# LLŶR FLOATING OFFSHORE WIND PROJECT

## Llŷr 1 Floating Offshore Wind Farm

## Environmental Statement

## Volume 6: Appendix 7A – LVIA Methodology

## August 2024

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FLOVENTIS ENERGY

## Document Status

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## Acronyms and abbreviations

| Acronym or abbreviation | Definition | Acronym or abbreviation | Definition |
|---|---|---|---|
| CJB | Cable Joint Bay | NRW | Natural Resources Wales |
| DTM | Digital Terrain Model | OS | Ordnance Survey |
| GLVIA | Guidelines for Landscape and Visual Impact Assessment | SNH | Scottish Natural Heritage (now known as NatureScot) |
| HDD | Horizontal Directional Drilling | TJB | Transition Joint Bay |
| LFW | Llŷr Floating Wind Ltd | ZTV | Zone of Theoretical Visibility |
| LVIA | Landscape and Visual Assessment | | |

## Glossary of project terms

| Term | Definition |
|---|---|
| The Applicant | The developer of the Project, Llŷr Floating Wind Limited |
| Array | All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s). |
| Array Area | The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located |
| Floventis Energy | A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary. |
| Landfall | The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays (TJB). |
| Llŷr 1 | The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases. |
| Marine Licence | A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers. |
| Offshore Development Area | The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application |
| Offshore Export Cable | The cable(s) that transmit electricity produced by the WTGs to landfall. |
| Offshore Export Cable Corridor (OfECC) | The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall. |
| Onshore Development Area | The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore |

| Term | Definition |
|---|---|
| | Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application. |
| Onshore Export Cable(s) | The cable(s) that transmit electricity from the landfall to the onshore substation |
| Onshore Export Cable Corridor (OnECC) | The area within which the onshore export cable circuit(s) will be located. |
| proposed Project | All aspects of the Llŷr 1 development (i.e. the onshore and offshore components). |
| Onshore Substation | Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption. |
| Onshore Substation Site | The area within which the Onshore Substation will be located. |
| Section 36 consent | Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works. |

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# 7-A– LVIA METHODOLOGY

## 7.1 Introduction

1. Llŷr Floating Wind Ltd (hereafter the Applicant) is proposing to develop the Llŷr 1 Floating Offshore Wind Farm (hereafter referred to as the proposed Project), located approximately 35 km off the coast of Pembrokeshire in the Celtic Sea.
2. The proposed Project is a test and demonstration wind farm development, comprising up to 10 wind turbine generators (WTGs) and associated infrastructure. The proposed Project will make landfall at Freshwater West before connecting into the national grid network at Pembroke Dock power station.
3. This Appendix provides details of the approach and methodology used for the Landscape and Visual Impact Assessment (LVIA) for the onshore elements of the proposed Project set out in **Chapter 07: Landscape and Visual**.
4. Landscape and visual effects are interrelated to one another but are assessed separately in line with good practice. Landscape character effects relate to changes to both the physical elements of the landscape and the perceptual aspects and qualities which contribute to its distinctive character. Visual effects relate to changes to views experienced by people through the addition and/or removal of elements.
5. The LVIA focuses on likely significant effects that may arise as a result of the proposed Project, both on its own and also in combination with other relevant nearby existing and proposed development.

## 7.2 Guidance

6. The methodology has been developed by Chartered Landscape Architects and has been informed by the principles set out in good practice guidance coupled with professional experience of undertaking LVIAs for onshore electrical infrastructure. The principal guidance documents which have informed the methodology include:

    - Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute, and Institute of Environmental Management & Assessment (2013) (GLVIA);
    - Assessing landscape value outside national designations, Technical Guidance Note 02/21, Landscape Institute (2021);
    - LANDMAP Guidance Note 46: Using LANDMAP in Landscape and Visual Impact Assessments, Natural Resources Wales (NRW) (2016); and
    - Visual Representation of Development Proposals, Technical Guidance Note 06/19, Landscape Institute (2019).

## 7.3 Technical Scope

7. The LVIA aims to identify the likely significant landscape and visual effects of the onshore elements of the proposed Project.
8. When considering the potential changes that future development may have on the landscape, it is necessary to identify those key elements of the landscape which make it distinctive. Landscape effects arise from changes to the physical components of the landscape, its character and how this is experienced.
9. In relation to 'visual effects', visual amenity can be described as the appreciation or pleasantness of the views people enjoy of their surroundings and as such includes a degree of subjectivity. The visual assessment determines the degree of anticipated change to views and visual amenity that would occur as a result of the proposed Project, based on professional

judgement. The visual assessment considers both fixed views from static locations and sequential views experienced from key recreational routes.

