Technical Appendix 4.2: LVIA Methodology

4.10 This LVIA methodology has been specifically developed for wind farm development in Northern Ireland in accordance with the relevant best practice guidance where applicable (see Technical Appendix 4.1). The LVIA refers to mapped information, planning policy and existing landscape character assessment documents, and uses photographs and field survey work, together with the professional judgement of an experienced Landscape Architect. It combines existing desktop information, such as maps and documents, with detailed site surveys of the Study Area. The desktop study includes a review of relevant planning policies to identify any elements or parts of the Study Area which are recognised for their landscape or visual qualities and any preferred locations for wind farms that may already have been identified. It also evaluates likely levels of acceptable change for various parts of the Study Area in accordance with current definitions of landscape and visual sensitivity.

4.11 Potential landscape and visual effects are assessed as separate but linked issues. Both require a combination of quantitative and qualitative evaluation. The 'Magnitude' of landscape effects is derived from the extent to which physical changes cause changes in landscape character and value. The 'Magnitude' of visual effects relates to changes in the composition of views and people's perception of/responses to these physical changes.

4.12 For both landscape and visual effects the 'Significance' of effect is derived from the assessment of 'Landscape Value', the nature of the receptors in question (hereafter referred to as 'Sensitivity') and the nature of the effects on these receptors (hereafter referred to as the 'Magnitude' of change that will be experienced) and also by using professional judgement in relation to site circumstances. It is important to recognise that the landscape is constantly evolving and that opinions on the beneficial or adverse effects of wind farms are highly subjective. Therefore, whilst a judgement is made on the significance of effects, no judgement is made on whether these effects are beneficial or adverse.

Baseline Characterisation: Landscape Character

4.13 The meaning of landscape in this LVIA is in accordance with the SPPS definition as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors*"[2]. The first stage of this LVIA establishes the existing landscape character of the Study Area. It includes a description of landform, land cover, seasonal elements and historical and cultural associations. Landscape character is the result of unique interactions between different elements such as geology, soils, vegetation and historical and current human influences. Natural, man-made, physical and aesthetic attributes are

[2] section 4.2.1 of SPPS

considered alongside the physical condition, frequency and rarity of these attributes. Areas of distinct, recognisable or common character are defined individually as LCAs. Existing definitions of LCAs and RLCAs are analysed by site survey.

4.14 Defining landscape character allows landscape value to be analysed. An understanding of landscape character and value requires an understanding of the processes that have created this character and future processes that may alter it. The overall value to society of each LCA is evaluated against defined criteria and their Sensitivity to development and change is established. The LVIA notes if/where existing definitions of landscape character have been amended. Some LCAs may not be considered in detail following the Baseline Assessment if they are not judged to be significantly affected by the Proposed Development. For example, LCAs on the periphery of the Study Area, or those from which there are few or no views of the Proposed Development. Such LCAs are clearly identified in the Baseline Assessment section of ES Chapter 4, Technical Appendix 4.3 and Figure 4.2.

Landscape Value

4.15 Values are attached to landscapes by different stakeholders for a variety of reasons. The LVIA process seeks to establish a definition of 'Landscape Value' that reflects both this range of opinions and each particular landscape's contribution to the overall landscape character of the Study Area. Defining the value of a particular landscape to society requires the recognition of 'sense of place' through consideration of factors such as condition, scenic quality, tranquillity, remoteness, rarity, cultural associations, history, conservation and recreational interests, and broader social, economic and environmental aspects.

4.16 The definition of landscape value has been derived from best practice guidance and the SPG, which defines Landscape Value as "*the intrinsic value that is attached to a landscape, often reflected in designation or recognition. It expresses national or local consensus as to the (degree of) importance of a landscape, for reasons including landscape quality, scenic (or visual) quality, wildness and tranquillity, natural and cultural heritage interests, cultural associations and recreational opportunities.*"

4.17 The following criteria outline the general principles that are used to inform and guide the assessment of Landscape Value:

- ***Outstanding Landscape Value***: Such landscapes may be outstanding because of factors such as dramatic scenic quality, or unspoilt beauty. They may also contain rare cultural or historic features, have notable cultural associations, important geological features or contain a large proportion of high quality habitats. They are likely to be in good

condition, with a distinctive sense of place, and may be of national or international importance that is evidenced by statutory designation;

- ***High Landscape Value***: Such landscapes may be aesthetically pleasing and have positive characteristics including features that are unspoilt and in good condition, a high proportion of sites that are of geological or ecological interest, notable historic associations and a strong sense of place. These areas may be of national or regional importance that is evidenced by relevant statutory designations;
- ***Moderate Landscape Value***: Such landscapes may have overall good aesthetic qualities, with some intact characteristic features, but with other features that are not in optimum condition, or which are fragmented or spoilt. These areas may contain a smaller number of features of interest and may be of local importance;
- ***Low Value***: Such landscapes may be in poor condition or have undergone change to the extent that they do not have a distinctive or coherent character, aesthetic quality or strong sense of place. Few characteristic features are likely to remain intact and features may be highly fragmented or spoilt. These areas may contain a limited number of notable features or associations and are unlikely to be statutorily designated.

