3 Design Evolution and Alternatives

3.1 Site Selection Considerations

3.1.1 SIMEC in the UK is focused on establishing a portfolio of renewable energy projects in order to provide low-carbon power for industry. In 2016 SIMEC, alongside fellow GFG Alliance member Liberty House, completed the purchase of the hydro-power and aluminium smelting operation at Lochaber, as well as the surrounding estate lands including the Glenshero Estate. This was identified as having suitable wind speeds for a wind farm development and the proposed development is situated within this estate.

3.1.2 The site covers an area of approximately 37.4 km^2 and is located approximately 5 km north of the A86 and approximately 8 km west of the village of Laggan, in the Highlands (EIAR Volume 3: Figure 1.1). The site was chosen for wind farm development for a number of reasons:

- The turbine array can be sited outwith designated areas (such as those designated for nature conservation, landscape or cultural heritage reasons) (EIAR Volume 3: Figure 3.1d);
- The site is largely located in Group 3 of Table 1 of Scottish Planning Policy 2014 and of THC's Spatial Framework Plan (EIAR Volume 3: Figure 3.2). Group 3 areas are defined by SPP and THC as "Areas with potential for wind farm development"; and
- There is existing infrastructure in the area which can be utilised by the proposed development such as Melgarve substation, the Beauly Denny 400 kV overhead line to the south of the site and Stronelairg Wind Farm to the north. Due to the presence of this existing infrastructure the proposed development can utilise an existing track network thereby reducing the need for new track.

3.2 Current Land Use and Site Context

3.2.1 Higher ground is found in the north of the site. There are two main watercourses on-site, the Allt Coire Iain Oig and the Allt Gilbe, which run southwards off the highest ground on the site and join the River Spey on the site's southern boundary.

3.2.2 There are areas of coniferous plantation woodland located within the central and southern part of the site, between the Allt Coire Iain Oig and the Allt Gilbe and on the southern site boundary.

3.2.3 The Beauly-Denny 400 kV overhead line (OHL) intersects the site, on its southern boundary (EIAR Volume 3: Figure 1.1), and lies immediately north of an undesignated length of General Wade's Military Road. The majority of the site comprises open moorland used for grazing livestock and for rearing grouse.

3.2.4 The nearest residential properties are located to the south of the site, alongside the minor road which leads from Strathmashie to Glenshero Lodge and Garva Bridge. No properties are located within the red line boundary.

3.2.5 There are a number of wind farms within 40 km of the proposed development (EIAR Volume 3: Figure 4.7). The consented Stronelairg Wind Farm, which is located adjacent to the site's northern boundary, is currently under construction. Operational and consented wind farms

include Beinneun and Extension, Millennium and Millennium South, Bhlaraidh, Corrimony, Corriegarth and Extension, Dunmaglass, Aberarder, Farr and Glen Kyllachy.

3.3 Policy Considerations

3.3.1 Relevant national planning policy and guidance, in addition to the Development Plan applicable to the site has been taken into account. Policy considerations have also included the Cairngorms National Park Partnership Plan. Full details of the applicable planning policy framework are contained in EIAR Volume 4: Technical Appendix 3.1.

3.3.2 The Scottish Planning Policy (SPP)[1] is a key national level document considered. SPP requires planning authorities to define a spatial framework identifying those areas that are likely to be most appropriate for onshore wind farms. The spatial frameworks must be based on the following criteria:

- Group 1: Areas where wind farms will not be acceptable:
  - National Parks and National Scenic Areas.
- Group 2: Areas of significant protection:
  - Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation; and
  - Group 2 areas include World Heritage Sites; Natura 2000 and Ramsar sites; Sites of Special Scientific Interest; National Nature Reserves; Sites identified in the Inventory of Gardens and Designed Landscapes; Sites identified in the Inventory of Historic Battlefields; areas of wild land as shown on the 2014 SNH map of wild land areas; carbon rich soils, deep peat and priority peatland habitat; and an area not exceeding 2 km around cities, towns and villages identified on the local development plan.
- Group 3: Areas with potential for wind farm development:
  - Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria.

3.3.3 The site does not lie within any 'Group 1' areas, or within any national and international designations for ecology, ornithology, cultural heritage or wild land (Group 2 areas). Most of the site is within Group 3 as presented on EIAR Volume 3: Figure 3.2.

3.3.4 However, some areas of the site are within Group 2 and this relates to peatland. The SNH Carbon and Peatland Map (2016[2]) provides an indication of the likely presence of peat on a high-level scale. The Carbon and Peatland map has been developed as *"a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities"*[2]. According to this map, the site contains scattered areas and fragments of Class 1 and Class 2 priority peatlands; the west of the site has patches of Class 1 peatland with Class 1 and Class 2 present in the east of the site. Peat depth, mire condition and NVC surveys have been carried out across the study area to inform the detailed site assessment on peatland. The severe erosion and peat hagging present has left much of the blanket bog

1 The Scottish Government (2014) Scottish Planning Policy, The Scottish Government, Edinburgh, June 2014 - URL: http://www.gov.scot/Publications/2014/06/5823/6, accessed 06/07/18

2 SNH Carbon and Peatland Map (2016) https://www.nature.scot/professional-advice/planning-and-development/natural-heritage-advice-planners-and-developers/planning-and-development-soils/carbon-and-peatland-2016

degraded and patchy with many areas of bare peat/non-active peatland. Much of the remaining vegetation is also now more referable to a wet heath community on the tops of haggs due to the loss of characteristic blanket bog and particular peat forming species. These conditions mean that the areas with peat depths >0.5m within the site do not fall within a Class 1 category and are more likely to fall within Class 2 or 3 (EIAR Volume 4: Technical Appendix 2.8: Phase 1 Peat Probing Report and EIAR Volume 4: Technical Appendix 6.1: NVC and Habitat Survey Report).

3.3.5 At a local level, the key policy is provided within the following documents:

- The statutory development plan for the site comprises the Highland-wide Local Development Plan (the HwLDP) (adopted April 2012)[3];
- Onshore Wind Energy Supplementary Guidance (adopted November 2016)[4];
- The West Highlands and Islands Local Plan (adopted September 2010 as continued in force, 2012)[5]. There is an emerging WestPlan but it is understood this has not proposed any amendments to the boundaries of the particular Special Landscape Areas (SLAs) that may be relevant to the assessment of the proposed development. WestPlan is currently undergoing Examination which is expected to conclude in May 2019;

3.3.6 This EIAR does not make any judgements regarding the acceptability of the proposed development. A separate Planning Statement is provided which presents an appraisal of the proposed development with reference to the energy and planning policy framework and relevant material planning considerations.

