

3. Evolution of Design and Alternatives

3.1 Introduction

- 3.1.1 The purpose of this chapter is to provide a description of the reasonable alternatives studied by the Applicant, in accordance with Regulation 5(2)(d) of the EIA Regulations.
- 3.1.2 Regulation 5(2)(d) of Part 1 of the EIA Regulations states that an EIAR should include "*a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*".
- 3.1.3 The Institute of Sustainability and Environmental Professionals (ISEP) identify good practice for the consideration of alternatives¹, which includes:
- considering alternatives early in the design process;
 - ensuring alternatives are objective and logical;
 - outlining how a project has involved since inception;
 - comparing the alternatives considered, the significance of effects and identifying the main reasons for the preferred choice; and
 - explaining the reasons for not selecting alternative options.
- 3.1.4 In accordance with the requirements of the EIA Regulations and ISEP good practice, this chapter of the EIAR explores the following key themes:
- Site Selection;
 - Key design considerations;
 - Design Evolution and Alternatives;
 - Mitigation by Design.
- 3.1.5 This chapter is supported by the following figures:
- Figure 3.1 – Key Environmental Constraints
 - Figure 3.2 – Design Evolution
- 3.1.6 The Design Statement submitted as part of the s.36 application package for the Proposed Development complements this chapter and provides more detailed information on the design evolution of the Proposed Development.

¹ • ISEP (2025) Considering alternatives during the EIA process. [online] Available at: <https://www.isepglobal.org/articles/considering-alternatives-during-the-eia-process> [Accessed 04/08/2025]

- 3.1.7 Reference is made in this chapter to the Main Development Area (MDA), which is the area where proposed turbine infrastructure, battery energy storage facility and main ancillary infrastructure is located. **Figure 1.2** provides details of the MDA location and extent.

3.2 Site Selection and Context

- 3.2.1 The Development Site is located approximately 13 km northwest of Alness and 3.5 km north of Loch Morie. The Development Site is shown on **Figure 1.1**.
- 3.2.2 The Development Site was identified by the Applicant following a detailed review of a range of technical, environmental, planning, and commercial factors for site selection, resulting from preliminary desktop reviews, site-specific wind resource assessments and site walkovers.
- 3.2.3 These are summarised in **Table 3.1**, alongside the reasoning as to why the Development Site was selected to move forward.

Table 3.1 Factors Considered

Factors	Considerations
Wind Resources	The Development Site has very good wind resources with consistently high wind speeds (>7 m/s).
Accessibility	The MDA is served by an existing 12 km forestry track (the 'Existing Forestry Access Track'). This will avoid the need for the construction of a completely new access track.
Electrical grid connection	Close proximity to the transmission connection point (Fyrish Substation is located approximately 15 km from the MDA).
Land use	The Development Site includes land currently used for commercial forestry as well as areas directly adjoining these operations. Because this land has already been subject to modification, it offers an opportunity to utilise existing forestry roads and infrastructure, which can substantially lower construction costs and minimise additional environmental impacts.
Residential receptors	The residential receptors in close proximity to the Development Site are shown on Figure 4.11 . The closest receptor to the MDA, Sonraichte, Kildermorie Estate, is located approximately 2.5 km from the MDA and 3.1 km to the southwest of the closest turbine (T11). There are two residential receptors within the southern extents of the Development Site but outside of the MDA at Inchlumpie. Due to these distances, noise, vibration, air quality and visual impacts from the Proposed Development on sensitive receptors are limited.
Ecological and Geological Designations	The Development Site is 3.27 km away from the nearest ecologically or geologically designated sites.
Heritage Receptors	The baseline data demonstrates that the Development Site has not been subject to extensive permanent settlement activity or exploitation from the prehistoric period onwards due to its marginal nature (i.e. exposed upland bog), therefore its archaeological potential is considered to be low.

Factors	Considerations
Peatland Habitat Conditions	A large portion of the peatland habitats within the MDA comprises actively eroding, drained and modified peatland, therefore the Proposed Development would limit disturbance of functioning bogs and provide an opportunity for habitat enhancements.