10. Landscape and visual effects can be positive (beneficial), neutral or negative (adverse). The landscape and visual resource of an area can be affected both directly and indirectly. GLVIA (page 36, paragraph 3.22) requires consideration of landscape and visual effects as follows:

*'…thought must be given to whether the likely significant landscape and visual effects can result directly from the development itself (direct effects) or from consequential change resulting from the development (indirect and secondary effects); are additional effects caused by the proposed development when considered in conjunction with other proposed developments of the same or different types (cumulative effects); are likely to be short term or to carry on over a longer period of time; are likely to be permanent or temporary, in which case their duration is important; are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity'.*

11. The LVIA also considers potential cumulative effects of the proposed Project with other relevant nearby onshore developments. Cumulative effects arise from the additional changes brought about by one development in conjunction with those of one or more similar developments. Other nearby developments that are operational, are under construction, have been granted planning consent or are subject to a planning application have been identified for inclusion in the cumulative assessment. In addition, nearby scoping stage projects have been included at the request of NRW. The cumulative assessment considers potential effects on landscape receptors, static viewpoint locations and potential sequential effects on the Pembrokeshire Coast Path.

### 7.4 Temporal Scope

12. The degree of landscape and visual change can differ from one stage of the proposed Project to the next and therefore it is necessary to consider potential effects at each phase of the proposed Project. The type and duration of the landscape and visual effects considered in this assessment fall within three main phases, as described below.

#### *7.4.1. Construction Phase*

13. Construction stage effects relate to changes that are temporary in nature and of a short duration (up to a maximum of 24 months), and may include the following:

- Potential temporary physical change arising from construction of the proposed Project on the landscape resource; and
- Potential temporary change to landscape character or visual amenity within the wider Study Area as a result of visibility of construction activities or the proposed Project during construction.

14. For the purposes of this assessment, proposed permanent structures, including the Onshore Substation, are not included within the construction stage assessment as potential impacts of the partially constructed structures are considered to be similar to, but less than, the completed structures which are assessed as part of the operational phase, as described below. At this stage the assessment therefore relates to the temporary activities, construction compounds, haul roads, soil stores, structures (such as cranes) and machinery which are only present in the construction phase.

*7.4.2. Operational Phase*

15. Operation stage effects relate to longer term changes anticipated to occur during the operational lifespan of the proposed Project, which is proposed to be 30 years. Operational stage landscape and visual effects may occur as a result of the following:

- Potential physical change to components of the landscape as a result of earthworks, vegetation clearance and introduction of new surfacing and structures;
- Potential change to perceptual aspects of landscape character and designations and to views and visual amenity resulting from introduction of the Onshore Substation; and
- Potential cumulative change resulting from the proposed Project in combination with other existing, consented and proposed developments, upon the landscape and visual resource of the Study Area.

16. The LVIA is based on the maximum heights of structures within the Onshore Substation as this is considered to represent the 'worst case' scenario.

17. It is recognised that effects can change over time, particularly where planting is included as mitigation. Where relevant the LVIA therefore considers potential operation effects at the following two time periods:

- Winter at Year 1 of operation, which represents the worst case scenario before any mitigation planting would have established; and
- Summer at Year 15 of operation, which gives an indication of the influence of proposed mitigation planting on longer term effects once it has established and begun to mature.

*7.4.3. Decommissioning*

18. Effects arising from the process and activities associated with decommissioning have been considered but are not assessed in detail as they are of a similar nature to construction issues (in reverse), but would be less intrusive, of a smaller scale and shorter duration.

## 7.5 Study Area

19. The Study Area for the LVIA has been defined on the basis of the maximum parameters of the onshore elements of the proposed Project, mapping and desk-based research and modelling and professional judgement.

20. Initial desk-based research included review of mapping and a range of publications in order to identify potentially sensitive landscape and visual receptors. Analysis of potential visibility of the proposed Onshore Substation was then undertaken, including through the use of Zone of Theoretical Visibility (ZTV) mapping and visualisations based on a 3D digital terrain/topographical model. This modelling and analysis involved consideration of Onshore Substation structures with a maximum height of 15 m above an anticipated platform level, positioned at more elevated parts of the identified site area.

21. The extent of the Study Area has been defined as 3 km from the Onshore Substation and 1 km from the outer extents of the Onshore Export Cable Corridor (OnECC). It is acknowledged that there may be potential visibility of the proposed Project these distances in certain conditions. However, the Study Area extent is considered to be the outer limit of potential for significant landscape and visual effects. The extent of the Study Area has been agreed in consultation with NRW and Pembrokeshire Coast National Park Authority.

## 7.6 Assessment Process

22. The LVIA has been undertaken in accordance with the approach and principles set out in GLVIA and with reference to the guidance listed in **Section 7.2**, above.

23. The assessments have been undertaken based on the following main steps:

- Establishment of the baseline,
- Appreciation of the proposed Project, and
- Assessment of effects.

*7.6.4. Establishment of the Baseline*

24. A baseline study has been undertaken through a combination of desk-based research and site appraisal in order to establish the existing conditions of the landscape and visual resources of the Study Area.

25. The landscape baseline study identifies landscape designations and distinct landscape character units within the Study Area and describes their key characteristics and special qualities. The visual baseline aids in the identification of potential visual receptor locations and provides a description of the nature of the existing views.

*7.6.5. Appreciation of the Proposed Project*

26. In order to be able to accurately assess the full extent of likely effects on landscape character and visual amenity it is essential to develop a thorough and detailed knowledge of the proposed Project. This includes a comprehensive understanding of its location, nature and scale and is achieved through a review of drawings, computer modelling and on-site appraisal. The LVIA includes consideration of all onshore elements of the proposed Project as detailed in **Chapter 04: Description of the Proposed Project** and summarised below.

