



Crossdykes Wind Farm

Environmental Statement Addendum

Volume One: Non-Technical Summary

January 2016



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1 Introduction

1.1 Background

Muirhall Energy Ltd submitted a planning application (Planning application reference 15/P/4/0142) in May 2015 to Dumfries and Galloway Council for consent to build and operate a wind farm consisting of fifteen turbines and associated infrastructure on land on Crossdykes Farm approximately 11 kilometres (km) North-West of Langholm, and 13km North-East of Lockerbie. A Site Location Plan is provided in **Figure A1.1**.

Following feedback from consultees, a number of changes have been made to the site layout. It has been agreed with the Council, that an addendum would be prepared, to update some of the specialist Environmental Impact Assessment (EIA) work within the original Environmental Statement (ES) where necessary.

The addendum includes the following updates;

- **Chapter A1** - Introduction/Overview
- **Chapter A2** - Project Description
- **Chapter A3** - Design Evolution
- **Chapter A4** - Landscape and Visual Impact Assessment
- **Chapter A6** - Ecology Assessment
- **Chapter A7** - Ornithology Assessment
- **Chapter A8** - Hydrology, Hydrogeology and Geology
- **Chapter A9** - Cultural Heritage
- **Chapter A10** - Noise
- **Chapter A11** - Traffic and Transport
- **Chapter A12** - Other Considerations
- A separate updated Planning, Design and Access Statement has been provided as a stand-alone document.

The addendum has been prepared in support of an application to Dumfries and Galloway Council for consent under The Town and Country Planning (Scotland) Act 1997 as amended by the Town and Country Planning etc. (Scotland) Act 2006.

This Non-Technical Summary (NTS) summarises the changes that have been made to the wind farm layout in response to consultee feedback and where relevant describes the outcome of updates to the assessments undertaken where relevant.

There has been no change to the wind farm ground to blade tip height of up to 130 metres (m). The candidate turbine has a capacity of 3.2 Megawatts (MW), so the likely installed capacity of the wind farm will be 48MW. The Development could generate the electrical energy equivalent to the average annual demand of approximately 27,985 homes¹.

¹ For working see **Volume 2** of the Original ES, **Chapter 12.8** – Carbon Savings, Climate Change and Atmospheric Emissions.

The Addendum consists of three volumes:

- **Volume One** is the Updated Non-Technical Summary (NTS), which summarises the main findings of the ES Addendum;
- **Volume Two** is the Main Report which provides a more detailed description of the development and updated EIA assessments.
- **Volume Three** is the updated Figures and Technical Appendices and should be read in conjunction with the Main Report (**Volume Two**).

The addendum and original Environmental Statement may be viewed at the following locations:

- Dumfries and Galloway Council, Planning Department, English Street, Dumfries DG1 2HS
- DG Customer Services Langholm, Market Place Langholm, DG13 0JQ
- DG Customer Services Lockerbie, 31-33 High Street, Lockerbie, DG11 2JL

The full Environmental Statement and Addendum are available on request at the following costs:

- Non-Technical Summary: Free of charge. Also available at www.muirhallenergy.co.uk;
- Environmental Statement (Text, Figures and Technical Appendices) on CD in PDF format: £5
- Environmental Statement (Text, Figures and Technical Appendices) printed: £250;
- Environmental Statement Addendum (Text, Figures and Technical Appendices): £250

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1.2 The Applicant

The application was made by Crossdykes WF Ltd, a project company of Muirhall Energy Ltd. Muirhall Energy is acting as the agent for this development.

Muirhall Energy is an independent renewable energy company based in rural South Lanarkshire, situated less than a mile away from the operating Muirhall Wind Farm giving the company a unique insight into the wind energy project at all stages of its lifecycle. The wind farm was first visualised in 2003 in response to an increasingly difficult economic reality experienced by the farming sector. Muirhall Energy has grown from this original development and now have a considerable number of projects of different scale throughout Scotland.

Muirhall Energy employs 14 full time staff and recognises the employment opportunities which are generated through locally designed projects and has a commitment to benefitting those communities closest to the development. Such projects bring sustainable economic development to Scotland's most rural communities and help to maintain rural populations. Empowering the local community is a central principle of the Muirhall Energy ethos. We truly believe that communities are the cornerstone for the success of every project and our neighbours should have the opportunity to share in the rewards. We are offering the community the opportunity to invest up to 10% of the wind farm company.

