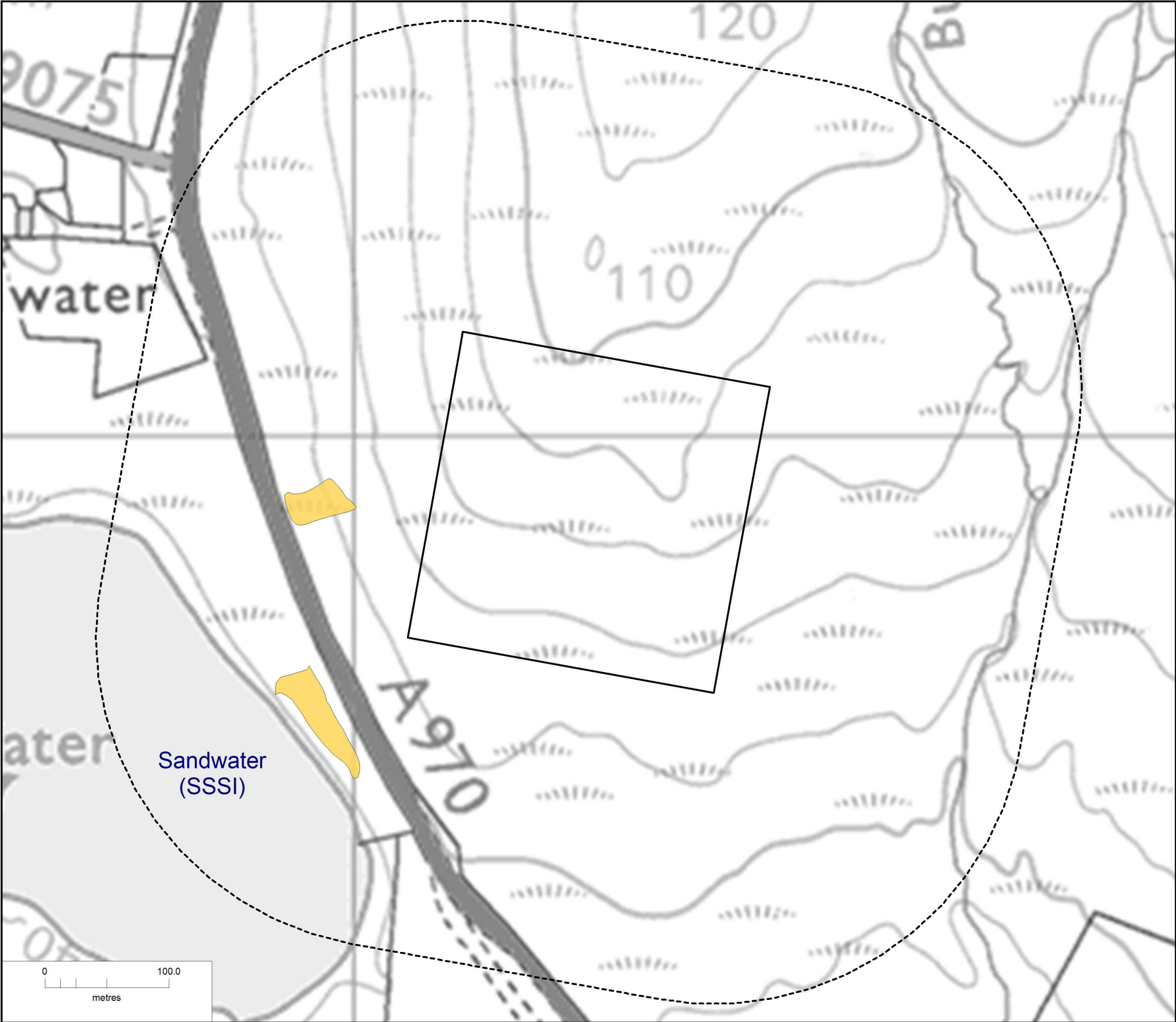
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**Original A3 plot scale**  
**1:3,000**

|                      |    |               |            |
|----------------------|----|---------------|------------|
| Client / Project No. |    | SSE / 005.070 |            |
| Rev. By              | CR | Drg. No.      | N/A        |
| Chk. By              | AM | Date          | 13/06/2019 |
| Appr. By             | AM | Layout        | N/A        |

**Figure 2**





**MAIN CONSTRUCTION COMPOUND**

**FIGURE 3**  
Groundwater Dependent Terrestrial Ecosystems

- Proposed construction compound
- Proposed construction compound 250 m buffer
- Groundwater Dependent Terrestrial Ecosystems**
  - Moderately groundwater dependent (MG10a)

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**Original A3 plot scale**  
**1:3,000**

|                      |    |               |            |                 |
|----------------------|----|---------------|------------|-----------------|
| Client / Project No. |    | SSE / 005.070 |            | <b>Figure 3</b> |
| Rev. By              | CR | Drg. No.      | N/A        |                 |
| Chk. By              | AM | Date          | 13/06/2019 |                 |
| Appr. By             | AM | Layout        | N/A        |                 |