3.4 Key Issues and Constraints

3.4.1 In addition to the policy considerations identified, key issues and constraints for consideration in the design process were established through a combination of desk-based research, extensive field survey and consultation (through the EIA scoping process). The design process considered the following issues:

- Landscape character and visual amenity within a 40 km study area;
- Cultural heritage, including mapping all known assets within the site, and assets of national importance within a 5 km study area to assess the potential for visibility and setting effects;
- Sensitive fauna, with the mapping of the presence of European protected species;
- Sensitive habitats, particularly peat forming habitats (supported by habitat and peat probing surveys) and habitats dependent on groundwater;
- Ornithology, including surveys for bird flight activity and breeding bird activity on the site; and
- Hydrology and hydrogeology, including identifying all sensitive surface water features.

3 Highland-wide Local Development Plan (2012), URL: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan, accessed 06/07/18

4 Onshore Wind Energy Supplementary Guidance (November, 2016), URL: (https://www.highland.gov.uk/downloads/file/18793/onshore_wind_energy_supplementary_guidance_november_2016, accessed 06/07/18

5 West Highlands and Islands Local Plan (2010), URL: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/216/local_plans/7, accessed 06/07/18

3.5 Alternatives

Do-Nothing Alternative

3.5.1 The "do nothing" scenario is a hypothetical alternative conventionally considered in the EIAR as a basis for comparing the development proposal under consideration. This scenario is considered to represent the current baseline situation as described in the individual chapters of this EIAR.

3.5.2 In the absence of the proposed development, it is anticipated that the site would continue to be managed as a combination of grazing livestock and rearing grouse. These land uses would continue on the site whether or not the proposed development proceeds.

3.5.3 It is recognised that the baseline would not remain static for the lifetime of the proposed development. In particular, and apart from any changes arising from economic and agricultural policies and economic market considerations, it is predicted that biodiversity and landscape would undergo some level of change as a result of climate change. Two publications from the Landscape Institute[6] and Scottish Natural Heritage[7] consider the potential climate change effects on the landscape character. Due to the complexities and uncertainties inherent in attempting to predict the nature and extent of such changes to landscape and biodiversity during the lifetime of the proposed development, it has been assumed that the current baseline would subsist. It is considered that this represents an appropriate approach for EIAR preparation purposes.

Design Evolution and Alternative Layouts

3.5.4 There have been four principal iterations, which have been developed at different stages in the project design process (EIAR Volume 3: Figure 3.3):

- Option A: Draft Scoping Layout;
- Option B: Scoping Layout;
- Option C: Gatecheck Layout; and
- Option D: Design Freeze Layout.

3.5.5 EIAR Volume 3: Figure 3.4 shows the locations of the design viewpoints that were used to help inform the layout of the proposed development and wirelines from these 4 viewpoints for three layout options (Option A: Draft Scoping Layout; Option B: Scoping Layout; and Option D: Design Freeze Layout[8]) are presented in EIAR Volume 3: Figure 3.5ai to Figure 3.5diii.

Option A: Draft Scoping Layout (September 2017)

3.5.6 The draft scoping layout (EIAR Volume 3: Figure 3.3a) was based on a standard turbine spacing of 5D x 4D, where 'D' is the rotor diameter of the turbines, within the northern portion of the site. Location of turbines on slopes in excess of 15% was avoided. The location of the nearby Stronelairg Wind Farm, and ensuring coherence between the two schemes, was one of the early key design considerations for the proposed Glenshero Wind Farm.

6 Landscape Institute (2008) Landscape architecture and the challenge of climate change, Position Statement, London, October 2008 – URL: https://www.landscapeinstitute.org/wp-content/uploads/2016/03/LIClimateChangePositionStatement.pdf

7 Land Use Consultants (2012) An assessment of the impacts of climate change on Scottish landscapes and their contribution to quality of life: Phase 1 – Final Report. Scottish Natural Heritage Commissioned Report 488 – URL: http://www.snh.org.uk/pdfs/publications/commissioned_reports/488_1.pdf

8 No changes were made to turbine layout in Options C and D.

3.5.7 The draft scoping layout included 54 turbines at a maximum tip height of 149.9 m. The tip height was selected in order to maximise the options for commercially available turbines, whilst additionally recognising that most of the nearby Stronelairg Wind Farm had turbine tip heights of 135 m.

3.5.8 A range of desk and field surveys helped to inform the draft scoping layout and a summary is provided in the following paragraphs.

3.5.9 Key landscape and visual design considerations initially focussed on reducing or avoiding effects on:

- The special qualities of designated or classified landscape areas, including the Cairngorms National Park, Special Landscape Areas (SLAs) and three Wild Land Areas (WLAs) (14. Rannoch-Nevis-Mamores-Alder; 19. Braeroy-Glenshirra-Creag Meagaidh; and 20. Monadhliath);
- Sensitive landscape character types;
- Visual amenity from settlements and key transportation routes, as well as recreational users such as hill walkers and walkers/cyclists; and
- The draft Scoping Layout used preliminary Zone of Theoretical Visibility[9] (ZTV) analysis to demonstrate limited visibility from local population centres and the transport network, as well as the Cairngorms National Park.

3.5.10 Desk-based archaeology and cultural heritage studies identified the presence of previously recorded heritage assets both on-site and within 5 km of the site. Features within the site boundary included an undesignated section of General Wade's Military Road and a Category A-listed Bridge at Garvamore. Scheduled sections of the Military Road, the Corrieyairack Pass, lie within approximately 3 km of the western site boundary. Another two Scheduled Monuments (Dun da Lamh fort, SM4361 and St Kenneth's Church, SM5703) are to the south of the site, and there are two Category A, seven Category B and five Category C-listed buildings within 5 km of the site.

3.5.11 Baseline habitat and protected species surveys, in addition to a desk-based study for historic records and designated sites helped to inform the draft scoping layout. The designated site search determined that the site drains into the catchment of the River Spey Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) which holds important populations of Atlantic salmon, eel and lamprey as well as freshwater pearl mussel. Adjacent to the east of the site, the Monadhliath SAC and SSSI is designated for blanket bog. In addition, baseline surveys determined that water vole is widespread across the site, and otter is present along larger watercourses.

3.5.12 The draft scoping layout was developed to avoid direct or indirect impacts on these receptors, and additionally brown trout, through maintaining a minimum 50 m buffer distance between turbine locations and watercourses. In addition, a 75 m buffer was maintained between the infrastructure and the adjacent Monadhliath SAC and SSSI blanket bog. Finally, the track length and alignment were designed to reduce the extent of track and number of watercourse crossings required, where feasible.

3.5.13 A series of ornithological surveys have been carried out since 2013 and the results of these surveys, combined with a desk-based study for designated sites, were used to influence the

[9]Ramboll Environ (2017) Glenshero Wind Farm DRAFT Scoping Report - Figure 3.2: Preliminary ZTV and Proposed LVIA Viewpoint Locations

draft scoping layout. In particular, cognisance was given to the presence of known golden eagle territories within 6 km of the site. Other identified ornithological sensitivities include golden plover and dunlin (recorded during the breeding season across the site).

