

3 Design Iterations and the Proposed Development

Contents

3.1	Introduction	3-1
3.2	Design Iterations from 2020 Layout to 2021 Layout	3-1
3.3	Description of the Proposed Development	3-4
3.4	Construction	3-6
3.5	Operation and Decommissioning	3-6

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3 Design Iterations and the Proposed Development

3.1 Introduction

- 3.1.1 This chapter presents a description of the changes to the design of the Proposed Development, from the 23 turbine layout assessed in the 2020 Supplementary Environmental Information (SEI) (referred to as the '2020 Layout') to the currently proposed 18 turbine layout (referred to as the '2021 Layout'). These changes are proposed in response to comments received from consultees (refer to Chapter 2). This chapter then provides a summary description of the Proposed Development for which the Applicant is now applying for consent.
- 3.1.2 Chapter 2 of the 2019 EIA Report provides a description of all the design iterations that were undertaken before arriving at the 2019 Layout (the 29 turbine layout assessed within the 2019 EIA Report). This included a reduction in turbines, from an original 63 to 29, and multiple amendments to the turbine and infrastructure locations to minimise the environmental effects of the Proposed Development.
- 3.1.3 Chapter 3 of the 2020 SEI provided a summary of the further design iterations made as part of the 2020 Layout. Both should be read in conjunction with this chapter, although a broad summary of the design principles applied to minimise the environmental impact and/or address stakeholder concerns has been summarised in this chapter.
- 3.1.4 The 2019 Layout is shown in the 2019 EIA Report Figure 1.2, the 2020 Layout is shown in the 2020 SEI Figure 3.4, and the 2021 Layout is shown in SEI 2 Figure 1.1. Figure 3.1 of this SEI 2 shows the evolution of the turbine layout from the 2019 Layout through to the current 2021 Layout and Figure 3.2 provides a detailed comparison of the 2020 Layout and the 2021 Layout.

3.2 Design Iterations from 2020 Layout to 2021 Layout

- 3.2.1 The Proposed Development that is considered and described within the 2020 SEI has changed following consideration of consultee objections and/or comments. The site boundary remains unchanged. As described above, design iterations prior to the 2020 Layout¹ are described in detail in Chapter 2 of the 2019 EIA Report (layout iterations A-J) and Chapter 3 of the 2020 SEI (layout iterations K-M).

Layout N

- 3.2.2 In December 2020, following consideration of the comments received from NatureScot and Shetland Island Council (SIC) in response to the 2020 SEI, regarding the visual impact of the 2020 Layout on the Shetland National Scenic Area (NSA), the Applicant proposed to remove turbines T5, T6, T8, T9 and T10 from the layout. The associated tracks, hardstandings and borrow pit H were also removed. The Applicant also proposed for all remaining turbines to be set at 180 m tip height.
- 3.2.3 This 18 turbine layout ('Layout N') was presented in indicative wirelines to NatureScot in February 2021, who advised that they considered this layout to have "*the potential to mitigate the effect of the wind farm on the immediate coastal character of Yell, which in turn contributes to the experience of NSA special landscape qualities.*" and that they "*consider there to be merit in assessing this layout*" (NatureScot, March 2021.).

¹ It should be noted that the 2019 EIA Report reports 10 layout changes culminating in Layout J which is the 2019 Layout upon which the 2019 EIA Report was undertaken. The 2020 SEI reports on three further layout changes, culminating in Layout M which is the 2020 Layout upon which the 2020 SEI was undertaken. The design iterations in this chapter therefore begin at Layout N.

Layout O (2021 Layout)

- 3.2.4 During discussions in December 2020, Scottish Environment Protection Agency (SEPA) advised that the Applicant should look at minimising the requirement for borrow pits and thus minimise impacts on peatland habitat across the site. As noted above, the design iteration presented in February 2021 included the removal of borrow pit H as well as the removal of five turbines and associated infrastructure. This resulted in a substantial reduction in anticipated volumes of peat to be excavated.
- 3.2.5 The Applicant also undertook a detailed engineering review of Layout N in June 2021 to determine whether any further amendments could be made to optimise the layout while minimising impacts on peatland habitat. This review presented an alternative layout ('Layout O') which presented minor revisions to the 2020 Layout infrastructure.
- 3.2.6 The amendments from the 2020 Layout to Layout O (including the amendments made through Layout N) are detailed below:
- Removal of 5 turbines (T5, T6, T8, T9, and T10), including removal of associated tracks and hardstandings (as detailed in paragraph 3.2.2 above);
 - All 18 remaining turbines set at 180m tip height (with 10 of the 18 turbines reducing from 200m to 180m);
 - Relocation of 4 turbine hardstandings at T16, T19, T25, and T27 to minimise earthworks and optimise approach by abnormal loads during construction;
 - Reduction and refinement of all turbine hardstandings to reduce their overall area;
 - Removal of crane area at T16 hardstanding to avoid encroaching into a watercourse buffer. It is proposed that the crane assembly area at a neighbouring turbine will be utilised and the crane transported on site to T16;
 - Removal of 3 borrow pits search areas – B, F, and H – plus associated tracks, following re-evaluation of aggregate requirements and to minimise impacts on peat deposits;
 - Refinement in size of 4 borrow pit search areas – A, D, C, and E – to utilise areas of low peat depth while maintaining a peat balance;
 - Revised location of construction compound 2 (CC2) following engineering review of location;
 - Realignment of track whilst minimising track footprint:
 - from existing track north to T19 to avoid deep peat deposits while following topography and improving abnormal load access to T19 and T20;
 - from T17 to T21 to better follow topography;
 - from T26, past T27 to T28 to better align with topography;
 - at T15 to improve corner alignment;
 - leading up to T22 to better follow topography; and
 - spur to T25 for improved access.
 - Revision of proposed floating and excavated track following a detailed consideration of topography and engineering limitations;
 - Additional track from T23 to T24 past borrow pit search area C to improve geometry for abnormal load access;
 - Revision of junction at T13 to minimise impacts to sensitive habitats and peat;

- Widening of junction at T19 to improve abnormal load access west;
- Addition of 1 turning head north of T28;
- Width of main spur road increased to 6m as required for abnormal load access;
- Widening of junction at CC2/Substation Access to include a standard turning radius; and
- Widening of secondary spurs to 5m wide.