3.3 Key Design Considerations

Overview

- 3.3.1 Following site selection and establishing the MDA, the design of the Proposed Development as reported and assessed within this EIAR is the result of approximately 14 months of design work. The EIA process is integral to the iterative design development, and the identification of opportunities to avoid or mitigate potential environmental effects have been explored through changes to the design.
- 3.3.2 This section identifies the key considerations which have influenced the iterative design development.

Site Planning History

- 3.3.3 An application for Glenmorie Wind Farm (11/04134/S36) was previously made on an area overlapping with the southern section of the MDA. The application was for a wind farm with 34 turbines (amended from 43) located across a 2,208 ha site and included 31.9 km of new access tracks. The new access track would have connected with the A836 to the north of the development, passing through the landscape adjacent to the Wester Fearn Burn and a section of the Dornoch Firth National Scenic Area (NSA).
- 3.3.4 The proposed turbines were to be located to the southwest of the Abhainn Glac an t-Seilich. Of these turbines, 16 were located outside of what is now the MDA to the south towards Kildermorie.
- 3.3.5 The application was refused in August 2015 due to landscape and visual considerations; including impacts on the *“wilderness qualities of wild land in the area around the development”* in the *“context of the new SPP (Scottish Planning Policy)”*.
- 3.3.6 As detailed in the following sections, design considerations for the Development Site, cognisant of the site history of Glenmorie Wind Farm, have been taken, including landscape and visual choices to minimise the nature and extent of potential landscape and visual effects.

Consultation

- 3.3.7 An extensive consultation exercise has been undertaken as part of the iterative design process in order to engage with statutory and non-statutory consultees, local communities and stakeholders.

- 3.3.8 An EIA Scoping Opinion was sought from the ECU in August 2024 on the environmental information to be provided in this EIAR. Since the EIA Scoping Opinion² was issued on 28 October 2024, dialogue has been ongoing between various members of the EIA team and consultees. Where this consultation is specific to the technical approach taken by a certain discipline, it will be detailed in the consultation section of the relevant technical chapter of this EIAR.
- 3.3.9 In addition to the ad hoc engagement with stakeholders, pre-application consultation has taken place with THC, which involved input from various THC Officers (including the Case Officer, planning, development planning, contaminated land, environmental health, ecology and flood risk), as well as NatureScot, the Scottish Environment Protection Agency (SEPA), Historic Environment Scotland and Transport Scotland. A meeting was held on 23 January 2025 and written pre-application advice was issued by THC on 27 February 2025 summarising all that was discussed.
- 3.3.10 Two rounds of public consultation have been held for this project in October 2024 and April/May 2025. These events allowed local stakeholders to meet with the project team to discuss the proposal in more detail.
- 3.3.11 Further details of this consultation can be found in **Chapter 5: Consultation**. Details of the Public Exhibitions and other consultation with the community are provided in the Pre-Application Consultation (PAC) Report. The PAC Report, a requirement for all major developments and details how a developer consulted with the public and stakeholders before submitting a planning application, supports this s.36 application.

Environmental Constraints and Opportunities

- 3.3.12 The EIA process is integral to the iterative design development process which has been informed by a range of surveys and stakeholder engagement.

Constraints

- 3.3.13 The key environmental constraints within the Development Site are listed below and are illustrated on **Figure 3.1**:
- Areas of peatland (including Class 1 designated peatland) within the Development Site.
 - Watercourses crossing the Development Site;
 - Terrestrial ecology and ornithology buffers;
 - The Rhiddoroch - Beinn Dearg - Ben Wyvis WLA encroaching into the norther portion of the Development Site;
 - Areas of Long established Woodland of Plantation Origin (LEPO) as designated within the Ancient Woodland Inventory, present along the proposed access track route; and

²: [Scottish Government - Energy Consents Unit - Application Details](#)

- The Dornoch Firth NSA, located 8.5 km northeast at its closest point from the Development Site.