## **APPENDICES**

**APPENDIX 1:** Records from the Shetland Biological Records Centre which include the Study Area.

| Taxon Latin Name         | Recommended Common Name | Location Name | Date                    | Spatial Reference | Obs Abundances (LC) | Obs Comment   |
|--------------------------|-------------------------|---------------|-------------------------|-------------------|---------------------|---|
| Nicrophorus humator      | Black Sexton Beetle     | Sandwater     | 2005                    | HU417552          | present Count       | An excellent description given, leaving no doubt as to species. One or two seen most years. |
| Pieris brassicae         | Large White             | Sandwater     | 18/06/2000              | HU4154            |                     | 1   |
| Pieris brassicae         | Large White             | Sandwater     | 18/06/2000              | HU4154            | 1 Count of present  |   |
| Vanessa atalanta         | Red Admiral             | Sandwater     | 26/06/2003              | HU4154            | 1 Count of present  |   |
| Cynthia cardui           | Painted Lady            | Sandwater     | 26/06/2003              | HU4154            | 1 Count of present  |   |
| Cynthia cardui           | Painted Lady            | Sandwater     | 07/07/1990              | HU4154            |                     | 1   |
| Glyphipterix thrasonella | Speckled Fanner         | Sandwater     | July 1997               | HU4154            |                     | common  |
| Plutella xylostella      | Diamond-back Moth       | Sandwater     | 01/07/2000              | HU4154            |                     | hundreds  |
| Rhigognostis senilella   | Rock-cress Smudge       | Sandwater     | 29/05/1995              | HU4154            |                     | 1 on peat bank  |
| Rhigognostis senilella   | Rock-cress Smudge       | Sandwater     | 09/05/1996 - 11/05/1996 | HU4154            |                     | singles on each date  |
| Rhigognostis senilella   | Rock-cress Smudge       | Sandwater     | 23/08/1998              | HU4154            |                     | 1   |
| Agonopterix heracliiana  | Common Flat-body        | Sandwater     | 10/05/2001              | HU4154            | 1 Count of present  |   |
| Syndemis musculana       | Dark-barred Twist       | Sandwater     | 01/06/2005              | HU4154            | 1 Count of present  |   |
| Syndemis musculana       | Dark-barred Twist       | Sandwater     | 20/06/1994              | HU4154            |                     | 3 - 1 det. by KB. Determined by KPB   |
| Syndemis musculana       | Dark-barred Twist       | Sandwater     | 12/06/1995              | HU4154            |                     | 8   |
| Syndemis musculana       | Dark-barred Twist       | Sandwater     | 19/06/1998              | HU4154            |                     | 1   |
| Syndemis musculana       | Dark-barred Twist       | Sandwater     | 15/06/1999              | HU4154            |                     | 1   |
| Syndemis musculana       | Dark-barred Twist       | Sandwater     | 31/05/2000              | HU4154            |                     | 4   |
| Clepsia senecionana      | Obscure Twist           | Sandwater     | 05/06/1998              | HU4154            |                     | 2   |
| Acleris hyemana          | Heath Button            | Sandwater     | 05/05/2001              | HU4154            | 1 Count of present  |   |
| Acleris hyemana          | Heath Button            | Sandwater     | 15/04/2005              | HU4154            | 1 Count of present  |   |
| Acleris hyemana          | Heath Button            | Sandwater     | 21/05/2000              | HU4154            |                     | 1   |
| Olethreutes lacunana     | Common Marble           | Sandwater     | 28/07/1999              | HU4154            |                     | 1   |
| Ancylis unguicella       | Broken-barred Roller    | Sandwater     | 30/05/1996              | HU4154            |                     | 1   |
| Ancylis unguicella       | Broken-barred Roller    | Sandwater     | 17/07/1997              | HU4154            |                     | 1   |
| Ancylis unguicella       | Broken-barred Roller    | Sandwater     | 08/06/1999              | HU4154            |                     | 1   |
| Ancylis unguicella       | Broken-barred Roller    | Sandwater     | 27/05/2000              | HU4154            |                     | 2   |
| Epinotia mercuriana      | Moorland Bell           | Sandwater     | 03/08/1998              | HU4154            |                     | 1   |