Landscape Sensitivity

4.18 The SPG defines 'Landscape Sensitivity' as a term based on the inherent sensitivity of landscape receptors to changes in both landscape character and visual terms, and which, in EIA terms, can also be used to encompass the value placed upon landscape. This definition has been updated by the GLVIA[3] which advises that sensitivity should be clearly separate from value. It should combine judgements on the susceptibility of landscape receptors to change caused specifically by the Proposed Development with the Value attached to the landscape in question. Therefore, in the context of this LVIA judgements on Landscape Sensitivity consider the susceptibility of landscape receptors to the changes caused specifically by the Proposed Development. The LVIA takes account of the stability and resilience of LCAs to withstand change and recuperate from loss or damage to their character elements resulting from the Proposed Development without unacceptable detrimental effects on overall character. An understanding of how different landscape attributes interact assists in defining if, and how, wind farm development may be suitably placed in the landscape. It also allows choices to be made on suitable turbine layouts and sizes of wind farms, which vary according to the characteristics of the receiving landscape. Key landscape attributes that are likely to influence sensitivity to wind farm developments include:

[3] The Landscape Institute and IEMA (April 2013) *'Guidelines for Landscape and Visual Impact Assessment 3rd Edition' section 5.39*

- ***Scale and Enclosure:*** The perception of the size and presence of various character elements, such as landform, trees and houses, against which the relative scale of larger features such as wind turbines are perceived. Consideration is given to whether the landscape is open or enclosed, the range of views (e.g. close, medium or long range), and the extent to which elements such as topography and vegetation provide screening. Landscapes that are visually contained may be less sensitive, although close range views from populated areas may increase sensitivity. A Proposed Development should be of a size and layout that is in keeping with the receiving landscape character;
- ***Skyline:*** The extent to which people's eyes are drawn towards the skyline depends on the simplicity or complexity of the skyline and whether there are other elements or foci distributed in the view and/ or along the skyline. Where they are visible, skylines are often important character components, and wind farm developments should relate well to them;
- ***Landscape Pattern:*** Understanding the complexity of a landscape can help to determine how a development might relate or conflict with the character of the receiving landscape. A landscape may have a simple composition, such as open moorland, or be more complex, for example, a rugged landscape containing many peaks, or a mosaic of land uses. New development should be designed to relate well to any strong existing landscape patterns, such as hedgerow networks or drainage ditches;
- ***Remoteness and Tranquillity:*** The introduction of turbines may not only result in physical effects on the landscape but, together with the movement of blades, may impact on the perceived sense of remoteness and tranquillity. The extent to which a landscape is remote or tranquil is considered in the assessment of Sensitivity;
- ***Features of Interest:*** The presence of natural and cultural heritage features, such as designated habitats, archaeological sites, and specific cultural associations, which serve to make a landscape particularly special or unique. New developments should not diminish the enjoyment of these features;
- ***Manmade Influence:*** Some landscapes may contain existing, sometimes large-scale elements, such as buildings and structures, commercial forestry and transport infrastructure, which indicate the extent to which the character is already shaped by man. This may influence how the landscape would be affected by wind farm development. A mix of different man-made elements may lead to visual confusion or interruption. Landscapes which are already heavily influenced by man-made elements

may also be less sensitive to wind farm development, although close proximity to settlement may also increase sensitivity;

- ***Rarity*** is the frequency, or density of rare or unusual landscape features which serve to make a landscape particularly special or unique;
- ***Quality*** is influenced by the physical state of the existing landscape, its intactness and its ability to repair after loss. High quality landscapes may be more or less sensitive to change depending on the robustness of their individual character elements;
- ***Value:*** The value attributed to the landscape is an important factor to be considered when assessing the sensitivity of a given landscape.

4.19 The consideration of each of the key landscape attributes described above enables a considered judgement to be made on the level of sensitivity to be apportioned to each defined LCA within the Study Area. The level of sensitivity relates specifically to the Proposed Development. The following criteria outline the general principles that are used to inform and guide the assessment of Landscape Sensitivity:

- ***High Landscape Sensitivity:*** A landscape where the majority of attributes are unlikely to withstand change without causing a change to overall landscape character to the extent that it would be difficult or impossible to restore. The frequency and sensitivity of receptors may be high but not exclusively so;
- ***Medium Landscape Sensitivity:*** A landscape with a combination of attributes that is capable of absorbing some degree of change without affecting overall landscape character. There are unlikely to be large numbers of sensitive receptors;
- ***Low Landscape Sensitivity:*** A landscape where the majority of attributes are robust and/ or tolerant of change to the extent that change or development would have little or no effect on overall landscape character. It is likely to be easily restored and the frequency and sensitivity of receptors may be Low but not exclusively so.

Baseline Characterisation: Visual Character

4.20 The visual context of the site is described and a ZTV is established to indicate where all, or part of, the Proposed Development is likely to be visible from. A ZTV is a map-based diagram of where and how many wind turbines, or wind farms, would theoretically be visible from all parts of the Study Area. The ZTV is first used to assist the identification of areas with theoretical visibility and the location of viewpoints as part of the Baseline Assessment. It is then used to aid the assessment of visual effects because the turbines would be the most visible element of the Proposed Development, particularly during the operational period.

4.21 The ZTV is created using computer-generated contour data at 50 m intervals (Ordnance Survey of Northern Ireland's digital terrain model, or 'DTM'). A three-dimensional computer model of the Proposed Development is created and accurately located within the DTM. Categories of theoretical visibility are indicated using different colours, for example, areas with theoretical visibility of all the proposed turbines would be indicated by one colour, and areas with visibility of lesser numbers of turbines would be indicated by contrasting colours. The computer model takes account of the effect the curvature of the earth would have on visibility, and is based on a viewing height of 2 m.