3.5.14 To further understand golden eagle site usage, effort-corrected flight activity maps were created, which showed that distribution was widespread and there were no clear areas of significantly higher or lower activity within the site. Preliminary Predicted Aquila Territory (PAT) modelling was carried out to inform this layout with the aim of understanding the extent of golden eagle territories and importance of areas within the site to particular breeding pairs. The PAT model is a Geographical Information System (GIS) based tool that can be used to predict the extent of range loss and, therefore, contribute to the design of a wind farm (assuming that eagles are displaced from the immediate vicinity around turbines).

3.5.15 The nearest residential receptor is located to the south of the site, alongside the minor road that leads from Strathmashie to Glenshero Lodge and Garva Bridge, more than 3 km from the nearest turbine. No property is located within the site boundary. As such noise was not considered to be a substantive design consideration.

3.5.16 Two options for access were under consideration at this stage. Broadly these were either the eastern option or the western option:

- Eastern option: From the Port of Inverness southbound on the A9, joining the A889 at Dalwhinnie before heading southwest on the A86 and leaving the public road at Achduchil to join a number of private tracks to site. Access via these private tracks would involve crossing the U2104 Laggan - Garvamore - Melgarve road. This option required that the red line application boundary extended within the Cairngorms National Park, including crossing the Garva Bridge Geological Review Site.
- Western option: Access from the west would most likely follow the established route of delivery to Stronelairg Wind Farm and three variants were considered:
  - Option 1: Broadford Aerodrome via Kyle of Lochalsh, the A87 to Invergarry then northbound on the A82 from Invergarry Fort Augustus before joining the B862. The route would then leave the public road network at the entrance to the existing Stronelairg Wind Farm.
  - Option 2: From Corpach following the A830 onto the A82 at Lochy Bridge to Fort Augustus before turning onto the B862 to the Stronelairg Wind Farm entrance.
  - Option 3: From the port of Inverness joining the A82 southbound via General Booth's Road, westbound onto the A887 before turning south onto the A87 and joining the route described in Option 1 to the site.

3.5.17 Proposals for battery storage were considered during within the draft Scoping Layout stage; however, due to a number of commercial uncertainties this option was not progressed in further design iterations.

Option B: Scoping Layout (November 2017)

3.5.18 The Scoping Layout resulted in a major design iteration to both the proposed turbine layout and maximum tip height (EIAR Volume 3: Figure 3.3b). These changes were introduced in order to take account of pre-application feedback from a range of statutory and non-statutory consultees; and, in response to additional environmental baseline data collection and wind resource assessment. These changes were considered to offer improvements on the draft Scoping Layout with respect to effects on the Cairngorms National Park and other elevated summits, the Corrieyairack Pass and the Great Glen Way.

3.5.19 More detailed landscape and visual analysis resulted in the identification of a reduced development area for the proposed Glenshero Wind Farm. This revised area focussed on both the northeast and northwest of the site, with the central northern section now removed to avoid placing turbines on a particularly prominent and elevated positions, this change reduced the number of turbines to 40. The maximum turbine tip height was also reduced to 135 m to achieve greater consistency with the neighbouring Stronelairg Wind Farm.

3.5.20 The key landscape and visual priorities in developing this preferred development were as follows:

- Location of proposed development outwith areas subject to landscape designations or classifications;
- use of topography to the east of the site to minimise visibility from within the Cairngorm National Park (CNP), avoiding potential for significant effects on the majority of CNP and its principal sensitive core area (i.e. the Cairngorm Mountain National Scenic Area);
- Use of elevated topography to the west of the site to screen the proposed development from the interior of the Great Glen, as well as the majority of the Loch Ness and Duntelchaig, Loch Lochy and Loch Oich Special Landscape Areas, and summits on the western side of Loch Ness;
- Adoption of suitable stand-offs to prominent slopes and skylines to minimise effects on some of the most sensitive parts of the Ben Alder, Laggan and Glen Banchor SLA as well as the Great Glen and Corrieyairack Pass;
- Adoption of set-back from prominent upland edges to screen the proposed development from the main concentrations of receptors, including settlements, transportation and tourist/scenic routes;
- Avoidance of skylining turbines in most cases, wherever possible, in accordance with THC's criteria in its Supplementary Guidance[4].
- Positioning of the proposed development in larger scale upland moorland locations adjacent to Stronelairg Wind Farm, thereby avoiding smaller scale landscapes and distinctive topographical and landscape features;
- The adoption of a layout that reflects the underlying north-west - south-east pattern of ridges and watercourses, but that, when viewed from neighbouring elevated receptor locations, is consistent with the form of the Stronelairg array;
- Positioning of the proposed development so that it appears in close association and consistent with the adjacent Stronelairg Wind Farm in views from key locations within the CNP, adjacent WLAs and key summits, appearing in front of or behind the Stronelairg array, or as a lateral extension to this permitted development (refer to the comparative wirelines in EIAR Volume 3: Figure 3.5);
- Avoidance of prominent elevated summits that could cause turbines to notably exceed the level of Stronelairg turbines (as demonstrated in the wireline images in EIAR Volume 3: Figure 3.5); and
- Minimisation of extent to which the proposed development would be seen without the context of the Stronelairg development.

3.5.21 A site walkover was conducted in late October 2017 and Historic Environment Record searches were completed. These identified some additional undesignated assets of local importance. The Scheduled sections of the Old Military Road to the west and southwest of the site, and

the Category A Listed Barracks and Bridge at Garvamore were considered to be key sensitivities.

3.5.22 Cultural heritage visualisations were prepared for a number of locations. Potential setting impacts upon the Old Military Road and the Bridge and Barracks at Garvamore contributed to the redesign of the original scoping layout. The original 54 turbine layout was amended to remove 14 turbines from the design. The remaining 40 turbines were arranged in two clusters on the higher ground in the northeast and northwest corners of the site. This redesign had the effect of moving turbines further away from the designated heritage features.

3.5.23 Stage 1 peat probing (and associated vegetation quadrats) had been carried out across the majority, though not all of, the preferred development area at this point. This allowed development of a peat depth map and this mapping was combined with habitat data to classify the site into Class 1 and Class 2 peat (priority peatland) in order to further shape the design layout. Turbine locations generally avoided areas of peat greater than 1 m in depth. This approach takes account of Scottish Government guidance on deep peat and peat slide risk assessment, which defines deep peat as >1 m depth.