| Taxon Latin Name             | Recommended Common Name  | Location Name | Date                    | Spatial Reference | Obs Abundances (LC) | Obs Comment                        |
|------------------------------|--------------------------|---------------|-------------------------|-------------------|---------------------|------------------------------------|
| <i>Epinotia mercuriana</i>   | Moorland Bell            | Sandwater     | 03/08/1999              | HU4154            |                     | 2                                  |
| <i>Crambus lathoniellus</i>  | Hook-streak Grass-veneer | Sandwater     | 24/06/2001              | HU4154            | 5 Count of present  |                                    |
| <i>Crambus lathoniellus</i>  | Hook-streak Grass-veneer | Sandwater     | 15/06/1994              | HU4154            |                     | 1                                  |
| <i>Agriphila straminella</i> | Straw Grass-veneer       | Sandwater     | 15/07/1999              | HU4154            |                     | 10                                 |
| <i>Agriphila straminella</i> | Straw Grass-veneer       | Sandwater     | 16/07/2000              | HU4154            |                     | 20                                 |
| <i>Agriphila straminella</i> | Straw Grass-veneer       | Sandwater     | 14/07/1995              | HU4154            |                     | 4                                  |
| <i>Agriphila straminella</i> | Straw Grass-veneer       | Sandwater     | 27/07/1995              | HU4154            |                     | numerous                           |
| <i>Scoparia ambigualis</i>   | Common Grey              | Sandwater     | 06/07/2001              | HU4154            | 1 Count of present  |                                    |
| <i>Scoparia ambigualis</i>   | Common Grey              | Sandwater     | 19/06/1998 - 27/07/1998 | HU4154            |                     | 6 on each day (19-7 to 27-7) + 1 F |
| <i>Scoparia ambigualis</i>   | Common Grey              | Sandwater     | 12/07/2000              | HU4154            |                     | 2                                  |
| <i>Scoparia ambigualis</i>   | Common Grey              | Sandwater     | July 1996               | HU4155            |                     | small numbers                      |
| <i>Scoparia ambigualis</i>   | Common Grey              | Sandwater     | 18/07/1994              | HU4154            |                     | 1                                  |
| <i>Scoparia ambigualis</i>   | Common Grey              | Sandwater     | 07/07/1997 - 17/07/1997 | HU4154            |                     | common                             |
| <i>Eudonia alpina</i>        | Highland Grey            | Sandwater     | 26/05/2000              | HU4154            |                     | 1                                  |
| <i>Nomophila noctuella</i>   | Rush Veneer              | Sandwater     | 11/05/1996              | HU4154            |                     | 1                                  |
| <i>Xanthorhoe montanata</i>  | Silver-ground Carpet     | Sandwater     | July 1996               | HU4155            |                     | small numbers                      |
| <i>Xanthorhoe montanata</i>  | Silver-ground Carpet     | Sandwater     | 15/07/1998              | HU4154            |                     | 1                                  |
| <i>Entephria caesiata</i>    | Grey Mountain Carpet     | Sandwater     | 19/08/1998              | HU4154            |                     | 1                                  |
| <i>Chloroclysta citrata</i>  | Dark Marbled Carpet      | Sandwater     | 27/08/1998              | HU4154            |                     | 2                                  |
| <i>Operophtera brumata</i>   | Winter Moth              | Sandwater     | 14/11/1997              | HU4154            |                     | 1                                  |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | 27/05/2000              | HU4154            |                     | 10                                 |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | 03/07/2000              | HU4154            |                     | 1                                  |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | 27/05/1997 - 04/06/1997 | HU4154            |                     | 6 in total                         |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | 1993                    | HU4154            |                     |                                    |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | 16/06/1994              | HU4154            |                     | 1                                  |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | 12/06/1995 - 26/06/1995 | HU4154            |                     | about 10                           |
| <i>Eupithecia satyrata</i>   | Satyr Pug                | Sandwater     | June 1996               | HU4154            |                     | recorded                           |

| Taxon Latin Name           | Recommended Common Name | Location Name | Date                    | Spatial Reference | Obs Abundances (LC) | Obs Comment                        |
|----------------------------|-------------------------|---------------|-------------------------|-------------------|---------------------|------------------------------------|
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 04/06/1998 - 19/06/1998 | HU4154            |                     | up to 3                            |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 15/05/1999              | HU4154            |                     | 2                                  |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 02/06/1999 - 14/06/1999 | HU4154            |                     | 1-2 most days                      |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 25/05/2000              | HU4154            |                     | 1                                  |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 26/05/2000              | HU4154            |                     | 30                                 |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 23/05/2001 - 31/05/2001 | HU4154            | 5 Count of present  | One on 23rd & 4 on 31st May        |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 12/05/2004              | HU4154            | 1 Count of present  |                                    |
| <i>Eupithecia satyrata</i> | Satyr Pug               | Sandwater     | 02/06/2005 - 24/06/2005 | HU4154            | 3 Count of present  | Singles on 3 dates.                |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 14/05/2001 - 31/05/2001 | HU4154            | 6 Count of present  | Max of 4 on 14th May               |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 07/05/1999 - 31/05/1999 | HU4154            |                     | occasional records of up to 6      |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 26/05/2000              | HU4154            |                     | 2                                  |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 27/05/2000              | HU4154            |                     | 1                                  |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 06/05/2002 - 16/05/2002 | HU4154            | 3 Count of present  | Singles on three dates             |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 12/05/2004 - 31/05/2004 | HU4154            | 4 Count of present  | Singles on 4 dates                 |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 10/06/2005              | HU4154            | 2 Count of present  |                                    |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 08/05/1993 - 14/06/1993 | HU4154            |                     | up to 6 on 5 dates                 |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 16/05/1994 - 30/06/1994 | HU4154            |                     | 1 on 16th, 6 on 23rd and 1 on 30th |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 29/05/1995 - 12/06/1995 | HU4154            |                     | 8 in total                         |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 11/05/1996 - 09/06/1996 | HU4154            |                     | up to 5 on four dates              |
| <i>Ematurga atomaria</i>   | Common Heath            | Sandwater     | 30/05/1997 - 04/06/1997 | HU4154            |                     | 31 in total                        |