4.22 ZTV diagrams are based on the visibility of either the turbine blade tips or hub height. Blade tip visibility means that any area where the tip of the blade is theoretically visible is indicated on the diagram. It shows the highest potential levels of theoretical visibility. This approach is in accordance with the SNH recommendation to err on the side of over-representation of potential effects. However, it does not necessarily illustrate the most realistic levels of visibility because blade tips may be counted even where they protrude only a small amount above a skyline and this type of visibility will alter as the turbines rotate. Hub height diagrams represent a more realistic illustration because they show theoretical visibility of all points of the turbines to the hub/ nacelle, and therefore also include the upper parts of the turbine blades as a minimum. A Reverse ZTV diagram is used as a clear means of illustrating the parts of the Study Area where no turbines would be visible.

Viewpoint Selection

4.23 Viewpoints are chosen as part of the Baseline Assessment to provide a representative sample of viewers (receptors) and types of views of the Proposed Development across the Study Area and, most importantly, to demonstrate potential views of the Proposed Development rather than to show the screening effect of landscape features. Viewpoints are always selected in publicly accessible locations and those frequented by members of the public, such as public rights of way, car parks, popular visitor attractions and views from settlements, as well as viewpoints located in particularly scenic areas, are favoured because these are likely to represent a greater concentration of sensitive visual receptors. Viewpoints from which the Proposed Development is likely to be prominent are also favoured if they are available. Private residential views are represented where relevant and possible by the selection of appropriate viewpoints on public roads in proximity to residential receptors. This is in accordance with current best practice guidance. A selection of Provisional Viewpoints (PVPs) is identified through the Baseline Assessment. These are assessed through an initial site survey and those that are most representative of typical views, locations and receptors across all parts of the Study Area that fall within the ZTV are retained from more detailed assessment in

the LVIA. The viewpoint selection process for this project is described in Technical Appendix 4.4 and illustrated on Figure 4.3.

4.24 When carrying out viewpoint surveys, the nature of the view is noted, whether partial or full views of the Proposed Development would be experienced, whether views are static or transitory, how prominent the Proposed Development may be, and whether large numbers of properties or viewers would experience such views. In many cases finding an uninterrupted view can be difficult and viewpoint locations where there is a significant amount of existing screening or no safe stopping place (e.g. on a busy road) are generally not shortlisted. This is to ensure the safety of both the surveyor and any third parties, such as the planning authority and members of the public, who may wish to visit the viewpoints. Therefore, although the views chosen are representative they cannot always be typical of the whole Study Area.

4.25 Viewpoint locations are illustrated in all the Figures which accompany the LVIA and the process for producing these illustrations is described in detail in paragraph 4.41 below.

Summary Description of the Proposed Development

4.26 Details of the Proposed Development and its associated infrastructure are described in detail in Chapter 1 of this ES and summarised briefly in relation to landscape and visual effects in Chapter 4, paragraph 4.19. To ensure that visual effects are minimised, factors such as layout and turbine specification, colour scheme, rotation pattern of blades, uniformity and infrastructure design may be considered. The Proposed Development is considered from the perspective of the shortlisted viewpoints.

Assessment of Effects on Landscape Character

4.27 Landscape effects may include direct physical changes to landscape elements caused by the Proposed Development or indirect effects, such as effects on the setting of a particular landscape that may arise as a consequence of the Proposed Development. The potential landscape effects across the Study Area are identified by the on-site analysis and verification of landscape character information gathered as part of the Baseline Assessment. The landscape assessment criteria described below provides a framework for the assessment of landscape effects. It must be noted that there may be exceptions to these broad categories due to specific local characteristics that may apply in individual circumstances. This LVIA does not seek to determine whether the potential landscape effects of the Proposed Development would be beneficial or adverse because this is a subjective matter that depends very much on the viewer's own opinion.

Magnitude of Landscape Effects

4.28 The Magnitude of effect on landscape character is defined as the degree of change that would result from the introduction of the Proposed Development in terms of size or scale, geographical extent of the area that would be influenced, and the duration and reversibility of the proposed change. It is dependent on a number of factors, including:

- The degree to which landscape character elements would be altered by the Proposed Development;
- The number of turbines and their prominence within the landscape;
- Whether effects would have a direct physical effect on a landscape or indirectly affect its character by having an effect on its setting;
- The distance of the Proposed Development from the LCA in question;
- The duration, permanence and extent of the effect in physical terms.

4.29 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of landscape effects:

- ***High Landscape Magnitude***: The Proposed Development would be immediately apparent and would result in substantial loss or major alteration to key elements of landscape character to the extent that there is a fundamental and permanent, or long-term, change to landscape character. The change may occur over an extensive area;
- ***Medium Landscape Magnitude***: The Proposed Development would be apparent in the view and would result in loss or alteration to key elements of landscape character to the extent that there is a partial long-term change to landscape character. The change may occur over a limited area;
- ***Low Landscape Magnitude***: The Proposed Development would result in minor loss or alteration to key elements of landscape character to the extent that there may be some slight perception of change to landscape character. The change may be temporary and occur over a limited area;
- ***Negligible Landscape Magnitude***: The Proposed Development would result in such a minor loss or alteration to key elements of landscape character that there would be no fundamental change.

Significance of Landscape Effects

4.30 The EIA Directive requires the LVIA to identify and assess the acceptability of significant effects. Best practice guidance recognises that the significance of effects is not absolute and is related specifically to the Proposed Development. It is also dependent on the points considered within the landscape sensitivity

appraisal, the factors that influence the Magnitude of change, and the relationship between Landscape Sensitivity and Magnitude of Landscape Effect.