Muirhall Energy recognises national targets for renewable energy generation and the contribution which wind energy projects make in tackling climate change and reducing Scotland's dependence on fossil fuels.

2 Project Description

The main elements of infrastructure of the wind farm are outlined below and shown in **Figure A2.1** of this Non-Technical Summary. This section should be read in conjunction with the updated project description chapter in **Chapter A2, Volume Two** of the addendum. It should be noted that the revised wind farm layout does not result in any changes to the planning application boundary.

Key components:

- 15 wind turbines each with an anticipated maximum rated capacity of 3.2MW and up to 130m blade height to tip;
- Crane hardstandings (used during construction, operational repair and decommissioning);
- An internal or external transformer at the base of each turbine;
- One new access bell mouth entrance from the C80a;
- Approximately 7.5km of new access tracks including both 6.5km of excavated track and 1km of floating track sections;
- Underground cabling within the Application Site running in trenches alongside the access tracks where possible;
- A control building which will house the electrical metering stores and welfare facility;
- Up to 2 temporary construction and laydown compounds;
- Two borrow pit areas;
- A temporary concrete batching plant
- One permanent anemometer mast approximately 80m in height

Consent is sought for a period of 25 years, thereafter the wind farm will either be decommissioned or consent may be sought to extend its operational life.

The construction period for the development is anticipated to be approximately 18 months. The decommissioning period is expected to last up to 12 months.

3 Design Evolution

3.1 Introduction

This section should be read in conjunction with the original ES **Chapter 3: Site Selection and Design** which describes the site selection process and the design strategies that were adopted in arriving at the original wind farm layout, however in summary the site at Crossdykes has been selected due to the following:

- Located in a 'Search Area' for large scale wind as defined by Dumfries and Galloway Council Policy
- Sufficient set back from residential properties
- High wind speeds
- Access to the grid
- Ability of the receiving landscape to accommodate the wind farm²
- Of low ecological and ornithological value

The revised layout has, where possible sought to build on the original key design objectives, which were to:

- Achieve a design that would be broadly comparable or co-existent with other existing and consented wind farm development in the area.
- Achieve a sufficient set back from Scheduled Monuments at Newlands Hill to the South.
- Maintain at least a 750m buffer from residential properties.
- Avoid placing turbines close to the C80a minor road.

3.2 Consultee feedback

Following submission of the Planning Application and associated Environmental Statement (ES), a number of consultee responses were provided. Primarily, modifications to the site layout have been made to mitigate concerns raised by Historic Scotland (now known as Historic Environment Scotland), however comments provided by Dumfries and Galloway Council's Landscape architect have also been factored into the re-design.

3.3 Modifications to the Wind Farm Design

The main driver for modifications to be made to the scheme were in order to resolve concerns from Historic Environment Scotland (formerly Historic Scotland) and Dumfries and Galloway's Archaeology Officer who objected to the development due to potential negative impacts on the setting of a number of scheduled monuments in the surrounding area.

² The site area is located within Zone 1 of SNH's Strategic Guidance for Onshore Wind Farms (March 2009) which is defined as an area of "Lowest natural heritage sensitivity identifies areas at the broad scale with least sensitivity to wind farms, with the greatest opportunity for development, within which overall a large number of developments could be acceptable in natural heritage terms, so long as they are undertaken sensitively and with due regard to cumulative impact."

Whilst a formal response was not received from Dumfries and Galloways Landscape architect, informal feedback on the layout was provided. Given that both setting impacts from a cultural heritage perspective and also landscape impacts are inter-related, extensive consultation was undertaken with both Historic Environment Scotland and Dumfries and Galloway Council to revise the layout to mitigate any concerns.

3.3.1 Cultural Heritage

Historic Environment Scotland and Dumfries and Galloway Councils Archaeologist have objected to the proposed development due to impacts on the setting of and intervisibility between two scheduled monuments located to the south of the development, namely Craighousesteads and Newlands Hill Forts. In order to address these concerns the revised layout has sought to:

- Relocate turbines further North away from Newlands Hill Fort so that they appear less dominant
- Ensure that turbines do not appear directly behind views between Craighousesteads and Newlands Hill Fort

Figure A3.1: Cultural Heritage Design Modifications illustrates how these design measures have been incorporated into the new wind farm layout.