| Taxon Latin Name       | Recommended Common Name         | Location Name               | Date                    | Spatial Reference | Obs Abundances (LC) | Obs Comment   |
|------------------------|---------------------------------|-----------------------------|-------------------------|-------------------|---------------------|---|
| Ematurga atomaria      | Common Heath                    | Sandwater                   | 02/06/1998 - 16/06/1998 | HU4154            |                     | 22 in total   |
| Papestra biren         | Glaucous Shears                 | Sandwater                   | 22/05/2001              | HU4154            | 2 Count of present  |   |
| Papestra biren         | Glaucous Shears                 | Sandwater                   | 12/05/2004              | HU4154            | 1 Count of present  |   |
| Mniotype adusta        | Dark Brocade                    | Sandwater                   | 08/06/2004              | HU4154            | 1 Count of present  |   |
| Mniotype adusta        | Dark Brocade                    | Sandwater                   | 06/06/2000              | HU4154            |                     | 1 - by day under cast peat                            |
| Hepialus fusconebulosa | Map-winged Swift                | Sandwater                   | 30/06/1994              | HU4154            |                     | 1 - dead  |
| Hepialus fusconebulosa | Map-winged Swift                | Sandwater                   | 16/07/1996              | HU4154            |                     | 1 under peat bank                                     |
| Scaeva pyrastris       | Scaeva pyrastris                | Sandwater                   | 08/06/1997              | HU420550          |                     | 1   |
| Sericomyia lappona     | Sericomyia lappona              | Sandwater                   | 13/06/1994              | HU420550          |                     | 1. Reference/Collection: coll. TDR. Determined by CWP |
| Bombus magnus          | Northern White-tailed Bumblebee | Near Sand Water             | July 1997               | HU423546          | 1 Count of adult    | Peat bank. NB date approx.                            |
| Bombus magnus          | Northern White-tailed Bumblebee | Sandwater                   | July 1997               | HU423546          | present Count       | On peat bank.   |
| Mustela erminea        | Stoat                           | Sandwater                   | 01/09/2005              | HU4155            | 1 Count of present  |   |
| Mustela erminea        | Stoat                           | Sandwater                   | 20/09/2005              | HU4155            | 1 Count of present  | Chasing rabbit along side of main road.               |
| Mustela erminea        | Stoat                           | North of Sandwater junction | 07/09/2009              | HU4155            | 1 Count of present  |   |
| Lepus timidus          | Mountain Hare                   | Sandwater                   | 14/05/2010              | HU4154            | 4 Count of present  |   |
| Lepus timidus          | Mountain Hare                   | Sandwater                   | 28/05/2007              | HU4154            | 1 Count of present  |   |
| Lepus timidus          | Mountain Hare                   | Sandwater                   | 21/01/2008              | HU4154            | 1 Count of present  |   |
| Lepus timidus          | Mountain Hare                   | Sandwater                   | 21/12/2002              | HU4154            | 1 Count of present  |   |



## APPENDIX 2 Target Notes from the Phase 1 Habitat Survey

| TARGET NOTE REFERENCE NO.* | NATIONAL GRID REFERENCE | HABITAT NOTES   |
|----------------------------|-------------------------|---|
| 1                          | HU 42400<br>54850       | Blanket Bog. Towards the east side of the survey area there are frequent bare peat gully and micro-gully features. There is a lack of <i>Sphagnum</i> generally and this blanket bog is verging on wet modified bog in places. There is some variation in quality locally but generally <i>Racomitrium lanuginosum</i> is dominant over all <i>Sphagnum</i> species. The peat is generally over 1m deep.  |
| 2                          | HU 42100<br>54900       | Blanket Bog. Towards the west side of the survey area there is generally better quality blanket bog. There are <i>Sphagnum</i> species regularly present. There is less variation in quality and it is generally good but there are localised places where <i>Sphagnum</i> cover is less. The peat is generally over 1m in depth. There is evidence of recent localised trafficking by plant related to the wood pole electricity line and in localised areas this has resulted in barer peat areas and damage. |
| 3                          | HU 42100<br>54700       | Blanket Bog. There is blanket bog down to the road in most places but there are localised areas where there are re-vegetated gullies which contain drainage water at times moving down the slope. These consist of grasser damp areas with small localised patches of <i>Juncus effusus</i> in places. There are also old and recent peat cuttings in several places just above the road.   |
| 4                          | HU 42256<br>54956       | Shallow Bog Pool. This was the only bog pool seen in the study area. It was vegetated sparsely with <i>Sphagnum cuspidatum</i> with the rest of the pool bottom being bare peat.  |
| 5                          | HU 42249<br>54941       | Dry Modified Blanket Bog - Grassy Heath. This small area was very obviously different from the surrounding blanket bog. The peat is over a metre deep but <i>Erica cinerea</i> is present and the area looks semi-improved. There is mountain hare evidence and sheep grazing evidence. The area is c. south facing. It appears that the vegetation of this area has been altered over time by the grazing and enrichment from both species.  |
| 6                          | HU 42110<br>54800       | Wet Modified Blanket Bog. The peat is generally c. 1m in depth. There is evidence of recent heavy trafficking by plant related to the wood pole electricity line and in this area tracking has resulted in larger bare peat areas and significant damage.   |
| 7                          | HU 42027<br>54677       | Acid Grassland verging on semi-improved in places. There are indications of varying pH, although overall it is acidic there are indications of more neutral conditions very locally in places. This grassland immediately below the road is flushed with road drainage regularly and in wetter places contains small localised patches of marshy grassland/rush pasture. Although it is grassland dominated it does contain some bog species in places and is on deeper peat.                                   |
| 8                          | HU 41970<br>54835       | The road verges within the study area are locally varied. There is a ditch containing water on the upslope side (a cut-off drain). The vegetation is very varied as would be expected for this situation. The grassland is mainly acidic in nature but there are small patches which are verging on neutral grassland. There are also small gravel verges giving pioneer vegetation. No notable invasive species were recorded during this survey.  |