4.31 This LVIA uses the following criteria to inform and guide the assessment of the Significance of Landscape Effects:

- ***Significant Landscape Effects:*** Effects that would occur when the majority of landscape attributes are deemed to be highly sensitive and the magnitude of change would alter landscape character to the extent that it would become defined, or considerably influenced, by the presence of the Proposed Development;
- ***No Significant Landscape Effects***: Effects would not be significant when the majority of landscape attributes are not deemed to be highly sensitive and where the Proposed Development would have little, or no, effect on existing landscape character. This would also occur where the Proposed Development can be integrated into the existing Study Area without the loss of key landscape attributes landscape effects. Where the Proposed Development is easily noticeable but the number and sensitivity of landscape attributes decreases, so landscape character will become less defined by the Proposed Development and more so by other landscape attributes.

Assessment of Visual Effects

4.32 Visual effects relate to changes in the composition of views and people's responses to these changes. It is evident from research, and publications on public attitudes to wind farms, that opinions vary greatly, ranging from strongly adverse to strongly positive, depending on the type and nature of effects and individual perceptions. This LVIA does not seek to determine whether the potential visual effects of the Proposed Development would be beneficial or adverse because this is a subjective matter that depends very much on the viewer's own opinion. The assessment criteria described in this section below provides a framework for the assessment of visual effects. It is noted that there may be exceptions to these broad categorisations due to specific characteristics that may apply to individual circumstances.

4.33 The potential visual effects across the Study Area are identified in four stages:

i. ZTV diagrams are created. A desk-based analysis of these is carried out in order to gain a broad understanding of the nature of visibility in the Study Area, and to identify provisional viewpoint locations. Wirelines are created as working drafts for all provisional viewpoints;

ii. The ZTVs and viewpoint locations are verified on site. The presence of screening elements, such as vegetation, is noted because this is not reflected by the ZTVs bare-ground representation of visibility. Key visual

receptors within the Study Area are identified during the site survey, and the assessment of potential visual effects on each of these receptor groups is made. Visual receptors may include, for example, people within settlements, on vehicular routes, at tourist destinations, etc. The viewpoints are assessed for the extent to which they provide truly representative views of the key visual receptors and typical views within the Study Area.

iii. In most cases photographs are taken from each viewpoint location. However, in accordance with SNH guidance, viewpoint locations beyond 20 km from the Proposed Development may not require photomontages where the proposed turbines are below 150 m in height and where they are unlikely to be perceptible features in the view. A judgement on which viewpoints require photomontages is made on a case-by-case basis in each LVIA;

iv. Finally, a detailed assessment of visual effects is made from each viewpoint. This is assisted by computer-generated wirelines (all viewpoints) and photomontages (for most viewpoints with the exception of those described in point iii above), which provide as realistic as possible visualisations of how the Proposed Development would appear within each viewpoint, and which are presented as Figures in the Environmental Statement.

Assessment of Viewpoints

4.34 From each viewpoint a description is provided of the existing view and potential changes that would result from the Proposed Development. The effect of the Proposed Development on the existing view is then assessed. The following elements are considered in the description and assessment of visual effects from each viewpoint:

- The existing visual character and quality of the viewpoint (including whether it is within a designated landscape, the presence of visual detractors, etc.);
- The character of the existing landscape against which the turbines would be viewed including any screening provided by existing surface features, vegetation and local topography;
- The viewpoint location, the presence and concentration of receptors, and receptor sensitivity (for example, would people view the site during work or leisure activities, whilst in transit, etc.);
- The number of turbines that would be visible, their scale, distance from the viewpoint and their position in the view in relation to other features in the viewpoint;

- The duration of the potential effect, i.e. is it long term or temporary, continuous or transitory (the latter meaning that the receptor would be exposed to the effect for a short time);
- Whether effects would occur during construction and decommissioning of the Proposed Development.
- The presence of existing wind farms, particularly those in close proximity to the Proposed Development, are considered as part of the assessment of visual effects as well as the assessment of cumulative visual effects.

Sensitivity of Visual Receptors

4.35 The Sensitivity of visual receptors is dependent on the nature of the receptor and the value of the view, including other landscape elements within it. The following criteria, which are drawn from current best practice guidance (Technical Appendix 4.1), outline the general principles that are used to inform and guide the assessment of visual sensitivity at each viewpoint:

- ***High Visual Sensitivity***: would typically include residents of individual dwellings within the countryside which may be located in order to take advantage of high quality landscapes or views. Views from such properties are likely to be static and the main view may be orientated towards the Proposed Development and likely to be experienced for long periods of time; people undertaking recreation where the landscape within which the Proposed Development is seen is the primary reason for attraction (for example, walkers, cyclist and drivers on classified scenic driving routes). Receptors are more likely to be within a designated landscape and could be attracted to visit more frequently, or stay for longer, by virtue of the view;
- ***Medium Visual Sensitivity***: would typically include people undertaking active recreational pursuits where the wider landscape within which the Proposed Development is not seen as the primary reason for attraction (e.g. golf, water sports, theme and adventure parks, historic sites, parks and gardens). Receptors are less likely to be within a designated landscape and could be attracted to visit more frequently or stay for longer by virtue of the facilities and features of the particular attraction rather than by the value of the view;
- ***Low Visual Sensitivity***: would typically include receptors in vehicles that would experience transitory views whilst travelling at speed for reasons other than the enjoyment of landscape or visual quality (excluding those using scenic driving routes). Their use of the road network may be enhanced by landscape and visual quality but would also be heavily influenced by manmade elements, the roads themselves and the traffic on them. These may themselves be of detriment to landscape quality,