3.2.7 This Layout O is the layout taken forward and referred to throughout this SEI 2 as the 2021 Layout of the Proposed Development, and which is assessed within SEI 2. This layout is summarised in Section 3.3 below and shown in Figure 1.1.

Summary of changes to Infrastructure Design

3.2.8 A summary of the key changes is provided in Table 3.1 below. Figure 3.1 shows the evolution of the turbine layout from the 2019 Layout through to the current 2021 Layout. Figure 3.2 provides a more detailed comparison of the 2020 Layout with the 2021 Layout.

Table 3.1 – Summary of Differences between 2019 Layout, 2020 Layout and 2021 Layout

Infrastructure	2019 Layout	2020 Layout	2021 Layout
Maximum number of turbines	29	23	18
Maximum height of turbines	29 turbines 200 m to tip	9 turbines 180 m to tip and 14 turbines 200 m to tip	18 turbines 180m to tip
Number of borrow pit search areas	Nine	Seven	Four
Number of meteorological masts	One	One	One
Number of construction compounds (including substation construction compound)	Four	Three	Three
Length of new permanent floated access track	18.35 km	12.5 km	8.4 km
Length of new permanent dug access track	1.75 km	990 m	2.2 km
Length of new temporary floated access track	980 m	720 m	160 m

Infrastructure	2019 Layout	2020 Layout	2021 Layout
Length of upgraded existing track	1.05 km	1.05 km	630 m
<i>Total length of proposed access track</i>	<i>22.1 km</i>	<i>15.3 km</i>	<i>11.4 km</i>
<i>Overall Footprint</i>	<i>483,209 m²</i>	<i>383,518 m²</i>	<i>279,327 m²</i>

3.3 Description of the Proposed Development

3.3.1 The Proposed Development comprises 18 wind turbines of up to a maximum 180 m height from ground to blade tip when vertical. The overall capacity of the Proposed Development (subject to turbine procurement) will be approximately 126 MW, but would not exceed 200 MW. A number of ancillary elements are also proposed, including the following:

- three temporary construction compounds (1, 2, and substation);
- permanent hardstandings adjacent to the wind turbines for maintenance and decommissioning cranes;
- temporary laydown areas adjacent to the wind turbines;
- external transformers;
- internal access tracks;
- an abnormal loads access junction off the A968;
- underground cables between turbines;
- an on-site substation and maintenance building;
- a permanent meteorological monitoring mast; and
- four potential temporary borrow pit search areas.

3.3.2 The Proposed Development site layout is shown in Figure 1.1.

3.3.3 The proposed final locations of the turbines have been defined in order to enable SEI 2 to describe and assess fully the Proposed Development for which consent is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Table 3.2 below. This table is an update of Table 3.2 within the 2020 SEI. It should be noted that, for ease of cross-referencing, the turbines have not been re-numbered. The Applicant is seeking a 100 m micro-siting allowance, as detailed in the 2019 EIA Report.

Table 3.2 Maximum Turbine Height and Coordinates

Turbine	Height (m)	Easting	Northing
T11	180	449777	1201270
T12	180	449088	1200632
T13	180	449752	1200772

Turbine	Height (m)	Easting	Northing
T14	180	449368	1200263
T15	180	449961	1200325
T16	180	450428	1200150
T17	180	450396	1201116
T18	180	450606	1200678
T19	180	451071	1200336
T20	180	451554	1200185
T21	180	450563	1201645
T22	180	451005	1201521
T23	180	451298	1200900
T24	180	451800	1200817
T25	180	451594	1201485
T26	180	451762	1202249
T27	180	451323	1202379
T28	180	451037	1202718

3.3.4 Following consultation with, and subsequent approval from, the Civil Aviation Authority (CAA) and the Ministry of Defence, the Applicant proposes a reduced aviation lighting scheme whereby the peripheral turbines will be lit with medium intensity, visible, aviation lighting and infrared lights for military and rescue aviation purposes. Further details can be found in Appendix 13.1.

3.3.5 The turbine foundations, crane hardstanding areas, and new access tracks have been refined from those proposed in the 2019 EIA Report and 2020 SEI through the detailed engineering review discussed in Section 3.2 above. The following refined dimensions are proposed within the 2021 Layout:

- turbine foundations would be approximately 15 m in diameter;
- permanent hardstanding areas would measure approximately 30 m wide by 60 m long;
- temporary turbine laydown and crane assembly areas will measure approximately 25 m wide by 80 m long;
- new access tracks within the site boundary will be up to a maximum width of 6 m; and
- approximately 23 new watercourse crossings will be required, seven less than the 30 new crossings required for the 2020 Layout.

3.3.6 All other details of the Proposed Development infrastructure, following the removal of infrastructure noted in Section 3.2 above, will be as detailed in Chapter 3 of the 2019 EIA Report.

3.4 Construction

3.4.1 The outline construction methodology for the Proposed Development will be as summarised in Chapter 3 of the 2019 EIA Report and Chapter 3 of the 2020 SEI. The 2021 Layout does not necessitate any significant changes to the proposed outline construction methodology.

3.5 Operation and Decommissioning

3.5.1 Operation and decommissioning of the Proposed Development will be as summarised in Chapter 3 of the 2019 EIA Report.

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