\* - See Figure 1 for Referenced Target Note Locations.

### APPENDIX 3 Phase 1 Plant List

| LATIN NAME                                    | COMMON NAME             |
|---|-------------------------|
| <i>Agrostis canina</i>                        | Velvet Bent             |
| <i>Agrostis capillaris</i>                    | Common Bent             |
| <i>Alchemilla vulgaris</i> agg.               | Lady's mantle           |
| <i>Anothoxanthum odoratum</i>                 | Sweet vernal-grass      |
| <i>Calluna vulgaris</i>                       | Common heather          |
| <i>Campylopus atrovirens</i>                  | Moss                    |
| <i>Campylopus introflexus</i>                 | Moss                    |
| <i>Cardamine pratensis</i>                    | Lady's smock            |
| <i>Carex nigra</i>                            | Common sedge            |
| <i>Carex panicea</i>                          | Carnation sedge         |
| <i>Carex viridula</i> subsp. <i>Oedocarpa</i> | Common yellow-sedge     |
| <i>Cladonia arbuscula</i>                     | Lichen                  |
| <i>Cladonia furcata</i>                       | Lichen                  |
| <i>Cladonia uncialis</i>                      | Lichen                  |
| <i>Cirsium palustre</i>                       | Marsh thistle           |
| <i>Cirsium vulgare</i>                        | Spear thistle           |
| <i>Dactylis glomerata</i>                     | Cock's-foot             |
| <i>Dactylorhiza maculata</i>                  | Heath spotted orchid    |
| <i>Dactylorhiza purpurella</i>                | Northern marsh orchid   |
| <i>Danthonia decumbens</i>                    | Heath-grass             |
| <i>Deschampsia flexuosa</i>                   | Wavy hair-grass         |
| <i>Dicranum scoparium</i>                     | Moss                    |
| <i>Diplophyllum albicans</i>                  | Liverwort               |
| <i>Epilobium palustre</i>                     | Marsh willowherb        |
| <i>Equisetum arvense</i>                      | Field horsetail         |
| <i>Equisetum palustre</i>                     | Marsh horsetail         |
| <i>Erica cinerea</i>                          | Bell heather            |
| <i>Erica tetralix</i>                         | Cross-leaved heath      |
| <i>Empetrum nigrum</i> ssp. <i>nigrum</i>     | Crowberry               |
| <i>Epilobium palustre</i>                     | Marsh willowherb        |
| <i>Eriophorum angustifolium</i>               | Common cottongrass      |
| <i>Eriophorum vaginatum</i>                   | Hair's-tail cottongrass |
| <i>Festuca ovina</i>                          | Sheep's fescue          |
| <i>Festuca rubra</i>                          | Red fescue              |
| <i>Galium saxatile</i>                        | Heath bedstraw          |
| <i>Heracleum sphondylium</i>                  | Hogweed                 |
| <i>Holcus lanatus</i>                         | Yorkshire fog           |
| <i>Huperzia selago</i>                        | Fir clubmoss            |
| <i>Hylocomium splendens</i>                   | Moss                    |
| <i>Hypnum jutlandicum</i>                     | Moss                    |
| <i>Juncus effusus</i>                         | Soft rush               |