particularly where road corridors are in poor physical quality or where noise from busy traffic detracts from the tranquillity of the landscape; outdoor workers (e.g. farm and forestry workers) who are mobile and engaged in active work. The quality of landscape and visual character would not influence their presence or length of stay although they are likely to spend prolonged periods of time outdoors; people in indoor workplaces and community facilities who would spend only short periods of time in the landscape for reasons that are not related to or significantly affected by landscape and visual quality. They would experience temporary or transitory views whilst engaged in other activities. This group of receptors may include churchgoers, customers at petrol stations and garages, public houses, leisure centres and other community facilities; residents within larger settlements. Their locations are unlikely to be governed by landscape and visual quality and their views may be heavily dominated by manmade urban and suburban elements. Receptors are unlikely to be within a designated landscape and are most likely to be present at a given viewpoint by virtue of some other need or necessity unrelated to the appreciation of the landscape or visual value.

Magnitude of Visual Effects

4.36 The Magnitude of effect on visual character is defined as the degree of change that would result from the introduction of the Proposed Development. It is dependent on a number of factors, including:

- The prominence of the Proposed Development within the view;
- The number of turbines and extent of the Proposed Development that would be visible;
- The angle and elevation of the view;
- The proportion of the view that is affected by the Proposed Development;
- The scale and character of the landscape in which the Proposed Development would be viewed;
- The duration, permanence and frequency of available views.

4.37 Factors such as the distance of a wind farm from a viewpoint, weather conditions, time of day/year, angle of view, and composition of other elements in the view, all contribute to the assessment of visual effects. This LVIA uses these factors to define levels of visual prominence as follows:

- ***Visually Dominant***: The Proposed Development would occupy a commanding or elevated position and would seem to tower above the surrounding landscape from the viewpoint in question and/or from the surrounding landscape. The Proposed Development would become more important or noticeable than anything else in the view.

- ***Visually Prominent***: The Proposed Development would be immediately noticeable and likely to attract attention due to its size or position within the view.
- ***Visible***: The Proposed Development would be evident and perceptible from the viewpoint in question and/or from the surrounding landscape but would not be a prominent feature.
- ***Not Visible***: The Proposed Development would not be seen or would not be immediately apparent to the naked eye.

4.38 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of visual effects:

- ***High Visual Magnitude***: The Proposed Development would be a dominant and immediately apparent feature that would affect and change the overall character of the view and to which other features would become subordinate;
- ***Medium Visual Magnitude***: The Proposed Development would form a visible and recognisable new element within the overall view and would be readily noticed without changing the overall nature of the view;
- ***Low Visual Magnitude***: The Proposed Development would form a component of the wider view that might be missed by the casual observer. Awareness of the Proposed Development would not have a marked effect on the overall quality of the view;
- ***Negligible Visual Magnitude***: The Proposed Development would be barely perceptible, or imperceptible, and would have no marked effect on the overall quality of the view.

Significance of Visual Effects

4.39 The EIA Directive requires the LVIA to identify and assess the acceptability of significant effects. Best practice guidance recognises that the significance of effects is not absolute and is related specifically to the Proposed Development. It is also dependent on the points considered within the appraisal of sensitive visual receptors, the factors that influence the magnitude of change, and the relationship between Visual Sensitivity and Magnitude of Visual Effect.

4.40 This LVIA uses the following criteria to inform and guide the assessment of the Significance of Visual Effects:

- ***Significant Visual Effects***: Effects that would occur when the majority of visual receptors are deemed to be highly sensitive and the magnitude of change would alter visual character to the extent that it would become defined, or considerably influenced, by the presence of the Proposed Development;

- ***No Significant Visual Effects***: Effects would not be significant when the majority of visual receptors are not deemed to be highly sensitive and where the Proposed Development would have little or no effect on existing views. The Proposed Development would be likely to constitute a minor component of the wider view, which might be missed by the casual observer, and awareness of the Proposed Development would not have a marked effect on the overall quality of the view. Where the Proposed Development is easily noticeable but the number and sensitivity of visual receptors decreases, so overall visual character will remain less defined by the Proposed Development and more so by other elements of the existing view.

Production of Viewpoint Visualisations: Wirelines and Photomontages

4.41 Computer-generated wirelines and photomontages are used to assist the assessment of potential visual effects by providing an accurate impression of the scale, size and appearance of the turbines from the chosen viewpoints.

4.42 A wireline model of the Proposed Development and surrounding terrain is generated from each viewpoint using specialist software - RESoft Wind Farm R4, map tiles and digital terrain data provided by Ordnance Survey of Northern Ireland, the proposed turbine layout, and individual turbine geometry. Turbine blades are displayed at an angle of 0º, i.e. the uppermost blade is always shown pointing directly upwards, in order to demonstrate the highest possible level of blade tip visibility. Cumulative wind farms and single turbines within the Study Area are shown on the wirelines. The wireline model is an accurate model of the bare-ground topography. Land cover elements are then overlaid onto this model in the form of photographs, which are taken at each viewpoint location. Both the wireline and photograph cover a minimum 80º - 180º angle of view depending on the actual extent of the view on site. For example, the view on site may be constrained on both sides by tall vegetation or be part of a wider panorama. A 50º - 53.5º view is generally accepted as the normal viewing angle of the human eye[4].