3.3.2 Landscape & Visual

One of the key design objectives for the initial wind farm design was that the Development should relate well to the relationship of the Ewe Hill Wind Farm and the underlying Ewe Hill land mass, emphasizing common landscape characteristics. The development should also be seen as part of a 'Ewe Hill' wind farm group whilst maintaining adequate separation or a 'gap' between the revised Development and other wind farms including Ewe Hill, Minsca and Solwaybank.

Whilst this design objective was considered to be appropriate by SNH and the Councils Landscape Architect, it was felt that further separation between the Ewe Hill Wind Farm and Crossdykes would further improve the design.

The revised turbine layout has addressed these concerns by moving turbines 14 and 15 closer to the main group and repositioning the remaining turbines accordingly.

3.3.3 Changes to Site Infrastructure

As a result of turbine relocation, a number of amendments have also been made to the wind farm infrastructure which are as follows:

3.3.3.1 Turbines

Following the decision to relocate turbines to address cultural heritage and landscape concerns, the site layout also had to be designed to avoid other known on site environmental and technical constraints. This has in most instances only resulted in changes in location within 100 metres of their original position, however a number of turbines have moved slightly further, with Turbine 13 moving significantly further away joining the first row of turbines in the north. This decision was taken to ensure that lost generation resulting from the movement of turbines from the highest and windiest part of the site could be offset by maintaining production of Turbine 13 rather than complete removal.

3.3.3.2 Access Tracks

The access tracks have been re-routed to service the new turbine locations. This has resulted in the length of access track required being reduced from 8.5km to 7.5km. The same design rationale has been applied in that tracks have been designed to route along the forest edge to the north initially and then down from the back of the site rather than coming directly from the west and crossing the open and simple hillside.

3.3.3.3 Control building

A control building will be required to house the electrical switchgear and control equipment and welfare facilities for staff. Two options are being considered for the control building location at present as the final grid route has not been finalised. Whilst the northern option has been relocated closer to the site entrance and will therefore be more visible from the C80a, a number of design measures would be agreed with the planning authority and employed to ensure that the building is in keeping with the local landscape.

3.3.3.4 Permanent anemometer mast

A permanent anemometer mast will be required to inform wind farm operations and performance monitoring. The original layout allowed for two permanent masts; however the most northerly mast has been discounted for technical reasons. Only permission for the most southerly mast is being sought as part of the re-design.

3.3.3.5 Watercourse crossings

As the more southerly turbines have moved off the top of the hill and further west, due to a number of onsite environmental constraints predominantly for landscape reasons, this has meant that additional watercourse crossings are required. The crossing points have been designed to ensure that all crossings are over watercourses <1m wide.

3.4 Conclusion

The revised layout shown in **Figure A3.2** has sought to build on previous design objectives following advice from consultees, whilst at the same time avoiding on-site environmental constraints.

In particular, the revised layout is considered to strengthen the original design strategy that sought to create a design that reads coherently with the landscape, and creates a coherent group of turbines that has been designed to appear well related to the Ewe Hill Wind Farm with sufficient similarity of design and visual appearance to preserve the integrity of Ewe Hill whilst reinforcing the appropriateness of wind farms within the Ewe Hill landmass or Southern Upland with Forestry: West Langholm unit

4 Landscape and Visual Impact Assessment (LVIA)

4.1 Introduction

The updated LVIA assessment conforms to the Guidelines for Landscape and Visual Impact Assessment, Third Edition³ (GLVIA) and has been undertaken by chartered landscape architects at AMEC Environment and Infrastructure Ltd. The assessment process has encompassed the construction, operation, and decommissioning phases of the revised Crossdykes Wind Farm layout and has included design iteration and re-assessment of the residual effects.

Strategic landscape planning advice from SNH, the DGC Local Development Plan, Interim Spatial Strategy (March 2015) and the Dumfries and Galloway Wind Farm Landscape Capacity Study provides the following advice on the proposed Crossdykes Wind Farm site:

- The proposed site area is located within 'Zone 1' of SNH's Strategic Guidance for Onshore Wind Farms (March 2009) which is defined as areas of 'lowest natural heritage sensitivity'.
- The DGC Local Development Plan, Interim Spatial Strategy (March 2015) indicates that the proposed site lies wholly within an 'Area of Greatest Potential for Large Turbines' (>80m).
- The DGWLCS has been used as the main reference for landscape character and capacity assessment for wind farm development and the revised development would be predominantly within the Southern Uplands with Forest (19a) West Langholm unit, close to the boundary with the Foothills with Forest (18a) Castle O'er unit. The DGWLCS considers that the Southern Uplands with Forest (19a) West Langholm unit, is of 'Low' overall sensitivity to wind farm development and that this landscape character type is of the lowest sensitivity to large turbine typology within Dumfries and Galloway as a whole.

