

2 Site Selection & Design Iteration

Contents

2.1	Introduction	2-1
2.2	Background	2-1
2.3	Site Selection and Alternatives	2-1
2.4	Design Process	2-2
2.5	Summary	2-4

This page is intentionally blank.

2 Site Selection & Design Iteration

2.1 Introduction

2.1.1 This chapter describes the site identification and design iteration process which has been undertaken by the Applicant prior to arriving at the final design, described in **Chapter 3**.

2.2 Background

2.2.1 The Applicant proposes to construct the Proposed Development within the Orkney Islands Council (OIC). The principles of the EIA process, that site selection and project design should be an iterative constraint-led process, have been followed as part of the Proposed Development. This has ensured that potential negative impacts, as a result of the Proposed Development, have been avoided or minimised as far as reasonably possible.

2.3 Site Selection and Alternatives

2.3.1 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 state that the EIA Report must include *“A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects”* (Schedule 4.2) (Scottish Government, 2017).

2.3.2 The landowners of Nisthouse and Ludenhill Farm approached Infinergy with the proposal of developing a wind farm on their land. Based on this, alternative sites have not been considered in the case of the Proposed Development and so the matter is not considered further in the EIA Report.

2.3.3 The main alternatives including design, turbine specification, location, size and scale have been considered for the Proposed Development. This chapter explores these options and explains how the final design of the Proposed Development has evolved.

Location

2.3.4 The Proposed Development is located approximately 5km east of Birsay and borders Loch of Swannay on Orkney at site centre British National Grid (BNG) HY 30393 27104.

2.3.5 In order to identify a suitable site, the following technical and environmental factors that influence the feasibility of a potential wind farm were taken into account:

- Initial desk-based studies and onsite wind data suggest that there is likely to be sufficient wind resource, and the site is available for wind energy development;
- Suitable terrain and topography for a wind energy development;
- Available options to connect the Proposed Development to the electricity grid;
- Site access suitability for the delivery of turbine components, such as the blades;
- Military and Aviation constraints;
- Environmental constraints such as ecology, archaeology, hydrology etc;
- Health and Safety requirements such as stand offs from public roads;
- Underground and overground services such as pipelines and telecommunication links;
- Appropriate ground conditions; and
- Cumulative effects with other wind farm developments.

2.4 Design Process

Design Principles

- 2.4.1 In an EIA, the identification of constraints should continue throughout the design process as more detailed surveys reveal additional constraints to development. In this way, the findings of the technical and environmental studies can be used to inform the design of a development, and hence achieve a ‘best fit’ within the environment of the Proposed Development.
- 2.4.2 The Applicant adopted the following principles during the design iteration process to ensure the final design of the Proposed Development was the most suitable for the site:
- Avoided locating turbines on the highest points of the site to minimise visibility;
 - Respected cultural heritage constraints;
 - Limited impact on protected habitats where possible;
 - Proximity from Hoy and West Mainland National Scenic Area (NSA); and
 - Maximised the potential electricity generation of renewable energy.
- 2.4.3 The design of any development is driven by the key objective of positioning turbines so that they capture the maximum energy possible within a suitable area further informed by environmental and technical constraints. All site constraints are discussed in more detail in **Chapter 3** and are shown in **Figure 3.1**.
- 2.4.4 It is important to note that the identification of a constraint does not necessarily result in the exclusion of that area from the potential development envelope; rather it means that careful thought and attention was paid to the constraint and the design altered appropriately. The key constraints considered during the design process included:
- Landscapes and visual constraints;
 - Presence of cultural heritage features;
 - Location of residential receptors;
 - Presence of protected habitats; and
 - Location of existing small scale turbines.
- 2.4.5 The identification of constraints continued throughout the design evolution process as more detailed surveys refined the development envelope.
- 2.4.6 A description of how the various environmental and technical disciplines have contributed to the design through detailed assessment is described below. Information in respect of the survey work undertaken is provided in the technical chapters of this EIA Report.