4.43 In accordance with best practice guidance all photographs are taken with a full frame digital Single Lens Reflex (SLR) camera and a digital lens focal length of 50 mm (to provide as accurate a representation of the human eye as possible). The largest possible aperture setting is used to ensure the maximum level of detail in the view is shown. A panoramic tripod head is used to obtain true horizontal alignment of the photographs and maintain a constant height above ground (1.5 m).

4.44 Accurate records are taken on site of weather conditions and time of day. Viewpoint coordinates are recorded using a hand-held Global Positioning System

[4] Paper presented to British Wind Energy Association Conference by K. Hawkins of E4environment Ltd and Dr P. Marsh of Environmental Data Analysis (2001) 'The Camera Never Lies' and Scottish National Heritage (2017) 'Visual Representation of Wind Farms'

(GPS, accurate to 3.65 m). These are refined using GIS software and Google Maps to achieve a greater degree of accuracy.

4.45 The photographs are merged, and the resulting image is imported into the software programme where it provides the backdrop to the wireline. The wireline terrain data may differ slightly from that pictured in the photograph due to deficiencies in the digital terrain model data (DTM). This can cause the turbines to appear slightly above or below the ground. Therefore, minor adjustments may be made to the software settings to ensure that the photograph and wireline match before the turbines are rendered consistently with model data. The wireline is then hidden so that only the finished photomontage is visible.

4.46 Visualisations are prepared in accordance with the SNH and Landscape Institute best practice guidance as far as practical. SNH's best practice guidance recommends that the following information on the limitations of visualisations is included in all LVIA methodologies[5]:

- *"Visualisations of wind farms have a number of limitations which you should be aware of when using them to form a judgement on a wind farm proposal. These include:*
- *A visualisation can never show exactly what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;*
- *The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate;*
- *A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;*
- *The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;*
- *To form the best impression of the impacts of the wind farm proposal these images are best viewed at the viewpoint location shown;*
- *The images must be printed at the right size to be viewed properly (The visualisations in this LVIA are 130 mm x 42 mm at A3);*
- *You should hold the images flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, you should stand at arm's length from the image presented to gain the best impression.*
- *It is preferable to view printed images rather than view images on screen. If you do view images on screen you should do so using a normal PC screen with the image enlarged to the full screen height to give a realistic*

[5] Scottish National Heritage (2017) 'Visual Representation of Wind Farms', Annex A: Information on limitations of visualisations

impression. Do not use a tablet or other device with a smaller screen to view the visualisations described in this guidance."

4.47 In many scenarios wind farms are visible as elements of wide-angle views which can only be appreciated if viewers turn their heads from side to side or move through the landscape. Wirelines and photomontages show the turbines in accurate proportion to other visual elements. However, the overall scale of the view is reduced by the practical need to illustrate the view on a single sheet of paper that allows as many people as possible to have fair and easy access to the published Environmental Statement. Features that are of note in wider views, but which are beyond the angle that can be illustrated in the viewpoint figures, such as other wind farms, are included in the detailed written descriptions of viewpoints in the LVIA report. Photomontage figures should be reproduced at a minimum of 300 pixels per inch to ensure best quality representation of the viewpoints.

4.48 It must be noted that the purpose of wirelines and photomontages is to help the assessor establish what the Proposed Development's visual effect might be by providing a 'snapshot' of what the Proposed Development would look like within the landscape. They should always be viewed in conjunction with the LVIA report which provides a detailed written assessment of visual effects, as well as a visit to all the viewpoints in appropriate weather conditions. Wirelines are not intended to be visually representative images but they are generally accepted as an illustrative digital imaging tool. They provide a good indication of the location of turbines within the landscape and their relationship with the Cumulative Baseline of other wind farms in the Study Area. If these limitations are recognised, visualisations can be accepted as adequate representations for the purpose of the LVIA.

Assessment of Effects of the Proposed Layout on the Site

4.49 This LVIA is primarily concerned with the operational phase of the Proposed Development. However, consideration is also given to the potential effects during construction and decommissioning. During the construction period several activities would occur that may temporarily or permanently affect the physical landscape or visual amenity of the Study Area. Temporary effects may only last for the duration, or part of, the construction period and may include effects such as the visibility of construction traffic, plant, and stockpiled materials. If managed adequately these construction effects can be minimised or avoided. Permanent effects would result from irreversible physical changes to the site such as the removal of vegetation, alteration of landform and new access arrangements.

4.50 Details of the Proposed Development and its associated infrastructure are described briefly, starting at paragraph 4.19 and in more detail in Chapter 1. Mitigation measures to avoid or minimise both temporary and permanent effects are proposed from paragraph 4.204.

Design Evolution and Mitigation Measures

4.51 During the EIA the layout of the Proposed Development may change as part of an iterative assessment and design process. Liaison between all parties involved in the EIA is a key part of this process and the LVIA takes cognisance of the findings of other chapters, such as Archaeology and Cultural Heritage. Mitigation measures which seek to avoid, reduce, or compensate for landscape and visual effects would generally be implemented as part of this process and may include, for example, changes to layout and turbine specification, colour, uniformity of layout, under-grounding of onsite power cables, and infrastructure design. Following the implementation of mitigation measures in relation to physical site constraints (e.g. the presence of protected species, hydrological features, etc.) the Proposed Development would be considered from the perspective of the identified viewpoints. The computer-generated wirelines would be used to examine initial designs and identify opportunities to improve the layout in visual terms where necessary.