3.3.14 These constraints have been key considerations in guiding the design evolution of the Proposed Development.

Opportunities

3.3.15 In addition to the constraints considered above, there are also the following opportunities identified within the Development Site:

- The Proposed Development forms part of the transformational change to energy generation which is underway in response to the net zero targets set by 2045 in Scotland and 2050 in the UK as part of their commitments to tackling climate change and the ambitious renewable energy growth target set by the Scottish Government, which includes reaching 12 GW of additional onshore wind capacity by 2030³.
- The Development Site encompasses land currently used for commercial forestry, as well as areas directly adjoining these operations. Because this land has already been altered, it offers an opportunity to utilise the Existing Forestry Access Track, which can substantially lower construction costs and minimise additional environmental impacts.
- The Development Site comprises of peatland habitat. The Peatland Condition Assessment (**Appendix 8.5**) indicated that a large proportion of the peatland habitats within the Surveyed Area comprises actively eroding, drained and modified peatland. Therefore, there would be an opportunity to undertake peatland restoration as part of the proposed habitat management.
- The restoration of the peatland habitats identified within **Appendix 8.6 Outline Habitat Management Plan**, will likely result in an increase in the extent of suitable breeding and foraging habitat within and around the MDA for moorland bird species recorded during baseline surveys, including breeding waders (dunlin, golden plover and greenshank), merlin, hen harrier and golden eagle.

Planning Policy

3.3.16 NPF4 is a key consideration for the design evolution of the Proposed Development. NPF4 is designed to support Scotland's commitment of reaching net zero emissions by 2045 and thereby tackle the climate emergency. It is of direct relevance to wind farm developments in Scotland.

3.3.17 A Planning Statement is provided as part of this s.36 application and demonstrates how the Proposed Development aligns with national and local planning policy. **Table 3.2** sets out the key policies relevant to the design evolution of the Proposed Development.

³ Scottish Government (2023) Draft Energy Strategy and Just Transition Plan – delivering a fair and secure zero carbon energy system for Scotland. Available at: <https://www.gov.scot/publications/draft-energy-strategy-transition-plan/documents/> [Accessed 04/08/2025]

Table 3.2 Key NPF4 Policy Considerations to Design Evolution

Policy	Policy Intent	Relevance
Policy 1 Tackling the climate and nature crises	To encourage, promote and facilitate development that addresses the global climate emergency and nature crisis.	The principle of the Proposed Development is to support the transition to net zero emissions in order to address the global climate emergency (Paragraph 3.3.15).
Policy 3 Biodiversity	To protect biodiversity, reverse biodiversity loss, deliver positive effects from development and strengthen nature networks.	The Proposed Development has been designed and sited to minimise impacts on biodiversity, including important habitats such as peatland. There will be permanent biodiversity enhancement delivered as part of the Proposed Development. (Paragraph 3.3.15).
Policy 4 Natural Places	To protect, restore and enhance natural assets making best use of nature-based solutions.	The Proposed Development has been designed and sited to minimise its visual and physical impact as far as practicable. Several turbines have been removed following Scoping or repositioned lower into the valley in order to reduce their visual impact (Section 3.4).
Policy 5 Soils	To protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development.	Informed by two phased peat probing surveys (Chapter 13: Geology, Hydrology, Hydrogeology and Peat), the Proposed Development has been sited to minimise impacts on Class 1 peat as far as possible. Peatland restoration is also planned (see Appendix 8.6).
Policy 6 Forestry, Woodland and Trees	To protect and expand forests, woodland and trees.	Impacts on forestry have been minimised as far as possible by accessing the Development Site via the Existing Forestry Access Track (Paragraph 3.3.15).
Policy 7 Historic Assets and Places	To protect and enhance historic environment assets and places.	The Proposed Development has been developed to minimise visual impact on the setting of heritage assets. Several turbines have been removed following Scoping or repositioned lower into the valley in order to reduce their visual impact (Table 3.1).