Scoping and Post application consultation on landscape and visual assessment, has been undertaken with SNH and Dumfries and Galloway Council. This advice has been used to assist the redesign and revised assessment process with additional comments provided on viewpoint selection and the cumulative assessment.

The revised Crossdykes Wind Farm would have a reduced development 'foot-print' and would require less infrastructure (reduced length of access track and reduction in the number met masts and compounds required for example). These reductions in the physical extent of the revised Development would lead to a localised reduction in the geographical extent of the direct landscape and visual effects likely to be experienced at a local level.

The updated LVIA assessment set out in the ES Addendum confirms that there would be **No Change** to the landscape and visual effects assessed in the ES. Whilst the nature of these effects in terms of the design and the landscape 'fit' with the existing landscape resource, demonstrates an improvement in the design and visual composition of the revised Crossdykes Wind Farm. Cumulatively the revised Development has been designed to appear well related to the Ewe Hill Wind Farm with sufficient visual separation to preserve the integrity of that development and reinforce the appropriateness of wind farms within the Ewe Hill landmass of the Southern Upland with Forestry: West Langholm unit. In this

³ Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and IEMA, 2013.

respect the design and assessment process has responded to post application comments and advice received from DGC and SNH in respect of design and landscape and visual effects.

4.2 Landscape Effects

Landscape Effects are concerned with how the proposed Development would affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

There would be **No Change** to the landscape effects assessed in the ES.

The revised Crossdykes Wind Farm would have a significant effect on part of the Southern Uplands with Forest: West Langholm unit and a small part of the adjacent Foothills with Forest: Castle O'er unit extending to within approximately 1-2km of the turbine locations. The Southern Uplands with Forest is already affected by the proposed Ewe Hill Wind Farm and the proposed Crossdykes Wind Farm would be seen as a closely related cluster forming part of a larger 'Ewe Hill Wind Farm Group' within this area of Southern Uplands with Forest, whilst maintaining adequate separation or a 'gap' between the revised Development and other wind farms including Ewe Hill, Minsca and Solwaybank.

The revised Crossdykes Wind Farm site is not designated at a local or national level and there would be no significant effects on locally or nationally designated landscapes including the Langholm Hills RSA.

4.3 Visual Effects

Visual effects are concerned wholly with the effect of development on views, and the general visual amenity. The visual effects are identified for different receptors (people) who would experience the view at their places of residence, during recreational activities, at work, or when travelling through the area.

There would be 'No Change' to the visual effects assessed in the ES.

The revised Viewpoint analysis indicates that significant visual effects would remain limited to within approximately 5km distance from the revised turbine positions and would affect the views from 4 residential properties within 2km (3 of which are involved properties), views from the C80a minor road / byway, 2 local footpaths and the winter views from the northern part of Corrie Common. The views from 3 of the 'features of interest' along the Eskdale Prehistoric Trail would also be significantly affected although it is considered that the overall visitor experience would not be compromised due to the wider 360° open views from these locations and the focus of the experience of the locality of these features. Many of these locations would already be affected by the proposed Ewe Hill Wind Farm and to a large extent the revised Development mirrors the effects profile of that consented wind farm development.

To conclude, the revised Crossdykes Wind Farm may be regarded as consistent with the guidance of the DGWLCS and the requirements of the DGC's LDP policies IN2 Wind Energy in respect of landscape, visual and cumulative effects.

5 Socio Economics, Tourism and Recreation

5.1 Introduction

Analysis has been undertaken in respect of the revised layout proposed at Crossdykes. The assessment analysed the Zone of Theoretical Visibility (ZTV)⁴ of the revised layout against each of the tourism and recreation receptors identified in the original ES assessment (May 2015) in order to gain an understanding of potential visual impact. In addition to analysing impact on the visual amenity of the receptor, the assessment also considered the likely tourist or recreational user's behavioural response to the change in their visual amenity and other mitigating factors. An impact on these receptors will only be experienced where people change their behaviour in response to the visual alterations to the landscape e.g. by visiting the area more frequently, by no longer visiting the area, or by visiting less frequently.

Predicted behavioural response is covered in detail in the comparative research evidence section of the Original ES, Chapter 5 (Section 5.11). This comparative research section strongly indicated that well-located wind farms are unlikely to lead to significant adverse impacts upon tourism or recreation in the area.