| LATIN NAME                                | COMMON NAME        |
|---|--------------------|
| <i>Juncus squarrosus</i>                  | Heath rush         |
| <i>Kingbergia praelonga</i>               | Moss               |
| <i>Lophocolea bidentata</i>               | Liverwort          |
| <i>Luzula campestris</i>                  | Field wood-rush    |
| <i>Luzula multiflora</i>                  | Heath wood-rush    |
| <i>Molinia caerulea</i>                   | Purple moor-grass  |
| <i>Nartheceium ossifragum</i>             | Bog asphodel       |
| <i>Pinguicula vulgaris</i>                | Common butterwort  |
| <i>Plagiothecium undulatum</i>            | Moss               |
| <i>Plantago lanceolata</i>                | Ribwort plantain   |
| <i>Plantago maritima</i>                  | Sea plantain       |
| <i>Pleurozia purpurea</i>                 | Liverwort          |
| <i>Polygola serpyllifolia</i>             | Heath milkwort     |
| <i>Polytrichum commune</i>                | Moss               |
| <i>Polytrichum strictum</i>               | Moss               |
| <i>Potentilla erecta</i>                  | Tormentil          |
| <i>Prunella vulgaris</i>                  | Selfheal           |
| <i>Pseudoscleropodium purum</i>           | Moss               |
| <i>Ptilidium ciliare</i>                  | Liverwort          |
| <i>Racomitrium lanuginosum</i>            | Moss               |
| <i>Ranunculus repens</i>                  | Creeping buttercup |
| <i>Rhytidiadelphus loreus</i>             | Moss               |
| <i>Rhytidiadelphus squarrosus</i>         | Moss               |
| <i>Rumex acetosa</i>                      | Common sorrel      |
| <i>Rumex acetosella</i>                   | Sheep's sorrel     |
| <i>Scilla verna</i>                       | Spring squill      |
| <i>Sphagnum capillifolium</i> both subsp. | Sphagnum moss      |
| <i>Sphagnum cuspidatum</i>                | Sphagnum moss      |
| <i>Sphagnum denticulatum</i>              | Sphagnum moss      |
| <i>Sphagnum palustre</i>                  | Sphagnum moss      |
| <i>Sphagnum papillosum</i>                | Sphagnum moss      |
| <i>Sphagnum subnitens</i>                 | Sphagnum moss      |
| <i>Sphagnum tenellum</i>                  | Sphagnum moss      |
| <i>Trichophorum germanicum</i>            | Deergrass          |
| <i>Trifolium pratense</i>                 | Red clover         |
| <i>Viola palustris</i>                    | Marsh violet       |
| <i>Viola riviniana</i>                    | Dog violet         |

APPENDIX 4: NVC Quadrat Data

|                                    | GROUP  | SPECIES                                       |                     | QUADRATS (DOMIN)  |  |  |  |   |  |   |  |  |
|------------------------------------|--------|---|---------------------|---|--|--|--|---|--|---|--|--|
|                                    |        | Latin Name                                    | Common Name         | 1   | 2  | 3  | 4  | 5   | 6  | 7   | 8  | 9  |
| COMPOUND                           |        |   |                     | MAIN  | MAIN   | MAIN   | MAIN   | MAIN  | MAIN   | MAIN  | MAIN   | MAIN   |
| WAY POINT                          |        |   |                     | 1   | -  | 45   | 46   | 47  | 48   | 49  | 90   | 128  |
| NGR                                |        |   |                     | HU 42335 55057  | HU 42152 54951   | HU 41934 55203   | HU 42241 55177   | HU 42256 54956  | HU 42249 54941   | HU 42109 54807  | HU 42027 54677   | HU 41964 54757   |
| PHOTOS                             |        |   |                     | YES   | YES  | YES  | YES  | NO  | YES  | YES   | YES  | YES  |
| PEAT DEPTH (m)                     |        |   |                     | >1m   | >1m  | >1m  | >1m  | >1m   | >1m  | >1m   | >1m  | 80cm   |
| BARE PEAT                          |        |   |                     | 6   | None   | None   | 5  | 8   | None   | 10  | None   | None   |
| Description                        |        |   |                     | Mossy Degraded BB - bare peat (overgrazing) and high cover of woolly fringe-moss (see Averis Upland Key). Low Sphagnum. | Short Shrubby BB - impoverished probably due to being drier than typical, grazed, slightly wind-clipped. Modified - no Sphagnum. | Dwarf Shrub BB - still fairly species poor but better quality. Sphagnum present.   | Mossy Degraded BB - bare peat (overgrazing) and high cover of woolly fringe-moss (see Averis Upland Key). No Sphagnum. | Shallow bog pool  | Heathy and Grassy (SI by mountain hares and sheep). Degraded blanket bog - no Sphagnum. Dry modified bog.                | Eroded Bare Peat Area. This would have been M19 but has been repeatedly tracked by plant (probably during wood pole works) and is now largely bare peat. Very degraded. | Very mixed acid grassland sward which appears to have been influenced by peat drying from the road above. The peat is still deep and there are still bog plants present in places. | Damp flushed grassland - soft rush pasture   |
| National Vegetation Classification |        |   |                     | M17b - <i>Trichophorum cespitosum-Eriophorum vaginatum</i> blanket mire, <i>Cladonia</i> sub-community.                 | M19b - <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire, <i>Empetrum nigrum</i> ssp. <i>nigrum</i> sub-community.       | M19b - <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire, <i>Empetrum nigrum</i> ssp. <i>nigrum</i> sub-community. | M17b - <i>Trichophorum cespitosum-Eriophorum vaginatum</i> blanket mire, <i>Cladonia</i> sub-community.                | M2 - <i>Sphagnum cuspidatum/falla</i> x bog pool community (species-poor rather than a or b, closer to b) | H10c - <i>Calluna vulgaris-Erica cinerea</i> heath, <i>Festuca ovina-Anthoxanthum odoratum</i> sub-community (poor fit). | M20a - <i>Eriophorum vaginatum</i> blanket and raised mire, species-poor sub-community (poor fit).  | U4a - <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland, typical sub-community.   | MG10a - <i>Holcus lanatus-Juncus effusus</i> rush-pasture, typical sub-community. Not a good match and this is an unclassified category but MG10a is the closest to it (Je <sub>2</sub> ). |
| GWDTE SENSITIVITY                  |        |   |                     | None  | None   | None   | None   | None  | None   | None  | None   | Moderate   |
| PEAT/BOG CONDITION                 |        |   |                     | Eroded  | Slightly Eroded - recovering?  | Intact   | Eroded   | Intact  | Eroded - recovering.   | Severely Eroded   | Intact - n/a.  | Intact - n/a.  |
| VEGETATION CONDITION               |        |   |                     | POOR  | OK   | GOOD   | V. POOR  | GOOD  | GOOD   | V. POOR   | GOOD   | GOOD   |
|                                    | Plants |   |                     |   |  |  |  |   |  |   |  |  |
|                                    |        | <i>Agrostis canina</i>                        | Velvet Bent         |   |  |  |  |   |  |   |  | 2  |
|                                    |        | <i>Agrostis capillaris</i>                    | Common Bent         |   |  |  |  |   | 3  |   | 7  |  |
|                                    |        | <i>Anthoxanthum odoratum</i>                  | Sweet vernal-grass  |   |  |  |  |   | Nearby   |   | 4  | Nearby   |
|                                    |        | <i>Calluna vulgaris</i>                       | Common heather      | 3   | 8  | 9  | 5  |   | 5  | Nearby  | 3  |  |
|                                    |        | <i>Cardamine pratensis</i>                    | Lady's smock        |   |  |  |  |   |  |   | Nearby   | 3  |
|                                    |        | <i>Carex nigra</i>                            | Common sedge        |   |  |  |  |   | 3  |   | 2  |  |
|                                    |        | <i>Carex panicea</i>                          | Carnation sedge     | 3   |  |  | 3  |   |  |   |  |  |
|                                    |        | <i>Carex viridula</i> subsp. <i>Oedocarpa</i> | Common yellow-sedge |   |  |  |  |   | Nearby   |   |  |  |
|                                    |        | <i>Cirsium palustre</i>                       | Marsh thistle       |   |  |  |  |   |  |   |  | Nearby   |
|                                    |        | <i>Danthonia decumbens</i>                    | Heath-grass         |   |  |  |  |   | Nearby   |   |  |  |
|                                    |        | <i>Deschampsia flexuosa</i>                   | Wavy hair-grass     |   |  |  |  |   |  |   | 3  |  |
|                                    |        | <i>Epilobium palustre</i>                     | Marsh willowherb    |   |  |  |  |   |  |   |  | 3  |
|                                    |        | <i>Equisetum arvense</i>                      | Field horsetail     |   |  |  |  |   |  |   | 2  |  |