3.5.24 A 75 m buffer was maintained between the infrastructure and the Monadhliath SAC/SSSI (designated for blanket bog) to avoid any potential drainage effects on the designated site. The carbon calculator research report[10] states that drainage effects can be up to 50 m on fibric peat but as low as 5 m on decomposed peat. A conservative stand-off distance of approximately 75 m from the edge of the SSSI has been applied to the design layout. This accounts for peat that may have high hydraulic connectivity (up to 50 m) with the SSSI blanket bog, plus a precautionary buffer to ensure that any hydraulic effects on peat hydrology can be scoped out.

3.5.25 More detailed 1:10,000 mapping was used to identify all relevant watercourses, and a 50 m buffer was applied. National Vegetation Classification (NVC) habitat survey mapping was used to identify habitats that fall under potential Ground Water Dependent Terrestrial Ecosystems (GWDTE) categories. The design approach involved siting turbines out-with areas of potentially highly or highly sub-dominant GWDTEs and avoiding potentially moderate GWDTEs where feasible. The same principle was applied to tracks and other infrastructure, wherever possible, whilst taking account of other environmental and technical constraints. A detailed appraisal of NVC category M16 (*Erica tetralix* - Sphagnum compactum wet heath) and its likely groundwater dependency within the site was undertaken and agreed in discussion with SEPA. In summary, agreement was reached with SEPA that M16 in the NVC study area is very unlikely to be a high GWDTE and that its sensitivity should be reduced to be in line with the M15 wet heath present (i.e. no more than moderate sensitivity), and M16 should be considered in the same way as M15 in any assessments and provision of mitigation.

3.5.26 The peat depth data combined with vegetation and condition data from Phase 1 probing and habitat data from NVC surveys have been used to reduce impacts on deeper, contiguous areas of blanket mire that are generally of higher quality.

3.5.27 The reduced development area in the scoping layout would potentially reduce the risk of effects on nearby designated sites, including reducing the risk of dispersal of deer onto the adjacent Monadhliath SAC/SSSI due to habitat loss. The risk of deer dispersal is addressed through the outline HMP (EIAR Volume 4: Technical Appendix: 6.5), as discussed below, and

[10] Dali Rani Nayak, David Miller, Andrew Nolan, Pete Smith, and Jo Smith (2008, corrected 2010) Calculating carbon savings from wind farms on Scottish peat lands - A New Approach

a deer management plan, in accordance with the deer management plan at EIAR Volume 4: Technical Appendix 6.7, would be agreed prior to construction.

3.5.28 Private Water Supply (PWS) data were requested from THC within a 5 km radius of the site boundary. No PWS are recorded as sourced within 250 m of the proposed turbines or internal access tracks.

3.5.29 All infrastructure remained out-with a 50 m buffer of all watercourses (with the exception of access track watercourse crossings). Peak run-off rates will be calculated for the existing and post-development scenarios. The post-development scenario is calculated based on the impermeable footprint of the proposed development. This is conservative as access tracks are likely to be partially permeable. The percentage increase in the peak flow should be negligible. Attenuation will be proposed where required to prevent an increase in the baseline runoff rate (EIAR Volume 4: Technical Appendix 6.8).

3.5.30 As stated in the Scoping Report, all culverts and/or bridges would be designed to accommodate a 1:200-year peak flow (EIAR Volume 4: Technical Appendix 2.2: Watercourse Crossing Design).

3.5.31 The revised layout has been reviewed to ensure that the track length and alignment has been designed to reduce the extent of track and number of watercourse crossings required, where feasible within the wider site constraints.

3.5.32 Further ornithological analysis involved gathering additional baseline data from the Highland Raptor Study Group, RSPB Scotland and the Regional Eagle Conservation Management Plan monitoring programme. Other nearby projects, in particular the adjacent Stronelairg Wind Farm were also considered in relation to survey results. The Stronelairg Habitat Management Plan (HMP) was considered to ensure that there would be no conflict with the management and aims of it and the proposed development. The PAT model was updated to include consideration of the revised preferred development area and any updated survey results showing different nest sites. The reduction in turbine numbers and turbine size in the scoping layout was considered likely to reduce the level of risk to golden eagle by reducing amount of territory affected, and risk of collisions with turbines.

3.5.33 The transport options remained unchanged between the Draft Scoping Layout and the Scoping Layout.

Option C: Gatecheck Layout (June 2018)

3.5.34 The Gatecheck Layout (EIAR Volume 3: Figure 3.3c) made some further refinements from the Scoping Layout. These included:

- Reduction in 5.52 km of new track length[11];
- Removal of northeastern section of track, near T31 originally included to facilitate early programmed access to eastern array. However, this is no longer considered to be feasible given constraints, ground conditions and access to materials;
- Deletion of T4 turbine to optimise efficiency of wind turbine layout;

[11] It should be noted that Stronelairg Wind Farm consent requires the restoration of the track between Stronelairg Wind Farm and Melgarve substation. THC has recently awarded planning approval to the Estate for the retention of a section of this track. Notwithstanding it is assumed that the existing section of track between Glenshero and Stronelairg Wind Farm would be restored, and then re-built to minimise disturbance to new area of ground. For the purpose of Glenshero Wind Farm, this section of track is considered new track.

- Revision of site boundary, meaning that none of the site lies within the CNP, as the eastern access route has been discounted for construction purposes, in line with SNH advice on reducing habitat impacts; and
- Relocation of turbines T39 and T40 due to response to landscape and visual constraints.

3.5.35 This final design iteration of the turbine locations focused upon further qualitative changes to consolidate improvements made to the scheme at scoping in landscape and visual terms. Further refinements/repositioning of turbines were introduced to achieve greater design consistency with the adjoining Stronelairg Wind Farm in respect of the layout and elevation of turbines, and to limit the perceived spread of development, whilst also limiting intrusion into views from designated /classified landscapes and key sensitive receptor locations.

3.5.36 With regard to the substation, control room and borrow pits, it was considered that these elements would best be accommodated within the undulating topography of the main wind farm site where they could be substantially shielded from views the CNP, WLAs and the Corrieyairack Pass. This approach would also avoid the need for placing further infrastructure or buildings in the Corrieyairack Pass, where they would otherwise be viewed in conjunction with the Beauly Denny Overhead Line and the Melgarve Substation.

3.5.37 The theoretical visibility of the final design is evidenced in EIAR Volume 3: Figure 4.5 that accompanies this report.

3.5.38 Mountaineering Scotland, in their scoping response (28th November 2017), identified a group of shielings on high ground at Monadhliath. These are approximately 10 km northeast of the site, and no operational effects upon them are anticipated. It is considered that there is low potential for similar remains to be found within the site boundary on gentle gradients below 450 m above Ordnance Datum (AOD). On steeper slopes, and on lands above 450 m AOD, there is negligible potential for archaeological remains to exist.

3.5.39 Although it is within the ZTV, no significant setting effects are anticipated upon Garvamore Barracks. Existing tree planting and buildings largely screen the turbines in views towards the barracks, and the presence of turbines 4 km to the north is not anticipated to result in any substantive change to the buildings' cultural significance.