5.2 Conclusion

The revised layout has not altered the proposed visibility of the scheme significantly from that submitted under the original ES. As a result the assessment has come to the same conclusions as those reached under the original ES, in that the revised layout will not lead to any significant residual effects. It can therefore be concluded that the significance of the permanent effect of the proposed development on the tourism and recreation facilities would be limited and is assessed as being of minor scale and not significant. As a result no additional work has been undertaken to assess this further.

⁴ The ZTV however, does not take account of built development and vegetation, which can significantly reduce the area and extent of actual visibility in the field.

6 Ecology

6.1 Introduction

The Ecology section of the addendum considers how the revised layout affects ecological receptors identified on site through previous survey work.

6.2 Findings

The potential effect on habitats within the site was assessed. When compared to the layout in the original Environmental Statement (ES), the revised layout results in slightly less total habitat loss as a result of the wind farm infrastructure such as access tracks and turbine foundations. In addition, the habitats affected are less sensitive, with a smaller area of more valued habitat such as modified bog predicted to be lost. These changes are relatively minor and the overall findings of the addendum do not differ from the findings of the original assessment in the ES.

6.3 Mitigation

An outline habitat management plan was included as part of the original ES including the promotion of natural bog plant species on site through reduced livestock grazing. Mitigation in the form of a habitat management plan is still considered to be required, and with this in place, the effect on habitats is not considered to be significant.

7 Ornithology

7.1 Introduction

The ornithology section of the addendum considers how the revised layout is predicted to affect bird populations identified through previous surveys identified in the original ES.

7.2 Findings

The potential for effects on a number of different groups of birds has been considered in the light of the revised layout. The revised layout covers broadly the same area as the layout assessed in the original ES. As a result, the assessment process has not found any changes to the significance of effects on bird populations as a result of this layout revision.

7.3 Mitigation

Mitigation in the form of a Habitat Management Plan is still considered to be required in relation to potential effects on the moorland waders breeding in the immediate vicinity of the proposed turbines. For example the damming of drains in some of the marshy areas of the site would help provide additional insect rich juvenile feeding areas for wader species such as curlew. With mitigation measures such as this in place none of the effects assessed in this addendum have changed in relation to their potential significance.

8 Hydrology, Hydrogeology and Geology

8.1 Introduction

The site is characterised by moderately sloping valley side topography ranging from 322m AOD at Pleamoss Hill in the north east to 210m AOD at the Water of Milk on the western boundary. The entire Project site is currently used for grazing of livestock, with commercial forestry present along the northern and eastern site boundaries. The site falls within the catchment of the Water of Milk which flows north to south along the western boundary of site. Several tributaries of the Water of Milk rise within the site, whilst there is also an abundance of artificial drainage present across the site. Tributaries of the Water of Milk draining the site include the Hare Sike, which drains the northern area, whilst the Glaister Burn and Carling Sike drain the central part of the site. Percy Cleugh drains a southern area of the site on the north facing slopes of Percy Hill, whilst the very southern tip of the site drains to the Newland Cleuch.

The assessment included a range of components including, surface water hydrology (including flooding and hydromorphology), hydrogeology, groundwater dependent terrestrial ecosystems (GWDEs), water quality, water supplies (including private water supplies, other water supplies and abstractions required by the development) and soils (including peat). The assessment methodology included a desktop study, site walkover and peat depth survey to establish baseline conditions, an assessment of the potential impacts of the development on hydrology and ground conditions, and the provision of suitable mitigation measures where necessary. Due to the presence of peat deposits across part of the site a Peat Slide Risk Assessment and Peat Management Plan were also prepared. A carbon balance assessment for the development has been undertaken using the Scottish Government carbon calculator. Further revisions to the assessments, including further peat depth surveys, have been carried out in the form of an addendum to address a number of subsequent changes to the design layout.

The key issues assessed in relation to the water environment are the potential for pollution, erosion and sedimentation and the alteration of natural drainage patterns. Key potential effects on the soil environment relate to the disturbance and excavation of soils, particularly peat, in terms of both peat slide risk and the management and appropriate re-use or disposal of any excavated peat deposits.