| GROUP         | SPECIES                            |                         | QUADRATS (DOMIN) |        |   |        |   |        |        |        |        |
|---------------|------------------------------------|-------------------------|------------------|--------|---|--------|---|--------|--------|--------|--------|
|               | Latin Name                         | Common Name             | 1                | 2      | 3 | 4      | 5 | 6      | 7      | 8      | 9      |
|               | Equisetum palustre                 | Marsh horsetail         |                  |        |   |        |   |        |        |        | Nearby |
|               | Erica cinerea                      | Bell heather            |                  |        |   | 4      |   | 4      |        |        |        |
|               | Erica tetralix                     | Cross-leaved heath      | 3                |        | 3 | 3      |   |        |        |        |        |
|               | Empetrum nigrum ssp. nigrum        | Crowberry               |                  | 4      | 3 |        |   |        |        |        |        |
|               | Epilobium palustre                 | Marsh willowherb        |                  |        |   |        |   |        |        |        | 3      |
|               | Eriophorum angustifolium           | Common cottongrass      |                  | 2      | 4 | 3      | 3 | 2      | 3      | 3      | Nearby |
|               | Eriophorum vaginatum               | Hair's-tail cottongrass | 5                | 5      | 5 | 5      |   |        | Nearby | Nearby |        |
|               | Festuca ovina                      | Sheep's fescue          |                  |        |   | Nearby |   |        |        | 3      |        |
|               | Galium saxatile                    | Heath bedstraw          |                  |        |   |        |   | 5      |        | 4      | 3      |
|               | Holcus lanatus                     | Yorkshire fog           |                  |        |   |        |   |        |        |        | 4      |
|               | Huperzia selago                    | Fir clubmoss            | 3                |        |   | 2      |   |        |        |        |        |
|               | Juncus effusus                     | Soft rush               |                  |        |   |        |   |        |        |        | 7      |
|               | Juncus squarrosus                  | Heath rush              |                  |        |   |        |   | 4      | Nearby | Nearby |        |
|               | Luzula multiflora                  | Heath wood-rush         |                  |        |   |        |   | 3      |        | 4      | 3      |
|               | Molinia caerulea                   | Purple moor-grass       |                  |        |   |        |   |        |        | 5      | 5      |
|               | Narthecium ossifragum              | Bog asphodel            | 3                |        |   | Nearby |   |        |        |        |        |
|               | Polygola serpyllifolia             | Heath milkwort          |                  |        |   | Nearby |   |        |        |        |        |
|               | Potentilla erecta                  | Tormentil               |                  |        |   |        |   | 3      |        | 4      | 3      |
|               | Ranunculus repens                  | Creeping buttercup      |                  |        |   |        |   |        |        |        | Nearby |
|               | Rumex acetosa                      | Common sorrel           |                  |        |   |        |   |        |        | Nearby | 2      |
|               | Rumex acetosella                   | Sheep's sorrel          |                  |        |   |        |   | Nearby |        | 3      |        |
|               | Trichophorum germanicum            | Deergrass               | 3                |        |   | 4      |   |        |        |        |        |
|               | Trifolium pratense                 | Red clover              |                  |        |   |        |   |        |        |        | Nearby |
|               | Viola riviniana                    | Dog violet              |                  |        |   |        |   |        |        | 1      |        |
|               |                                    |                         |                  |        |   |        |   |        |        |        |        |
| <b>Mosses</b> | OVERALL COVER                      |                         | 8                | 5      | 5 | 8      | 6 | 9      | 0      | 8      | 7      |
|               | Campylopus atrovirens              | Moss                    |                  |        |   | 2      |   |        |        |        |        |
|               | Campylopus introflexus             | Moss                    |                  |        |   | Nearby |   |        |        |        |        |
|               | Dicranum scoparium                 | Moss                    |                  | 1      | 3 |        |   | 4      |        |        |        |
|               | Hylocomium splendens               | Moss                    |                  | 5      | 3 |        |   | 8      |        | 8      | Nearby |
|               | Hypnum jutlandicum                 | Moss                    |                  | 3      | 4 |        |   |        |        |        |        |
|               | Plagiothecium undulatum            | Moss                    |                  |        | 3 |        |   |        |        |        |        |
|               | Polytrichum commune                | Moss                    |                  |        |   |        |   |        |        |        | 5      |
|               | Polytrichum strictum               | Moss                    |                  |        |   |        |   | Nearby |        |        |        |
|               | Pseudoscleropodium purum           | Moss                    |                  |        | 1 |        |   |        |        |        | 3      |
|               | Racomitrium lanuginosum            | Moss                    | 8                | Nearby |   | 8      |   | Nearby |        |        |        |
|               | Rhytidiadelphus loreus             | Moss                    |                  | 3      | 2 |        |   |        |        |        |        |
|               | Rhytidiadelphus squarrosus         | Moss                    |                  |        | 3 |        |   | 3      |        | 5      | 5      |
|               | Sphagnum capillifolium both subsp. | Sphagnum moss           | 2                |        | 5 |        |   |        |        | Nearby |        |
|               | Sphagnum cuspidatum                | Sphagnum moss           | Nearby           |        |   |        | 6 |        |        |        |        |
|               | Sphagnum palustre                  | Sphagnum moss           |                  | Nearby |   |        |   |        |        |        | 6      |
|               | Sphagnum papillosum                | Sphagnum moss           | Nearby           |        |   |        |   |        |        |        |        |
|               | Sphagnum subnitens                 | Sphagnum moss           | Nearby           |        |   |        |   |        |        |        |        |
|               | Sphagnum tenellum                  | Sphagnum moss           | Nearby           |        |   |        |   |        |        |        |        |