Layout Evolution

- 2.4.7 There have been four design iterations for the Proposed Development with layout four being the final iteration. The key evolutions to the layout have been highlighted below:
- Layout 1: was the initial layout with four turbines up to 180 m tip height based on known site constraints at the time.
 - Layout 2: sees the site tracks adjusted based on the on-site constraints and requirement for cut and fill. The number of turbines, location and scale remained the same as the initial layout.
 - Layout 3: sees the inclusion of the site infrastructure and reduce impact on cultural heritage features. The number of turbines, location and scale remained the same as the initial layout.

- Layout 4: sees the site access tracks adjusted to minimise the requirement for cut and fill and impact on the cultural heritage features as well as landscape and visual impacts from key receptors.

Other Site Infrastructure

Site Access and Site Tracks

- 2.4.8 The proposed access to the site has been carefully considered throughout the design process. It is proposed all components including blades will be transported from Haston Pier near Kirkwall, Orkney and continue to the proposed site entrance via Hundland Road. The blade components would be moved to site under escort. The public road network would be utilised for the full delivery route.
- 2.4.9 The site tracks have been designed to follow a route which minimises the landscape and visual impacts, cultural heritage impacts and excessive gradients to ensure the safe delivery of turbine components and associated parts.

Borrow Pits

- 2.4.10 Borrow pits are required as a source of rock to be used in the construction of the site tracks, hardstandings and foundations. There is an existing borrow pit within the site boundary. Following a geological review, it is proposed to expand the existing borrow pit for the Proposed Development.
- 2.4.11 During design optimisation, the locations of infrastructure and track design was refined to minimise the volume of earthworks and cut and fill required to construct the Proposed Development. The total number and size of borrow pits was selected to meet the estimated volume of rock required to construct the tracks, hardstandings and foundations.
- 2.4.12 If the Proposed Development was consented, further intrusive geotechnical investigation would be carried out to identify which of the five borrow pit locations would yield the required quality of rock for each aspect of the infrastructure. It is likely that not all five borrow pits would be needed, but this gives flexibility in case there is low yield identified at any location.

Temporary Construction Compounds

- 2.4.13 The temporary construction compounds have been located with the aim of limiting the effects on sensitive habitats and cultural heritage features. Steep areas have been avoided to reduce the requirement for cut and fill. The construction compounds have also been located for practical purposes; to control traffic entering the site, to be located close to turbines and borrow pit and to facilitate construction of the substation.

Substation

- 2.4.14 The substation will be located to the north-west of the site and at the site entrance to minimise proximity to the electricity network.

Micrositing

- 2.4.15 To be able to address any localised environmental sensitivities, unexpected ground conditions or technical issues that are found during detailed intrusive site investigations and construction, it is proposed that agreement is sought for a 50 m micrositing allowance around the wind farm infrastructure with the exception of Turbine 3. It is proposed Turbine 3 would have a 125 m micrositing allowance to avoid infringements on the EE telecommunications link traversing the north-eastern section of the site. The technical assessments (presented in **Chapters 6 to 15**) have considered the potential for micrositing (including 125 m at Turbine 3) and it is considered that the proposed infrastructure could be microsited without resulting in potential new effects. During construction, the need for any micrositing would be assessed and agreed with the onsite Environmental Clerk of Works (ECoW) and Archaeological Clerk of Works (ACoW).

2.5 Summary

- 2.5.1 The EIA Report is based on the final layout selected for the Proposed Development, as described in detail in **Chapter 3**. The final layout comprises four turbines at heights of up to 180 m, crane hardstandings, substation, construction compounds, borrow pit search area and site tracks.
- 2.5.2 The final Proposed Development layout has been informed by a robust design iteration process, taking into account potential environmental, landscape and visual impacts and their effects, physical constraints, and health and safety considerations. The information used to inform the design iteration process included baseline data, review of preliminary visualisations, ongoing impact assessments and wind yield optimisation.
- 2.5.3 The EIA process has been an iterative one, so that potential effects identified throughout the EIA and design process could be avoided and overall impacts of the Proposed Development avoided or reduced.
- 2.5.4 The assessment of potential effects of the Proposed Development is addressed in **Chapters 6 to 15** of the EIA Report. The residual effects after mitigation and good practice have been applied are provided in each relevant technical chapter and are summarised within **Chapter 17**.