8.2 Findings

The following list details the key findings of the assessments outlined above:

- The Water of Milk is designated as being of 'Good' ecological status under the River Basin Management Plan (RBMP) classification in 2013. The Water of Milk falls within the River Annan catchment which is designated under the Freshwater Fish Directive as salmonid waters;
- In total eight watercourse crossings will be required, one on the Water of Milk;
- The majority of the survey area is overlain by glacial till, higher ground is free from superficial cover with the exception of small areas with peat cover;
- The deepest peat deposits were found in the north eastern corner of the site, and adjacent to the Water of Milk in the west of the site. Smaller areas of shallower peat were identified along the northern and eastern site boundaries;
- The site layout has been designed to avoid peat deposits where possible;
- GWDEs are situated across the majority of the site;

- One turbine foundation (T3) is situated on deep peat (depth <1.6m), whilst five further turbines are situated on peat with an average depth of 0.5 – 0.7m;
- The remaining nine turbines are situated on organic soils;
- The majority of site infrastructure falls within zones of peat landslide risk which are acceptable for development, assuming that suitable mitigation, monitoring and contingency measures are put in place;
- Several short sections of access track near the site entrance are located in close proximity to the higher risk zone, as is the hardstanding of T2. A number of measures are suggested to mitigate this risk;
- The volume of peat excavated for the Project and has been calculated as 21,520m³, which consists of 15,391m³ of acrotelmic peat and 6,129m³ of catotelmic peat. This represents a reduction in overall excavated volume in comparison to the previous layout;
- One private water supply is located within the site boundary and is situated 47m to the west of the met mast. The developer has an agreement in place with the landowner/private water supply owner, with a commitment to provide an alternate supply prior to construction.

8.3 Mitigation

The infrastructure layout avoids hydrologically sensitive areas where possible and provides appropriate buffer zones between construction elements and watercourses to minimise the risk of water pollution and increased sediment loading. The layout has been designed iteratively to avoid areas of deeper peat and other on-site environmental constraints, only the infrastructure described above will be located within peat.

A Construction Environmental Management Plan (CEMP), including surface water and peat management, pollution prevention measures and construction method statements, will be in place during construction, operation and decommissioning. An Environmental Clerk of Works (ECOW) will supervise the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively. Best practice will be adopted throughout the Project phases following current guidance. A pollution prevention and response plan will be set out in the CEMP relating to the construction of the wind farm, statutory requirements and identification of areas of highest sensitivity. A monitoring plan will be established and implemented with the agreement of SEPA and will be incorporated into the CEMP. Surface water drainage arrangements for construction elements will be in line with the principles of sustainable drainage systems (SuDS).

An outline Peat Management Plan (PMP) has been revised to account for the changes proposed to the infrastructure layout. The outline PMP proposed that excavated material will be reused in line with the guidance produced by Scottish Renewables and SEPA (2012) and will utilise all the peat and organic soils excavated during construction. The Peat Landslide Risk Assessment (PLRA) has also been revised to account for layout changes, this outlines good practice and mitigation measures to reduce the likelihood of a peat landslide occurring or to reduce the potential effects associated with a peat slide. This includes the use of a live geotechnical risk register during the construction and decommissioning phases under the supervision of an on-site geotechnical engineer. Contingency planning for peat landslide events will be undertaken at an early stage during construction planning and the finalised PMP will be incorporated into the CEMP.

Specific mitigation measures have been identified to reduce the impact on the GWDTE, including design of tracks and drainage to maintain existing flow paths. The track layout has been designed to

minimise the number of new watercourse crossings where possible. There are eight proposed watercourse crossings, all crossings are at watercourses which are <1m wide. Crossings will be of sufficient size so as not to restrict or concentrate flows downstream and to convey flows during periods of heavy rainfall.

8.4 Conclusions

These mitigation measures and management plans would result in there being no significant effects from the project activities. Therefore overall the effects of the proposed wind farm on the water environment and soils are not considered to be significant under the terms of the EIA Regulations.

9 Cultural Heritage

9.1 Introduction

The revised layout has been assessed in terms of its impact on the cultural heritage value of assets both on and off site. The assessment has used the same assessment methodology and guidance as the original ES to assess the potential effects resulting from the amended layout of the proposed Crossdykes Wind Farm. The proposed layout of the wind farm has been primarily modified in response to comments from Historic Scotland, Dumfries and Galloway Council Archaeologist and Landscape Architect.