4.52 Further mitigation proposals, including any potential enhancement of landscape and visual character, will be made, where possible and appropriate, to address any potential effects which would remain with the final layout. It is important to note that the scope for mitigating the visual effect of wind farms is greatly restricted by the functional siting requirements, the scale of the turbines, and the characteristic movement of the blades.

Assessment of Residual Landscape and Visual Effects

4.53 Where mitigatory design proposals are implemented to reduce significant landscape and visual effects, the resulting reduction in effects is assessed and described.

Assessment of Cumulative Effects

4.54 In relation to LVIAs of individual developments, cumulative effects are taken to mean *"the additional changes caused by a proposed wind farm in conjunction with other similar developments*"[6].

4.55 "*The purpose of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a wind farm would have additional impacts when considered in addition to other existing, consented or proposed windfarms. It should identify the significant cumulative effects arising from the proposed wind farm*"[7]. In other words, the purpose of the cumulative impact assessment is to measure the incremental effect of the Proposed

[6] Scottish Natural Heritage (March 2012), '*Assessing the Cumulative Impacts of Onshore Wind Energy Developments*' paragraph 7, paraphrased from the GLVIA para 7.12

[7] Scottish Natural Heritage (March 2012), '*Assessing the Cumulative Impacts of Onshore Wind Energy Developments*', paragraph 55

Development on the Cumulative Baseline rather than to assess the combined effects of all, or some, of the Cumulative Baseline with the Proposed Development.

4.56 The Cumulative Baseline comprises existing, consented and proposed (in-planning) wind farms in an appropriate cumulative Study Area. In this LVIA the cumulative Study Area extends to a 30 km radius (see Technical Appendix 4.5 and Figure 4.4). Particular attention is paid to clusters of wind farms because these are already likely to be prominent features. Existing single turbines are noted as features within the existing landscape and visual baseline, and if they appear within selected viewpoints.

4.57 It must be noted that cumulative effect of some magnitude is largely unavoidable in any Study Area which contains existing wind farms and a judgement must be made on the relative and appropriate weight that is given to the various elements of the actual and assumed Cumulative Baseline. Current best practice guidance[8] makes it clear that this baseline should extend to operational and consented schemes but not necessarily to those which are the subject of undetermined applications for planning permission. Existing and consented wind farms are generally considered to be part of baseline landscape and visual character and the effects of the Proposed Development take consideration of their presence, or anticipated presence. The incremental effect of the Proposed Development on a Cumulative Baseline which includes other proposed wind farms is also considered. However, it is noted that applications for planning permission may be rejected and therefore, if a scheme is not yet approved, relatively limited weighting should be afforded to it when assessing the incremental effects of the Proposed Development. This LVIA includes existing, consented and proposed wind farms in its cumulative assessment but the weight afforded to individual schemes is a matter for the decision maker based on the evidence presented in the LVIA.

4.58 The assessment criteria described in this section provides a framework for the assessment of cumulative landscape and visual effects. It is noted that there may be exceptions to these broad categorisations due to specific characteristics that may apply to individual circumstances.

Assessment of Cumulative Landscape Effects

4.59 Cumulative landscape effects relate to the incremental degree of change to the existing landscape character or physical fabric of the Study Area that would result from the introduction of the Proposed Development over and above that of the Cumulative Baseline. The magnitude of cumulative change to landscape character is dependent on a number of factors, including:

[8] Including PPS18 at paragraph 1.3.37 and the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017

- The presence, appearance and interrelationship of other cumulative wind farms and turbines in the Cumulative Baseline, and the degree to which this already influences landscape character;
- The incremental change to landscape character elements that would be caused by the Proposed Development;
- The incremental effect of the Proposed Development on the overall number of turbines, their prominence within the landscape, and their effect on landscape scale;
- Whether effects are direct or indirect;
- The distance of the Proposed Development from the LCA in question, and from other cumulative wind farms that may also affect the LCA in question;
- The duration, nature, permanence and extent of the effect in physical and visual terms;
- The value attached to the landscape in question, including any landscape designations.

Magnitude of Cumulative Landscape Effects

4.60 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of Cumulative Landscape Effects:

- ***High Cumulative Landscape Magnitude***: The introduction of the Proposed Development to the Cumulative Baseline would be immediately apparent and would result in substantial incremental loss of, or major alteration to, key elements of landscape character to the extent that there would be a fundamental and permanent, or long-term, change to landscape character. The change may occur over an extensive area;
- ***Medium Cumulative Landscape Magnitude***: The introduction of the Proposed Development to the Cumulative Baseline would be immediately apparent and would result in the incremental loss of, or alteration to, key elements of landscape character to the extent that there would be a partial long-term change to landscape character. The change may occur over a limited area;
- ***Low Cumulative Landscape Magnitude***: The introduction of the Proposed Development to the Cumulative Baseline would result in minor incremental loss of, or alteration to, key elements of landscape character to the extent that there may be some slight perception of change to landscape character. The change may be temporary and occur over a limited area;

- ***Negligible Cumulative Landscape Magnitu***de: The introduction of the Proposed Development to the Cumulative Baseline would result in such a minor incremental loss of, or alteration to, key elements of landscape character that there would be no fundamental change to landscape character.