3.5.40 The ZTV (EIAR Volume 3: Figure 4.5) illustrating the visibility of the Glenshero turbines indicates that setting effects are unlikely to be an issue for either the Old Military Road or the Bridge and Barracks at Garvamore.

3.5.41 Supplementary NVC habitat and further Phase 1 peat probing surveys were carried out in May 2018 across locations that had not been covered prior to preparation of the Scoping Layout. The outputs from these surveys did not necessitate any substantive changes to the layout.

3.5.42 Phase 2 peat probing was completed in areas where there is infrastructure for the proposed development (EIAR Volume 4: Technical Appendix 2.9: Phase 2 Peat Probing Report). SEPA stated in their Scoping Response (19th December 2017) that probing is required near or where peat is greater than 1 m. Consideration was given to re-routeing of a section of access track between T13 and T37 to avoid an area of highly subdominant GWDTE; however, this would have involved increasing the prominence of the track from a landscape and visual perspective and therefore this option was not progressed further.

3.5.43 Areas of deep peat hosting blanket bog on the site have been avoided, where possible. The outline HMP (EIAR Volume 4: Technical Appendix 6.5) also includes measures for peatland restoration, and therefore, there would be no net loss of active blanket bog as a result of the proposed development.

3.5.44 All GWDTEs have been reviewed based on their hydrogeological setting as the site is underlain by a low productivity aquifer, and mitigation options have also been considered for the access track in its current position. The access track would be floated where this is feasible on the ground slope. SEPA was invited for pre-application discussion regarding the revised infrastructure layout and assessment relative to the potential GWDTE. A review of the potential impacts on GWDTE within the buffer of six key areas of infrastructure was issued to SEPA. SEPA responded on 18th July 2018 noting that based on the layout, the impacts are acceptable assuming suitable mitigation is put in place to minimise the effects. The mitigation proposed has been detailed in this EIAR (EIAR Volume 4: Technical Appendix 6.1).

3.5.45 The design of the access tracks has taken into consideration the technical and environmental constraints on-site and the potential effects associated with the options selected. Some examples of the specific design considerations for the design freeze layout of access tracks include:

- Access track to T17: the longest single turbine spur on-site is the track to T17. Several route options were considered for access to T17 including via T16 or via T19. The reasons the design freeze option for this access track was chosen are:
  - A direct approach from the main access track was considered unfeasible given the very steep terrain and the requirement to cross an area of deep peat to west of T17. This option would also site the track closer to and uphill of a moderate GWDTE area;
  - An approach via T16 would be extremely difficult due the steep terrain to the south and west. This route would encroach upon an area of Medium Peat Stability Risk. Additionally, an approach via T16 would require the crossing of a major watercourse rather than the crossing of two minor watercourses upstream from the point of convergence;
  - An approach via T19 would again require crossing of a major watercourse along with an area of deep peat; and
  - The design freeze option for access to T17 (EIAR Volume 3: Figure 2.1) although potentially longer than some of other options considered, avoids areas of deep peat and crossings of large watercourses, minimises crossing of steep terrain, makes use of negligible areas of Peat Stability Risk rather than low and makes use of areas where peat depth is less than 0.5 m, where possible. Therefore, although longer the final option for the proposed track at T17 is considered to be in keeping with SEPA's guidance.
- Access track around the T18/T20/T21 grouping (EIAR Volume 3: Figure 2.1): The arrangement of tracks serving this area of turbines is another part of the site where careful balancing of potential environmental effects was required. The Scoping Layout required 2,270 m of track and 3 major water crossings. Although the design freeze layout could have a potentially increased effect on areas of deep peat, the track length has been reduced by c.400 m to 1,830 m and only requires a single watercourse crossing. Any potential effects on the areas of peat would be mitigated using floated track and as such the slightly greater effects on deep peat are considered preferential to the additional track length and large watercourse crossings. It should also be noted that the small spur to T20 is driven by the terrain surrounding the turbine. Placing the track in line with the turbine for these small spurs would result in a similar overall length, once the horizontal and vertical geometry requirements have been accounted for.
- Access track to T29 (EIAR Volume 3: Figure 2.1): Consideration was given to accessing T29 from T30, however, this would require skirting around Dubh Lochan, through

watercourse buffers and up to two water crossings in difficult, wet ground. This solution would also make it very difficult to orientate the crane pad to avoid excavation of deep peat over its footprint. The final layout of the proposed track to T29 skirts the bottom of steep terrain in the west making use of a flat area of land between the slope and a lochan, large river and generally wet bog area to the east. Although the access track crosses an area of deep peat, the flat nature allows this track to be floated to minimise any effects on deep peat whilst reducing Peat Stability Risk associated with the steep slope to the east. Furthermore, the proposed route makes use of a large area with negligible Peat Stability Risk. The proposed route wholly avoids encroachment into watercourse buffers.

3.5.46 The reduction in track length and removal of the eastern access route option has the benefit of reducing the extent of habitat loss for sensitive receptors such as blanket bog and heaths, and, reduces the likelihood of potential impacts on the River Spey SAC/SSSI in particular. The reduced track length also reduces the potential for increased runoff rates and reduces the number of new watercourse crossings. A site walkover has been completed to obtain the dimensions of the watercourse crossings (EIAR Volume 4: Technical Appendix 2.2: Watercourse Crossing Design).

3.5.47 The results of a PWS data collection exercise confirmed the absence of PWS within 250 m of the infrastructure. Details received from all PWS within 5 km of the proposed development are presented in EIAR Volume 4: Technical Appendix 2.4: Private Water Supply Assessment.

3.5.48 The Gatecheck Layout was reviewed to ensure that the access track length and alignment has been designed to reduce the extent of access track and number of watercourse crossings required, where feasible within the wider site constraints. This includes landscape and visual effects of the proposed access track and engineering restrictions.

3.5.49 Collision Risk Modelling was undertaken to estimate a possible rate of golden eagle collisions associated with the proposed turbine layout, including consideration of territorial and non-territorial (juvenile) golden eagles. These results were used in a Golden Eagle Population Model, agreed with SNH, to predict effects on the golden eagle population within the relevant study area, known as Natural Heritage Zone (NHZ) 10. The population modelling additionally took account of cumulative effects from other wind farms within NHZ 10. This work concluded that either stable or continued growth of the golden eagle population would occur over the long-term, despite the additional predicted mortality associated with collisions due to the proposed development and other wind farms within the NHZ. As such, no significant effects on the NHZ population were predicted as a result of the proposed turbine layout. Collision modelling has been conducted for all sensitive ornithological receptors recorded during flight activity surveys and is reported in EIAR Volume 2: Chapter 7: Ornithology.