Policy	Policy Intent	Relevance
Policy 11 Energy	To encourage, promote and facilitate all forms of renewable energy development onshore and offshore. This includes energy generation, storage, new and replacement transmission and distribution infrastructure and emerging low-carbon and zero emissions technologies including hydrogen and carbon capture utilisation and storage.	The principle of the Proposed Development is supported by Policy 11.
Policy 12 Zero Waste	To encourage, promote and facilitate development that is consistent with the waste hierarchy.	The use of borrow pits within the Development Site reduces waste at source through excavating and using only the material required for construction, thus minimising surplus material, reducing the need for imported materials, and supports efficient use of resources in line with the waste hierarchy..
Policy 22 Flood Risk and Water Management	To strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding. Development proposals should not increase the risk of surface water flooding to others, or itself be at risk. In addition, all rain and surface water should be managed through Sustainable Urban Drainage Systems.	As indicated in Section 3.4 , the Proposed Development has been designed to ensure that the effects on flood risk have been reduced through: adherence to 50 m offsets from watercourses; a commitment to designing watercourse crossings to accommodate a 1:200 year flood event; the use of 100 m micro-siting buffers post-consent, where a risk is retained; and designing access tracks across the Proposed Development considering runoff. Suitable drainage solutions will be confirmed at detailed design stage.

3.4 Design Evolution and Alternatives

Overview

- 3.4.1 As mentioned in **Section 3.3**, the design of the Proposed Development, as reported and assessed within this EIAR, is the result of approximately 14 months of design development. The EIA process is integral to the iterative design development process which has been informed by a range of surveys and stakeholder engagement.
- 3.4.2 Many measures have been incorporated into the design of the Proposed Development to prevent, reduce or offset significant adverse effects as discussed further below. In some

cases, as the design has evolved, it has been possible to ‘design out’ significant effects on / resulting from the key design considerations identified in **Section 3.3**.

3.4.3 The following environmental surveys were carried out between March 2022 and May 2025⁴ and have fed into the design development:

- General environmental site walkover;
- Landscape and visual (**Chapter 6**);
- Cultural heritage (**Chapter 7**);
- Ecology (**Chapter 8**);
- Ornithology (**Chapter 9**);
- Noise (**Chapter 10**);
- Transport, Traffic and Access (**Chapter 11**);
- Forestry (**Appendix 4.3**);
- Hydrology and hydrogeology (including peat probing) (**Chapter 13**).

3.4.4 **Table 3.3** and **Table 3.4** provide an overview of the key changes made to the design of Creachan Wind Farm and the main reasons these changes were made. This is to illustrate why each layout has been replaced by an alternative with improved environmental effects.

3.4.5 The final layout, Design Freeze Refinement, represents the layout shown in **Figure 3.1** for which consent is being sought, and which is described within **Chapter 4: Project Description** and assessed in **Chapters 6 to 15**. Further information on each layout can also be found in the Design Statement.

EIA Scoping Layout

3.4.6 The early design process was guided by the environmental information available at the time for the Development Site. This information included, for example, watercourse locations, local topography and the location of landscape designations, forestry and ornithological constraints.

3.4.7 At early design stage, an area referred to as Wind Turbine Zone (WTZ) was initially identified for the location of the turbine infrastructure (**Figure 3.2**). The location and extent of the WTZ was based on a number of considerations:

- To provide a narrower spread of turbines to the east of Glac an t-Seilich compared to the previous Glenmorie Wind Farm application.

⁴ Whilst the majority of surveys which have shaped the design of the Proposed Development were undertaken from March 2024, the ornithology surveys began in March 2022. However, the results of these did not feed into design until a large amount of data had been gathered and the full EIA began.

- To limit the turbine infrastructure to the fringe of the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA (which encroaches the Northern part of the Development Site) in order to reduce the impacts on this designation.
- To keep the turbine infrastructure away from the Fannichs, Beinn Dearg and Glencalvie Special Landscape Area which overlaps the north of the Development Site.
- To limit the construction activities to less steep topography. The land further north is generally steeper / higher, which would be harder to construct on, and would lead to greater ground impacts from, for example, cut and fill, and would also increase landscape and visual impacts.
- To exclude the areas to the south occupied by forestry, which is actively managed for commercial crops and includes LEPO on the Ancient Woodland Inventory;
- To provide an area easily accessible from the existing forestry track, which would avoid the need to construct new and long access tracks, as was the case for the Glenmorie Wind Farm application which proposed a new approximately 30 km access track through previously undisturbed land and the Dornoch Firth NSA.