9.2 Impact Assessment and Mitigation

Following an objection from Historic Environment Scotland, and Dumfries and Galloway Council Archaeologist a decision was taken to principally relocate Turbines 11, 12, 13 14 and 15. This was undertaken to:

- Move turbines further North away from Newlands Hill Fort so that they appear less dominant
- Ensure that turbines do not appear directly behind views between Craighousesteads and Newlands Hillfort

The revised layout changes have not resulted in any changes to the conclusions of the original assessment of effects upon the setting of cultural heritage assets in the wider landscape. Indirect and cumulative effects of moderate significance have been predicted affecting the settings of three heritage assets: Camp Hill fort (Index No. 647); Newland Hill fort (Index No. 3964) and Newland Hill settlement (Index No. 12667). Indirect and cumulative effects of no more than minor significance have been predicted for the remaining heritage assets within the 10km assessment radius and ZTV. However, the predicted significant effects would not be so adverse as to diminish the integrity of the setting of these assets to an unacceptable degree, and, when measured against the baseline setting including Ewe Hill Wind Farm, these effects are considered not to be unacceptably adverse. The revised layout is considered to further lessen impacts in particular Newlands Hill Fort and Newland Hill Settlement by moving turbines further away to the north which Historic Environment Scotland have suggested no longer raise issues of national significance.

No direct effects have been predicted as a result of the revised layout; the iterative design process, which has included re-routing and micro-siting the proposed on-site access track has led to the avoidance of all identified heritage assets. It is possible that accidental damage to some assets may occur due to their proximity to proposed development infrastructure. To avoid such accidental direct effects, mitigation, in the form of fencing off or marking out these assets, has been proposed.

However, the likelihood of encountering remains of archaeological importance is assessed as being moderate to low. Mitigation, in the form of an archaeological watching brief has been proposed where the on-site main access track passes in close proximity to features identified, and over the footprints of the construction compound, concrete batching compound, substation and network operator compound areas which lie close to the areas where features have been recorded.

No significant residual direct effects resulting from the construction or decommissioning of the proposed development are predicted in the addendum.

10 Noise

10.1 Introduction

A noise impact assessment has been undertaken for the proposed development, based on a revised turbine and infrastructure layout, and has considered both the construction and operational phases.

The assessment of construction activities has been undertaken in accordance with the guideline noise limits detailed within British Standard BS5228-1:2009+A1:2014, 'Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise' (BSI, 2014).

The assessment of operational and cumulative noise has been undertaken in accordance with relevant standards and guidance documents including ETSU-R-97, 'The Assessment and Rating of Noise from Wind Farms' (DTI, 1996).

10.2 Findings

Predicted construction noise levels do not exceed daytime noise limit of 65dB LAeq or the evening and weekend noise limit of 55dB LAeq at any Noise Sensitive Receptor (NSR). Therefore, construction noise impacts are assessed as negligible and not significant in EIA terms.

The assessment of operational and cumulative noise has demonstrated that predicted noise immission levels do not exceed the derived ETSU noise level limits at any receptor. This is applicable across all assessed wind speeds, during both the daytime and night-time periods. Therefore, no significant effects are predicted.

The impact of noise from the proposed development, with a revised turbine and infrastructure layout, is therefore not considered to be significant. As a result, there will be no negative noise impacts associated with the construction or operation of the turbines.

11 Traffic and Transport

11.1 Introduction

The original transport ES chapter concluded that whilst flows would increase along stretches of roads used by construction traffic during the 18 month Construction period, overall traffic flows would still be well within their respective carrying capacities.

The proposed revised infrastructure layout has resulted in the following, relevant to the Construction Delivery Programme:

- Decreased the amount of access track required (original layout which was 8.5km) now 7.5km
- Removed Met Mast (1) and the associated access track
- Downsized the substation compound footprints originally 65 x 65 (now 50 x 50)
- Removal of network operator compounds x 2

The result of this will be an overall reduction in the volume of materials required to be imported onto the site which will lead to a reduction in the number of vehicles accessing the site during the 18 month construction period. Given that there will be an overall reduction in vehicle numbers generated as a result of the revised proposals, and that the implementation of a Construction Traffic Management plan can mitigate any adverse effects on the road network or local communities, it has been concluded that the revised proposals would not be significant in EIA terms.

12 Other Considerations

12.1 Aviation & Military Assets

12.1.1 Ministry of Defence (MoD)

There was no objection to the wind farm layout presented in the original environmental statement. Due to the changes in the revised site layout further consultation will be undertaken with the MoD, the outcome of which will be provided to Dumfries and Galloway council, although it is not expected that these amendments will change the MoDs response original response.