3.5.50 The reduction in access track length and removal of the eastern access route option would have the benefit of reducing the extent of habitat loss and disturbance risk for breeding birds such as golden plover, black grouse and ring ouzel.

3.5.51 Work has taken place to identify options for mitigation and enhancement, and locations for habitat management within the Glenshero Estate, which will benefit golden eagle and reduce the likelihood of any significant effects on breeding pairs. The proposals include enhancing currently sub-optimal moorland habitats (of greater extent than any loss of similar habitats associated with wind farm construction), woodland planting, reducing deer grazing pressures on sensitive habitats (including the adjacent Monadhliath SAC/SSSI) and reducing the attractiveness of the wind farm area to birds by removing deer carcasses and relocating them nearer to nest sites. These mitigation and enhancement measures will also have the benefit

of improving conditions for other sensitive receptors such as blanket bog, breeding waders and black grouse, and will be sympathetic to current management within the wider area, including that associated with the Stronelairg Wind Farm HMP. An outline habitat management plan is presented in EIAR Volume 4: Technical Appendix 6.5.

3.5.52 The removal of the eastern route option resulted in the removal of the application area from within the CNP. EIAR Volume 3: Figure 2.1 shows the use of the existing Stronelairg Wind Farm track. Western Option 3 was discounted due to the distance and required road improvements. Therefore, the turbine delivery would use a combination of western Options 1 & 2 (described above) with blades arriving from the Kyle of Lochalsh and other components arriving from Corpach (as per the consented Stronelairg Wind Farm).

3.5.53 The combined constraints are illustrated and EIAR Volume 3: Figure 3.1 and were used to inform the final layout presented on EIAR Volume 3: Figure 2.1.

Option D: Design Freeze Layout

3.5.54 A minor amendment to the red line boundary has been made as the access approaches Stronelairg Wind Farm to improve track geometry.

3.5.55 Following the results of the Phase 2 Peat Probing survey serval minor amendments were made to the ancillary infrastructure. However, no changes were made to the locations of the turbines. The proposed amendments to the infrastructure layout noted in Paragraph 3.5.61, resulting from the review of the Phase 2 Peat Probing survey findings, have resulted in an area reduction of 2,598 m^2 of deeper peat affected by the proposed development.

3.5.56 As a result, the final layout proposed is 39 turbines at a maximum height of up to 135 m.

3.5.57 The most suitable turbine model for a particular location can change with time and therefore a final choice of machine for the proposed wind farm has not yet been made. The most suitable machine would be chosen before construction. A candidate turbine has therefore been assumed for the purposes of the EIAR (with a nominal output of 4.3 MW and a maximum tip height of 135 m).

3.5.58 Most of the dominant wind turbine manufacturers are now producing turbines that are classed as suitable for the wind regimes typical of Scotland and many are also producing turbines that match the 135 m tip height specification that is suggested for the proposed wind farm. Exact tower and blade dimensions vary marginally between manufacturers, but suitable turbines are produced by Senvion, Nordex, GE and Vestas amongst others. The colour and finish of the wind turbine, blades, nacelles and towers would be agreed with ECU and THC in advance of construction though the mechanism of a condition of consent.

3.5.59 Each turbine would have a transformer and switchgear. For Glenshero Wind Farm it is proposed that the transformer and switchgear would be contained within the nacelle or tower base.

3.5.60 Site infrastructure would comprise access tracks with passing places, crane hardstandings at turbines, turning spurs, substation with control and welfare building, temporary construction compounds, a parking area and a turbine laydown area. This infrastructure accounts for approximately 0.39% of the land within the site boundary.

3.5.61 The Phase 2 peat probing work incorporated a more focused collection of probes in accordance with the guidance and as agreed with SEPA during the pre-application consultation process. As described in Paragraph 3.5.55, some additional smaller areas of deep peat have been

identified from this peat probing work. Proposed re-alignments, and resultant volume reductions, of the infrastructure (crane hardstandings and access tracks) are shown below, including further discussion on the alterations made:

- Flipping and rotating infrastructure at T5;
- Rotating infrastructure clockwise at T14;
- Rotating infrastructure at T20;
- Re-alignment of infrastructure at T25;
- Re-alignment of infrastructure at T38; and
- Removal of additional hub assembly area and minor access track re-alignment at T39.

3.5.62 SEPA was invited for pre-application discussion regarding the revised infrastructure. SEPA responded on 30th July 2018 noting that a sufficient level of probing and peat data has been collected to inform the application and welcomed the latest design iteration and the modifications noted. Three further recommendations were also made to reduce the impact on peat where possible. These included reducing the impact of the substation, T17 hardstanding and spur to T18. The substation has been moved in response to the recommendations. A number of hardstandings were micro-sited to reduce the potential impact. Following review of the hardstanding at T17, it remains located in the area of least gradient and has not been relocated due to the surrounding steeper slopes. The spur to T18 has not been relocated; however, the track could be floated in the detailed design thereby reducing the potential impact on peat. SEPA confirmed that it did not need to see this final set of design refinements. The substation and control building have been retained within the undulating topography of the main wind farm site where they could be substantially shielded from views from the CNP, WLAs and the Corrieyairack Pass. The substation was however relocated to the west of T13, previously having been located adjacent to the temporary construction compound. This approach therefore avoids the need for placing further infrastructure or buildings in the Corrieyairack Pass, where they would otherwise be viewed in conjunction with the Beauly-Denny Overhead Line and the Melgarve Substation.

Preferred Option

3.5.63 The preferred option which has been taken forward for assessment in this EIAR is Option D which is presented in EIAR Volume 2: Chapter 2: Development Description chapter and presented on EIAR Volume 3: Figure 2.1.

3.6 Mitigation by Design

3.6.1 The careful placement of the proposed turbines within the site boundary and the reduction in the number of turbines from 54 to 39 has facilitated effective mitigation, with potentially significant effects avoided or minimised as far as reasonably practicable through the design process. A summary of the potential effects addressed through the design process and the issues remaining following the selection of the final design is provided in Table 3.1 below.