3.4.8 In addition, the turbines within the WTZ were located outwith 50 m watercourse buffer area, which is the buffer required by SEPA to reduce potential impacts on watercourses. Consideration was also given to the ornithological constraints (red throated diver or black grouse) identified through field surveys carried out in 2022 to 2024. The location of the turbines also considered the potential visibility of the Proposed Development from Strath Rusdale (the closest area of residential properties in the area) by limiting the number of turbines on the south ridge.

3.4.9 The EIA Scoping Layout prepared to inform the EIA Scoping of the Proposed Development was based on the WTZ and it was considered that this could accommodate 21 turbines with tip heights of 220 m, taking into account the elements discussed above and in combination with the spacing required from a wind resource perspective.

3.4.10 The EIA Scoping Layout was submitted to the ECU as part of the EIA Scoping Report on 25 August 2024. The draft site infrastructure design had not been completed at this stage. The layout submitted is presented in **Figure 3.2**.

Design Chill Layout

3.4.11 The further stage of the design evolution was influenced by further environmental surveys and assessment, for example:

- Phase 1 Peat Probing;
- National Vegetation Classification survey;
- Ecological Peat Condition Assessment;
- Potential GWDTE Classification; and

- Peat Landslide Hazard and Risk Assessment;
- EIA Scoping responses and in particular the landscape and visual impact assessment (LVIA) effects on Dornoch Firth NSA and Rhiddoroch - Beinn Dearg - Ben Wyvis WLA.
- This design layout took cognisance of feedback from NatureScot and The Highland Council (THC), both of whom referred to the previously proposed Glenmorie Wind Farm. This feedback was focused on reducing impacts on Rhiddoroch - Beinn Dearg - Ben Wyvis WLA and Dornoch Firth NSA and consideration of the list of landscape and visual criteria set out in the Onshore Wind Energy Supplementary Guidance.

3.4.12 Initial on-site infrastructure was added to the design at this stage including the proposed:

- access track.
- Battery energy storage system (BESS).
- control building and substation.
- Borrow Pit Search Areas.
- temporary compounds.

3.4.13 Key amendments can be summarised below and set out in **Table 3.3**.

- Number of Turbines - Reduced from 21 to 15 turbines.
- Turbine Tip Heights - Fifteen turbines reduced from 220m to 200m tip height.

Table 3.3 Design Chill – Summary of Mitigation by Design

Turbine Numbering		Design Intervention
Scoping	Design Chill	
T1	N/A	Removed – • to reduce impacts on the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA and to reduce the overall lateral extent of the Proposed Development, including from the Dornoch Firth NSA.
T2	T1	Repositioned – • southeast to reduce prominence from the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA. and horizontal extent from the Dornoch Firth NSA.
T3	N/A	Removed – • to reduce impacts on the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA and Dornoch Firth NSA and to reduce lateral extent of the Proposed Development.

Turbine Numbering**Scoping****Design Chill****Design Intervention**

T4	N/A	Removed – - to reduce impacts on the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA and to reduce vertical and lateral extent of the Proposed Development. - was also located in area of peat bog, in a peat banding depth between 1.01 – 1.50 m.
T5	T2	Repositioned – - to area of modified bog based on peat condition assessment. - from an area of peat banding depth between 1.01 – 1.50 m, to 0.51 – 1.00 m. - to improve visual composition from Dornoch Firth NSA.
T6	T3	Repositioned – - to areas of peat identified as actively eroding based on National Vegetation Classification classifications. - to shallower areas of peat (less than 1 m) based on Phase 1 Peat probing. - to lower altitude, to help reduce landscape and visual impacts including from Bonar Bridge and the Dornoch Firth NSA.
T7	T4	Repositioned – - to shallower areas of peat (less than 1m) based on Phase 1 Peat probing. - Further away from areas of near natural peat based on peat condition assessment - to lower altitude to help reduce landscape and visual impacts and improve composition of views from WLA and Dornoch Firth NSA.
T8	T5	Repositioned – - to less steep topography - to lower altitude to help reduce vertical extent and hub visibility from Bonar Bridge and parts of the Dornoch Firth NSA - to improve visual composition from Dornoch Firth NSA
T9	T6	Repositioned – - to shallower areas of peat (less than 1 m) based on Phase 1 Peat probing. - to lower altitude to help reduce landscape and visual impacts..