12.1.2 NATS En Route Ltd (NERL)

A detailed Technical and Operational Assessment (TOPA) for the proposed development was produced as part of the consultation process with the National Air Traffic Service (NATS). The TOPA identified a potentially unacceptable technical impact on NATS Lowther Hill radar. A further potentially unacceptable impact was also identified on Prestwick Centre ATC. No impacts are predicted for navigational aids or radio telecommunication assets.

Since the submission of the original ES NATS have confirmed that suitable radar mitigation is available which if deployed will enable them to remove their objection. This will involve the developer entering into a contract which will ensure mitigation is in place prior to the wind farm becoming operational. Evidence will be provided to Dumfries and Galloway Council that mitigation is available so that a suitable condition can be attached to any planning consent granted.

12.1.3 MoD Eskdalemuir Seismological Recording Station

The MoD has no objections in regards to the Eskdalemuir Seismological Recording Station and in regards to the previous site layout. The revisions to the site layout will be consulted with the MoD and the response of which will be communicated with Dumfries and Galloway Council, although it is not expected that these amendments will change the MoDs original response.

12.2 Telecommunications

The revised turbine locations have been communicated to a number of consultees including British Telecom, Ofcom and The joint Radio Company who monitor assets on behalf of Scottish Power and Scottish Gas Networks. Consultees have raised no objections to the revised layout therefore no impacts are anticipated in respect of telecommunications.

12.3 Television Reception

Applying the Ofcom distance criteria to the proposed development shows that there are no residential properties within 500m; the nearest property is over 1km from the nearest turbine. There are also no transmitters within 5km of any of the turbines. The nearest transmitters are at Langholm and Moffat which are at a distance of approximately 10km and 24.5km respectively.

12.4 Public Safety

There has been no objection raised by Dumfries and Galloway's Access Officer to the proposed project in respect to the previous wind farm layout. Consultation will be undertaken to determine if any impacts have been identified due to the revised site layout.

12.5 Shadow Flicker

A shadow flicker assessment of the revised turbine layout was undertaken using a specialised computer software package. Any residential properties with the potential to be affected were considered.

The assessment used a worst-case scenario based on 10 times rotor diameters, beyond which shadow flicker is not considered a problem⁵.

Within 10 rotor diameters (1010 m) from each of the turbines, there are no properties which fall within the area potentially susceptible to Shadow Flicker. However, it is still the case that if any of the neighbouring residents experience a loss of amenity due to shadow flicker this will be investigated by the developer and suitable mitigation will be offered in the form of vegetation screening or blackout blinds for the affected window(s). If this does not offer a solution then the wind turbines can be programmed to be constrained during the most sensitive periods.

12.6 Carbon Savings, Climate Change and Atmospheric Emissions

As required by Government guidance, an assessment has been undertaken to establish how long the operation of the proposed development would take to offset the carbon emissions produced through the construction of the wind farm. For example some Carbon Dioxide may be released when peat is disturbed by access track or turbine foundation construction. The assessment has also considered the environmental benefits that the project could bring e.g. the amount of carbon emissions saved that would be produced by traditional methods such as coal and gas power stations, should the project not be progressed.

Following feedback from consultees on the original wind farm layout, a number of revisions have been made. Deeper areas of peat (which have the potential to release CO₂ if disturbed) on site have been avoided where possible by site infrastructure including access tracks, turbine foundations and hardstandings. The result of this is that Net overall CO₂ emissions have been minimised with the overall carbon payback being reduced.

Using a government recommended methodology 'Calculating Carbon Savings from Wind Farms on Scottish Peat Lands – A New Approach', an updated carbon assessment has been undertaken. The carbon assessment calculates that the carbon loss in developing the Crossdykes Wind Farm would be paid back in approximately 1.8 years. This achieved carbon balance for the Crossdykes Wind Farm is relatively short in comparison to the project's operational life and is aligned with the Scottish Government's position to maintain the impetus on providing decarbonising electricity supply to progress to a low carbon Scotland by 2030. The pay-back period is slightly shorter than that presented for the original layout in the ES (1.9 years) due to the reduced volume of peat excavated for the revised layout.

⁵ There is no guidance or set limits in Scotland for exposure to shadow flicker, however information specific to shadow flicker is provided in, "Onshore Wind Turbines, Scottish Government Renewables planning advice" last updated in May 2014, which states that: "Where separation is provided between wind turbines and nearby dwellings (as a general rule 10 rotor diameters), "shadow flicker" should not be a problem."