Table 3.1: Mitigation by Design			
Topic/Issue	**Environmental Constraint/ Potential Effect**	**Mitigation by Design**	**Issues Remaining**
Landscape and Visual Amenity	▪ Potential effects on the special qualities of designated or classified landscape areas including the Cairngorms National Park, Special Landscape Areas and Wild Land Areas; ▪ Potential effects on sensitive landscape character types; and ▪ Potential effects on visual amenity from settlements and key transportation routes as well as recreational users such as hill walkers and walkers/cyclists.	The number of turbines was reduced through the design process from 54 to 39 and the layout of the remaining turbines was altered to provide the following mitigation: ▪ Removal of turbines from the central north section of the site to avoid placing turbines on particularly prominent and elevated positions; ▪ Reduction in turbine height from 149.9 m to 135 m to achieve greater consistency with Stronelairg Wind Farm; ▪ Use of the site's topography to minimise and screen visibility; ▪ Application of suitable standoffs from prominent slopes and skylines; ▪ Set-back from prominent upland edges to screen the proposed development from the main concentrations of receptors; ▪ Avoidance of skylining, where possible; ▪ Placement of turbines in larger scale upland moorland; ▪ Creating a layout that reflects the pattern of ridges and watercourses; ▪ Minimising the extent to which the proposed development would be seen without the context of Stronelairg Wind Farm; ▪ Removal of the red line boundary from the Cairngorms National Park; and ▪ Location of substation, control room and borrow pits within the undulating topography to substantially shield views from external receptors.	EIAR Volume 2: Chapter 4: Landscape and Visual provides an assessment of the residual effects of the proposed development on landscape and visual receptors.

Table 3.1: Mitigation by Design			
Topic/Issue	**Environmental Constraint/ Potential Effect**	**Mitigation by Design**	**Issues Remaining**
Archaeology and Cultural Heritage	▪ Potential effects on known or unknown buried archaeological remains; possibility of disturbing, removing or destroying in situ remains and artefacts during ground breaking works; and ▪ Potential effects upon the setting of assets such as Scheduled Monuments, Listed Buildings, Conservation Areas and Inventory Historic Gardens and Designed Landscapes.	▪ On steeper slopes and on lands above 450 m AOD there is negligible potential for archaeological remains to exist. No new infrastructure has been sited below 450 m AOD; and ▪ Setting impacts on the General Wade's Military Road (Scheduled Monument) and Garva Bridge and Garvamore Barracks (Listed Buildings) were considered during the evolution of the design. Turbines were moved to higher ground and away from the central area of the site, moving the turbines further away from these designated features. This change in the design means that the proposed development would not result in substantive changes to the setting of these designated assets.	EIAR Volume 2: Chapter 5: Archaeology and Cultural Heritage provides an assessment focussed on identifying the likely significant indirect (setting) effects on cultural heritage assets.
Ecology (non-avian)	▪ Potential effects on sensitive habitats through habitat loss, displacements (deer), fragmentation and degradation, including peat forming habitats; ▪ Potential effects on protected species e.g. mammals, fish etc; and ▪ Potential effects on site designated for nature conservation.	▪ The layout has been designed to avoid direct or indirect effects on designated sites (River Spey SAC and Monadhliath SAC). With the exception of access track watercourse crossings, the design incorporates a minimum 50 m buffer distance around all surface watercourses, avoiding direct effects on watercourses. In addition, a 75 m buffer has been applied to all infrastructure and the adjacent Monadhliath SAC; ▪ Areas of deep peat hosting blanket bog have been avoided, where possible, and through the proposed peatland restoration would be no net loss of active blanket bog; ▪ The proposed development incorporates good practice drainage design during construction and operation, using a multi-tiered sustainable drainage system (SuDS) approach to control the rate, volume and	EIAR Volume 2: Chapter 6: Ecology assesses the residual effects on aquatic and terrestrial habitats, and protected species. EIAR Volume 4: Technical Appendix 2.1: Outline CEMP presents the approach to managing surface water quality and quantity. Habitat restoration proposals are included in EIAR Volume 4: Technical Appendix 6.5: Outline Habitat Management Plan and summarised in EIAR Volume 2: Chapter 6: Ecology. The GWDTE assessment is presented in EIAR Volume 4: Technical Appendix 6.1.

Table 3.1: Mitigation by Design			
Topic/Issue	**Environmental Constraint/ Potential Effect**	**Mitigation by Design**	**Issues Remaining**
		quality of runoff from the proposed development; ▪ Turbines and access tracks avoid sensitive habitats, including peat forming habitats and GWDTEs, as far as possible based on both habitat mapping and peat probing surveys; and ▪ Access tracks would be floated where this is feasible.	
Ornithology	▪ Short-term reduction in breeding or wintering bird populations due to construction disturbance (affecting breeding or foraging behaviour and causing reductions in productivity or survival); ▪ Long-term reduction in breeding or wintering bird populations due to the loss of habitat critical for nesting or foraging; ▪ Long-term reduction in breeding or wintering bird populations due to collision mortality; and ▪ Cumulative effects with other projects or activities that are constructed during the same period, and / or with projects or activities which pose either a potential collision risk or loss of habitat by displacement.	▪ The reduction in access track length and removal of the southern access option has the benefit of reducing the extent of habitat loss and disturbance risk for breeding birds such golden plover, black grouse and ring ouzel; and ▪ Golden Eagle collision risk modelling was completed for the proposed development and cumulative developments and no significant effects on the NHZ10 population were predicted based on the final layout.	EIAR Volume 2: Chapter 7: Ornithology assesses the residual effects on birds, including presenting the results of collision risk analysis.
Traffic and Transport	▪ Potential construction effects on other road users including: severance; driver delay; pedestrian delay; pedestrian amenity; fear and intimidation; and accidents and safety; ▪ Abnormal road wear and tear; and ▪ Road widening/ improvements to accommodate abnormal loads.	▪ Use of the consented Stronelairg Wind Farm access track has meant the red line boundary could be removed from within Cairngorms National Park; and ▪ Turbine components to be delivered via the same abnormal load delivery routes as the consented Stronelairg Wind Farm thereby minimising any potential road widening/landtake requirements on the surrounding road network.	EIAR Volume 2: Chapter 8: Traffic and Transport provides an assessment of the potential effects associated with the construction traffic. EIAR Volume 4: Technical Appendix 8.1: Transport Assessment includes an abnormal load assessment and a swept path analysis.
Noise	▪ Potential effects of construction noise due to construction plant and construction traffic; and	▪ Construction noise	Potential cumulative noise effects with Stronelairg.