Turbine Numbering		Design Intervention
Scoping	Design Chill	
T10	T7	Repositioned – to improve visual composition, including from Strath Rusdale and Ben Wyvis.
T11	T8	Repositioned – to area of modified bog based on peat condition assessment.
T12	T9	Repositioned – - away from peat slide risk area. - to areas of modified bog based on peat condition assessment.
T13	T10	Repositioned – - to shallower areas of peat (less than 1m) based on Phase 1 Peat probing. - to areas of modified bog based on peat condition assessment. - to lower altitude to reduce visibility from Dornoch Firth NSA.
T14	T11	Repositioned – - to shallower areas of peat (less than 1m) based on Phase 1 Peat probing. - to less steep topography. - into area of reduced risk of GWDTE impacts.
T15	T12	Repositioned – - to less steep topography. - to lower altitude to help reduce landscape and visual impacts. - to improve visual composition from Dornoch Firth NSA.
T16	T13	Repositioned – - to less steep topography. - to lower altitude to increase screening from adjacent landform and help reduce landscape and visual impacts.
T17	T14	Repositioned – to lower altitude to help reduce landscape and visual impacts.

Turbine Numbering		Design Intervention
Scoping	Design Chill	
T18	T15	Repositioned – - to shallower areas of peat (less than 1 m) based on Phase 1 Peat probing. - northwest to increase distance and separation from Strath Rusdale (reduction in visual impacts). - to reduce lateral extent of the Proposed Development, particularly from Rhiddoroch - Beinn Dearg - Ben Wyvis WLA, Dornoch Firth NSA and Ben Wyvis.
T19	N/A	Removed- - to reduce lateral visual extent of the Proposed Development, particularly from the Dornoch Firth NSA and Ben Wyvis. - to ensure the turbines are set behind the ridgeline, increasing physical and visual separation and reducing visual impacts on Strath Rusdale.
T20	N/A	Removed – - due to prominent location on the south ridge and potential impact on Strath Rusdale. - to reduce lateral visual extent of the Proposed Development, particularly from the Dornoch Firth NSA and Ben Wyvis.
T21	N/A	Removed – - due to prominent location on the south ridge and potential impact on Strath Rusdale. - to reduce lateral visual extent of the Proposed Development, particularly from the Dornoch Firth NSA and Ben Wyvis.

3.4.14 Overall, six turbines were removed (T1, T3, T4, T19, T20 and T21), and all remaining turbines were repositioned. This design significantly reduced the impact of the Proposed Development on peatland habitats, deep peat and also reduced impacts on key landscape receptors, including Dornoch Firth NSA and Rhiddoroch - Beinn Dearg - Ben Wyvis WLA (in response to comments in the Scoping Opinion from NatureScot), and on key visual receptors, including Ben Wyvis and Cnoc Fyrish, Strath Rusdale and Bonar Bridge.

3.4.15 The reduction in potential landscape and visual impacts was achieved through a reduction in the number and heights of the turbines and positioning turbines at lower elevation and behind landform features. This led to a reduction in the lateral and vertical extent of the Proposed Development, increased physical and visual separation and improvements to the visual composition. The changes to the design also took account of the ten criterion listed in the Onshore Wind Energy Supplementary Guidance, in response to feedback from THC, by reducing impacts on landscape character, settlements, key gateways and landmarks, and

transport and recreational routes, and considering the relationship with other existing and consented wind farms in the vicinity.

- 3.4.16 These changes resulted in the Design Chill Layout (January 2025) which is presented in **Figure 3.2**.
- 3.4.17 The Design Chill Layout was presented to THC at a Major Pre-application Advice Consultation meeting on the 23 January 2025. Written pre-application advice was subsequently received from THC on 27 February 2025. Changes were captured within the Design Freeze layout as discussed in the following section.