| GROUP      | SPECIES               |             | QUADRATS (DOMIN) |        |        |        |        |   |        |   |   |
|------------|-----------------------|-------------|------------------|--------|--------|--------|--------|---|--------|---|---|
|            | Latin Name            | Common Name | 1                | 2      | 3      | 4      | 5      | 6 | 7      | 8 | 9 |
|            |                       |             |                  |        |        |        |        |   |        |   |   |
|            |                       |             |                  |        |        |        |        |   |        |   |   |
|            |                       |             |                  |        |        |        |        |   |        |   |   |
| Liverworts |                       |             |                  |        |        |        |        |   |        |   |   |
|            | Diplophyllum albicans | Liverwort   |                  | Nearby | 3      |        |        |   |        |   |   |
|            | Lophocolea bidentata  | Liverwort   |                  |        |        |        |        |   |        |   | 3 |
|            | Pleurozia purpurea    | Liverwort   | 3                |        |        | Nearby |        |   |        |   |   |
|            |                       |             |                  |        |        |        |        |   |        |   |   |
|            |                       |             |                  |        |        |        |        |   |        |   |   |
| Lichens    | OVERALL COVER         |             | 0                | 0      | 0      | 2      | 0      | 1 | 0      | 0 | 0 |
|            | Cladonia arbuscula    | Lichen      | Nearby           |        |        | 1      |        |   |        |   |   |
|            | Cladonia furcata      | Lichen      | Nearby           |        |        |        | Nearby |   |        |   |   |
|            | Cladonia uncialis     | Lichen      | Nearby           |        | Nearby | 2      |        | 1 | Nearby |   |   |