Table 3.1: Mitigation by Design

Topic/Issue	Environmental Constraint/ Potential Effect	Mitigation by Design	Issues Remaining
	▪ Potential effects of operational noise from the turbines.	▪ The nearest residential receptor is located to the south of the site, alongside the minor road that leads from Strathmashie to Glenshero Lodge and Garva Bridge, more than 3 km from the nearest turbine. No property is located within the site boundary. As such noise was not considered to be a substantive design consideration; and ▪ A noise assessment in accordance with ETSU-R-97 and in consultation with The Highland Council indicated that the operational proposed development would meet the noise criteria stipulated both on its own and cumulatively with the consented Stronelairg Wind Farm.	
Hydrology and Hydrogeology	▪ Potential effects on designated sites due to potential changes in surface and/or groundwater quality and quantity; ▪ Potential effects on the catchments due to changes in surface and/or groundwater quality and quantity; ▪ Potential localised increase in flood risk due to watercourse crossings; ▪ Potential effects on GWDTE through changes to site hydrogeology; ▪ Potential effects on PWS abstractions due to potential changes in surface and/or groundwater quality and quantity; and ▪ Potential for peat slide risk.	▪ The layout has been designed to avoid direct or indirect effects on designated sites (River Spey SAC and Monadhliath SAC). With the exception of access track watercourse crossings, the design incorporates a minimum 50 m buffer distance around all surface watercourses, avoiding direct effects on watercourses. In addition, a 75 m buffer has been applied to all infrastructure and the adjacent Monadhliath SAC; ▪ The proposed development incorporates good practice drainage design during construction and operation, using a sustainable drainage system (SUDS) approach to control the rate, volume and quality of runoff from the proposed development; ▪ All watercourse crossings would be designed to accommodate a 1 in 200-year return period peak flow.	Potential effects on designated SACs are assessed in EIAR Volume 2: Chapter 6: Ecology, Annex 1. Measures for the protection and management of water quality, water quantity and handling of peat are considered in EIAR Volume 4: Technical Appendix 2.1: Outline CEMP. A Peat Management Plan has also been prepared (EIAR Volume 4: Technical Appendix 2.5). Watercourse crossing designs are presented in EIAR Volume 4: Technical Appendix 2.2. A GWDTE assessment is included in EIAR Volume 4: Technical Appendix 6.1 and PWS assessment is included in EIAR Volume 4: Technical Appendix 2.4. Mitigation to be applied where GWDTE cannot be avoided to allow the flow of water across the infrastructure.

Table 3.1: Mitigation by Design			
Topic/Issue	**Environmental Constraint/ Potential Effect**	**Mitigation by Design**	**Issues Remaining**
		▪ Turbines and access tracks avoid sensitive habitats, including peat forming habitats and GWDTEs, as far as possible based on both habitat mapping and peat probing surveys; ▪ The number of watercourse crossings has been minimised through the design process, with the location of crossings selected to avoid damage; ▪ All turbines and associated infrastructure has been located >250 m from private water supply abstractions; ▪ peat probing was completed across the developable area. The design process involved avoiding the areas of greatest peat depths when siting the infrastructure, insofar as possible, taking account of other environmental constraints (e.g. sensitive habitats, ornithology, landscape and visual receptors etc.); and ▪ a peat landslide hazard and risk assessment (PLHRA) (TA2.6: PLHRA) has been carried out to assess the potential for peat instability. This assessment concludes that there is a negligible to low risk of peat instability across most of the site. Where medium risk areas have been identified, the implementation of standard construction mitigation measures would also reduce these risks to insignificant. These mitigation measures would be documented as part of the CEMP and Peat Management Plan (PMP). There have been no high-risk areas identified.	The results of the Stage 1 and Stage 2 peat probing are presented in EIAR Volume 4: Technical Appendix 2.8 and 2.9 respectively. EIAR Volume 4: Technical Appendix 2.6 Peat Slide Risk Assessment provides details of the peat instability assessment and the recommended mitigation measures.
Aviation and Defence	▪ Potential effects on radar and areas of low flying military defence aircraft.	▪ The MOD raised no objection to the proposed development and requested that turbines are fitted with aviation lighting. Infrared lighting would be installed on the	▪ The lighting strategy for the turbines is presented in EIAR

Table 3.1: Mitigation by Design			
Topic/Issue	**Environmental Constraint/ Potential Effect**	**Mitigation by Design**	**Issues Remaining**
		turbines in a pattern that is acceptable to the Ministry of Defence (MoD) for aviation visibility purposes; ▪ NATS confirmed that the proposed development does not conflict with its safeguarding criteria; and ▪ Highlands and Islands Airport confirmed that its calculations showed that, at the given position and height, the proposed development would not infringe the safeguarding surfaces for Inverness Airport and most of the area is in shadow of terrain from the airport's radar. In the unlikely event that the radar is affected, the Applicant would enter into a radar mitigation contract to provide a technical solution to any potential interference.	Volume 2: Chapter 2: Development Description. ▪ No issues remaining. No further assessment is required.
Shadow Flicker	▪ Potential effects of shadow flicker on residential receptors.	▪ The wind farm has been designed to achieve the required 11 rotor diameter separation distance from residential receptors (THC local policy[12]), with the closest property 3 km from the site.	No issues remaining. No further assessment is required.
Forestry	▪ Potential requirement for forestry removal.	▪ Areas of forestry on-site have been avoided and there is no requirement for forestry removal as a result of the proposed development.	No issues remaining. No further assessment is required.
Socio-economics	▪ Potential effects on visual amenity for tourism and recreational locations.	▪ Refer to landscape and visual section of this table; and ▪ TA2.10: Outdoor Access Management Plan describes how access will be managed during the construction process.	Effects on visual amenity are assessed in EIAR Volume 2: Chapter 4: Landscape and Visual. No other significant effects are predicted and therefore no further assessment is required. Socio-economics issue addressed in EIAR Volume 2: Chapter 10: Socio-

[12] The Highland Council (November 2016) Local Development Plan, Onshore Wind Energy Supplementary Guidance

Table 3.1: Mitigation by Design			
Topic/Issue	**Environmental Constraint/ Potential Effect**	**Mitigation by Design**	**Issues Remaining**
			economics and a standalone socio-economics report which has been submitted with the application for consent.
Air Quality	▪ Potential effects on air quality.	▪ The proposed development is not considered likely to give rise to significant impacts on air quality. However, an outline CEMP (EIAR Volume 4: Technical Appendix 2.1) has been prepared which includes general measures to manage air quality such as dust control, wheel washing etc.	No issues remaining. No further assessment is required.
Ice Throw	▪ Potential safety effects of ice falling from turbines.	▪ The maximum potential distance of ice falling from turbines can be approximated using the formula 1.5 x (blade diameter + hub height)[13] . For the proposed development, the maximum distance from a turbine where ice could be expected to fall is therefore approximately 270 m. As such, the risk to public safety is considered to be very low because the distance from the turbines to the nearest public road, residential property or core path is greater than 270 m; and ▪ In line with current guidance[14] , however, a permanent warning sign at the site's entrance is proposed to alert the public to this issue.	No issues remaining. No further assessment is required.

[13] Seifert, H., Westerhellwg, A. and Kroning, J. (2003) Risk Analysis of Ice Throw from Wind Turbines. [pdf] URL: http://www.windaction.org/posts/13298-risk-analysis-of-ice-throw-from-wind-turbines#.VrDHV01yaUl (accessed 09/07/18)

[14] Scottish Renewables, Scottish Natural Heritage, SEPA and Forestry Commission Scotland (2015) Good Practice During Wind Farm Construction, Version 3, URL http://www.snh.gov.uk/docs/A1168678.pdf (Accessed 09/07/18)