Design Freeze Layout

- 3.4.18 The Design Freeze Layout took into consideration feedback from additional landscape and visual consultation with NatureScot in December 2024, the advice received from THC as part of the Major Pre-application Advice Consultation between January and February 2025, as well as the results of the Phase 2 Peat Probing, carried out in March 2025 (**Chapter 13: Geology, Hydrology, Hydrogeology and Peat**), and the Peatland Condition Assessment carried out in August 2025 (**Appendix 8.5**). The response from THC highlighted the importance of the Proposed Development's potential landscape and visual impacts, particularly on the WLA and NSA. It also raised SEPA's concerns regarding positioning turbines near the bowl of peat in the middle of the Development Site.
- 3.4.19 Key amendments can be summarised as set out below and in **Table 3.3**.
- Number of Turbines - Reduced from 15 to 13 turbines.
 - Turbine Tip Heights - Nine turbines at 200m tip height.

Four turbines at 180m tip height

Table 3.4 Design Freeze (Layout 11) – Summary of Mitigation by Design

Turbine Numbering		Design Intervention
Design Chill	Design Freeze	
T1	T6	Tip height reduced to 200 m to reduce visibility from the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA and the Dornoch Firth NSA.
T2	T5	Tip height reduced to 200 m to reduce visibility and vertical extent, including from the Dornoch Firth NSA.
T3	T4	Repositioned – • 226 m northwest to a lower elevation further reducing hub visibility from Bonar Bridge and the NSA. The repositioning to lower altitude along with a reduced tip height of 200 m reduces visibility from key design viewpoints.
T4	T7	Tip height reduced to 180 m to further reduce vertical extent and visibility from key design viewpoints.
T5	N/A	Removed –

Turbine Numbering

Design Chill	Design Freeze	Design Intervention
		to allow improvements to visual composition and reduce visual impact on NSA.
T6	T8	Tip height reduced to 200 m to reduce vertical extent and visibility from key design viewpoints and Dornoch Firth NSA.
T7	T9	Tip height reduced to 200 m to reduce visibility from key design viewpoints.
T8	T3	Tip height reduced to 200 m to reduce visibility from key design viewpoints. Repositioned – 24 m southwest to allow for crane pad alignment away from near natural peat and blanket bog.
T9	T2	Tip height reduced to 200 m to reduce visibility from key design viewpoints.
T10	T10	Tip height reduced to 200 m to reduce vertical extent and visibility from key design viewpoints and Dornoch Firth NSA.
T11	T1	Repositioned – 76 m southeast to allow for better crane access and access track alignment in relation to the topography, whilst accounting for the 50m watercourse buffer and peat depth / conditions. Tip height reduced to 200 m to reduce visibility from key design viewpoints.
T12	T11	Repositioned – 57 m southeast into an area of similar ground conditions to improve ellipses. Tip height reduced to 180 m to reduce visibility from Bonar Bridge and NSA.
T13	T12	Repositioned – 63 m northeast further from areas of deep peat (1.5 to 2 m). - downhill to reduce landscape and visual impacts. Tip height reduced to 180 m to reduce visibility and vertical extent from key design viewpoints and the Dornoch Firth NSA.
T14	T13	Repositioned – 2 m northeast to accommodate realignment of crane pad away from deep peat (2 to 2.5 m). Tip height reduced to 180 m to reduce vertical extent and visibility from key design viewpoints.
T15	N/A	Removed – - to reduce horizontal extent in views from NSA / WLA and Ben Wyvis and reduce impacts on Strath Rusdale - to reduce impacts on deep areas of peat which would be required for construction of the turbine.

- 3.4.20 In line with the pre-application advice provided by THC, NatureScot and SEPA, this design further reduced the impact of the Proposed Development on peatland habitats, deep peat and key landscape and visual receptors, such as Dornoch Firth NSA and Rhiddoroch - Beinn Dearg - Ben Wyvis WLA, Strath Rusdale, and Bonar Bridge while considering the potential impacts of the infrastructure associated with the development.