Significance of Cumulative Landscape Effects

4.61 The Significance of Cumulative Landscape Effects is dependent on the points considered within the landscape sensitivity appraisal, the factors that influence the Magnitude of change upon it, and the relationship between landscape Sensitivity and Magnitude of cumulative landscape effect. The following criteria outline the general principles that are used to inform and guide the assessment of the Significance of cumulative landscape effects:

- ***Significant Cumulative Landscape Effects***: Effects that would occur when the majority of landscape attributes are deemed to be highly sensitive and the incremental effects of the Proposed Development would alter landscape character to the extent that it would become defined or considerably influenced by the presence of wind farms, taking account of Cumulative Baseline conditions;
- ***No Significant Cumulative Landscape Effects***: Effects would not be significant when the majority of landscape attributes are not deemed to be highly sensitive and where the Proposed Development would have little or no incremental effect on the existing landscape character. Where the Proposed Development can be integrated into the existing Cumulative Baseline, without the loss of key landscape attributes, cumulative landscape effects would also be deemed as Not Significant. This level of significance would also occur where the Proposed Development is easily noticeable but its incremental effects would not cause the landscape character to become more defined by wind farms than it currently is, or to become more defined by wind farms than by other landscape attributes.

Assessment of Cumulative Visual Effects

4.62 Cumulative visual effects relate to the degree to which wind energy developments feature in particular views or sequences of views, and the resulting effects of this upon visual receptors. Current best practice guidance advises that the potential receptors of cumulative visual effects should be identified and the most significant receptors selected for detailed assessment. This LVIA considers simultaneous and sequential cumulative visual effects that may arise within the Study Area, and in relation to the selected viewpoints. The presence of existing wind farms and turbines, particularly those that are closely related to the Proposed Development,

are considered as part of the assessment of visual effects as well as the assessment of cumulative visual effects.

4.63 Simultaneous cumulative visibility is the extent to which the Proposed Development would be visible with one or more other cumulative wind farms from a single location, either in the same or different directions. Sequential cumulative visibility is the extent to which the Proposed Development would be viewed in succession with one or more other cumulative wind farms by receptors travelling through the landscape, regardless of whether or not the sites themselves are inter-visible.

4.64 The LVIA principally considers the degree to which the Proposed Development would contribute to wind energy development becoming a significant or defining characteristic of visual character. The sensitivity of visual receptors remains the same as that already defined in the visual effect assessment because the visual resource is unaltered. Different criteria are used for assessing Magnitude and Significance of Cumulative Visual Effects.

Magnitude of Cumulative Visual Effect

4.65 The Magnitude of cumulative visual effect is dependent on a number of factors, including:

- The nature of the Cumulative Baseline, i.e. the presence, appearance and intervisibility of existing, consented and proposed developments;
- The incremental effect that the Proposed Development would have on the prominence and distance of wind farms from visual receptors;
- The incremental effect that the Proposed Development would have on the number of turbines and the extent of wind farms that can be seen simultaneously, or sequentially;
- The incremental effect that the Proposed Development would have on the proportion of the view that is affected by wind turbines and the number of wind farms and turbines that would be visible in their entirety or otherwise;
- The visual relationship between the Proposed Development and other wind farms and turbines, including separation distances between wind farm developments;
- The scale and character of the landscape in which the Proposed Development would be viewed alongside the Cumulative Baseline;
- The nature of available views, including angle of view, prominence, screening elements, elevation, and distance from the viewpoint location.
- The duration, frequency and permanence of available views, including whether the potential cumulative effect is likely to be frequent (i.e. it would occur regularly, repetitively, or with short time lapses between

occurrences) or occasional (i.e. it would occur infrequently, with long time lapses or distances between occurrences);

- Whether the viewer would need to look in the same direction or different directions to obtain cumulative views;
- The speed and mode of travel of visual receptors, and duration of cumulative views.

4.66 The following criteria outline the general principles that are used to inform and guide the assessment of the Magnitude of cumulative visual effects:

- ***High Cumulative Visual Magnitude***: The Proposed Development would increase the scale of wind turbines in the landscape to a level at which the view would become dominated by wind farms;
- ***Medium Cumulative Visual Magnitude***: The Proposed Development would result in a noticeable increase in turbines but this increase would not result in wind farms being the dominant feature of the view;
- ***Low Cumulative Visual Magnitude***: The Proposed Development would be visible but would constitute a component of the view that might be easily missed by the casual observer and/ or would not contribute to the overall prominence of wind farms within the view;
- ***Negligible Cumulative Visual Magnitude***: The Proposed Development would be barely perceptible, or imperceptible, and/ or would have no effect on the perception of wind turbines within the view.

Significance of Cumulative Visual Effect

4.67 The Significance of cumulative visual effects is dependent on the points considered within the appraisal of sensitive receptors, the factors that influence the Magnitude of cumulative visual effects, and the relationship between visual Sensitivity and Magnitude of cumulative visual effect. The following general principles are used to inform and guide the assessment of the Significance of Cumulative Visual Effects:

- ***Significant Cumulative Visual Effects***: Effects that would occur when the majority of visual receptors are deemed to be highly sensitive and the addition of the Proposed Development to the Cumulative Baseline would result in the view becoming defined, or considerably influenced, by wind turbines;
- ***No Significant Cumulative Visual Effects***: Effects would not be significant when the majority of visual receptors are not deemed to be highly sensitive and where the Proposed Development would have little or no incremental effect on existing views. The Proposed Development is likely to constitute a barely perceptible, or imperceptible, component of the wider view, which might be missed by the casual observer. Awareness of the Proposed Development would not have a marked effect on the

overall quality of the view. Where the Proposed Development may be a noticeable addition to views containing wind farms in the cumulative baseline but it would not cause the overall visual character of the view to become defined by wind turbines rather than by other elements of the existing view the overall effects would also be deemed to be Not Significant.