Design Freeze Refinement

- 3.4.21 As part of the Design Freeze Refinement, the following changes were made to the infrastructure at this stage:

- Minor alterations to the MDA Access Tracks to improve access to T12.
- Abnormal indivisible load (AIL) turning head added between T5 and T6 to reduce infrastructure requirements at crossing of valley to north of T2 (WCC32 on -).
- AIL turning head removed from west of T1 as it was no longer required due to the addition of an AIL turning head to the east of T1. All turning heads were also updated to align with Nordex dimensions.
- Compound south of T9 moved northwest out of deep peat;
- Temporary compound located between T5 and T6 moved from the northern to the southern side of the MDA Access Track onto AIL turning head.
- Indicative passing places added.
- An access track leading to the meteorological mast was added to the south of T6.
- Substation compound size increased from 80m x 40m to 120 m x 50 m based on recent construction examples.
- Additional Borrow Pit Search Areas were identified in the MDA, increasing the number of borrow pits in the MDA from four to seven. Following site visit two Borrow Pit Search Areas were discounted and removed from the Existing Forestry Access Track, reducing the number of borrow pits along this track from three to one.

- 3.4.22 The WTZ was also updated during this design freeze refinement in order to ensure that it encompassed all new infrastructure proposed as part of the Proposed Development. The area was resized to reflect the actual footprint of the proposed turbine infrastructure and to include other key infrastructure (e.g. battery storage, new tracks etc). as such it was renamed as the MDA.

- 3.4.23 The Design Freeze Refinement Layout (i.e. The Proposed Development Layout) forms the basis of this EIAR and is presented in **Figure 2.1**.

3.5 Mitigation by Design

3.5.1 The detailed design of the Proposed Development has evolved through an iterative process, incorporating the results of the environmental assessments which are reported in **Chapters 6 to 13**. As these assessments have identified potential adverse environmental effects or opportunities to maximise environmental benefits, proposed mitigation measures have been integrated into the design where possible. These measures, developed and refined throughout the iterative process, are known as embedded mitigation measures.

3.5.2 These measures include:

- Initial site selection to minimise the requirement for new access track or watercourse crossings by accessing via existing forestry access track;
- Turbines located at a minimum distance of 3.1 km from the nearest residential properties;
- The design of the access track route incorporated consideration of forestry and woodland constraints, with that final alignment selected to minimise woodland loss where practicable;
- Avoidance of areas of peat greater than 2.0 m deep as far as practicable. Where not possible infrastructure has been sited within areas of peat identified as being of reduced quality (i.e. drained or actively eroding);
- Use of existing borrow pits along the Existing Forestry Access Track where practicable to reduce the requirement to open new borrow pits;
- Location outside of sites designated for development or conservation within the Local Development Plan;
- The removal or careful siting of proposed infrastructure to reduce visual impacts and direct impacts on environmental receptors such as peatland, protected bird species and designated landscapes;
- The minimisation of the MDA Access Track and the provision of floating access tracks in areas of deep peat to minimise the impacts on peat;
- Reduction of flood risk through adherence to 50 m offsets from watercourses, a commitment to designing watercourse crossings to 1:200 year floods and use of the 100 m micro-siting buffers post-consent, where a risk is retained;
- The identification of temporary construction compounds, a temporary concrete batching plant area and borrow pit search areas at locations close to the entrance to the Development Site to reduce transport and climate impacts associated with travel to and from the site;
- Reduction of the horizontal extent of the Proposed Development and the potential visibility and prominence of the turbines from the NSA, including from the main settlements and lower lying areas from which the majority of people experience the NSA;

- Siting the turbines to strengthening the sense of the separation from the NSA, provided by the intervening uplands;
- Siting of turbines at the fringe of the Rhiddoroch - Beinn Dearg - Ben Wyvis WLA;
- Reduction in the height of turbines to reduce visual intrusion on residential properties and other sensitive receptors at Strath Rusdale as well as the WLA and NSA; and,
- The implementation of a reduced scheme of visible aviation lighting agreed with the Civil Aviation Authority to further minimise visual impacts. This is based on the installation of visible 2000 candela lights (dimmable to 200 candela in good visibility conditions) on the nacelle of five of the turbines (T5, T6, T9, T12 & T13) along with infrared lights on all turbines (see **Appendix 12.1**).

3.5.3 The design measures embedded into the Proposed Development are also detailed in **Chapters 6 to 13**.