27. At the landfall the export cable(s) would be installed via Horizontal Directional Drilling (HDD) ducts to traverse the intertidal zone at Freshwater West. The Landfall HDD drilling would require one 100 m x 75 m temporary compound as part of the HDD temporary works area. Up to 2 underground transition joint bay (TJB) of up to 12 m long, 6 m wide and 2.25 m deep would be required at the Landfall. A 100 m x 50 m temporary works area along with a 40 m x 50 m construction compound would be required at each TJB during installation. Once constructed, the only infrastructure remaining above-ground would be the link pillar, a small kiosk (1 m x 1 m x 0.6 m) above each TJB to allow inspection and maintenance.

28. The Onshore Export Cable would be installed between the Landfall, Onshore Substation and grid connection point at Pembroke Power Station. The precise cable route within the OnECC would be refined post consent and would require a construction working width of up to 35 m. Cable Joint Bays (CJBs) would be required every 1000 m along the cable route, each requiring a working area of approximately 20 m x 20 m. The cable trenches and CJB would be backfilled and the ground and vegetation restored as part of the construction phase.

29. The Onshore Substation would occupy a maximum area of 126 m x 109 m (up to 15,000 $m^2$) (excluding laydown area) and would comprise a range of electrical equipment and a control building. The height of the substation would depend on whether air insulated, or gas insulated switchgear would be utilised. The maximum height of the air insulated switchgear would be 8 m and if gas insulated switchgear is utilised it would be 15 m. The maximum control building height would be 15 m. The assessment has been undertaken based on gas insulated switchgear as this represents the greatest height of potential structures and therefore is representative of the worst case scenario.

30. The precise location of the Onshore Substation within the Onshore Substation Site is not yet known. The LVIA has been undertaken based on a realistic worst case scenario with the Onshore Substation positioned on more elevated parts of the Onshore Substation Site, while

allowing space for potential mitigation measures, if required, as shown on **Volume 5: Figure 7-8**.

*7.6.6. Assessment of Effects*

31. The LVIA seeks to identify, predict, and evaluate the significance of potential effects upon landscape characteristics and established views. The assessments are based on an evaluation of the sensitivity to change and the magnitude of impact for each identified landscape or visual receptor. For clarity and in accordance with good practice, the assessment of potential effects on landscape character and visual amenity, although closely related, are undertaken separately.

32. The initial stage of assessment involved a process of desk and field-based survey to refine the scope of the detailed assessment in order to ensure a proportionate approach, focused on potential significant effects. This process involved preparation and analysis of ZTV calculations to determine the extent of potential visibility of the proposed Project. Those receptors located outside the extent of the ZTV were then scoped out of the assessment.

33. The prominence of the onshore elements of the proposed Project in the landscape or view would vary according to the prevailing weather conditions. The assessments have been carried out assuming the 'worst case' scenario, namely on a clear, bright day in winter, when neither foreground deciduous foliage nor haze can interfere with the clarity of the view obtained.

34. GLVIA places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. This LVIA has been undertaken by Chartered Landscape Architects and professional judgement has been used in combination with structured methods and criteria to evaluate value, susceptibility, sensitivity, magnitude, and significance of effect.

## 7.7 Method of Assessment

*7.7.7. Landscape Sensitivity to Change*

35. The sensitivity of a landscape to change varies according to the nature of the existing resource and of the changes which may result from the proposed Project. The sensitivity of the landscape receptor is a combination of the value (undertaken as part of the baseline study) and the susceptibility to change of the receptor to the specific type of development being assessed.

36. Landscape value is frequently addressed by reference to international, national, regional, and local designations, determined by statutory bodies and planning agencies. Absence of such a designation does not necessarily imply a lack of quality or value. Factors such as accessibility and local scarcity can render areas of nationally unremarkable quality, valuable as a local resource. The evaluation of landscape value is informed by the Landscape Institute TGN 02/21 and GLVIA page84, paragraph 5.28 / Box 5.1, and has been undertaken considering the following factors and classified as very high, high, medium, low or negligible with evidence provided as to the basis of the evaluation:

- Natural heritage – extent to which a landscape has clear evidence of ecological, geological, geomorphological, or physiographic interest which contribute positively to the landscape.
- Cultural heritage – extent to which a landscape has clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape.

- Quality and condition - the measure of the physical state of the landscape including the overall intactness and the condition of individual elements.
- Association - extent that connections with notable people, events and the arts contribute to the perception of the landscape receptor.
- Distinctiveness – a measure of the strength of identity and expression of characteristics, presence of distinct, rare or unusual features and contribution to character or identity of a settlement.
- Recreation - the extent of recreational opportunities and activities where appreciation of the landscape is important to the experience/enjoyment.
- Scenic quality - the level of visual and sensory appeal of the landscape.
- Perceptual aspects - the extent that the landscape receptor is recognised for its perceptual qualities (e.g. wildness, tranquillity and/or dark skies).
- Functional – extent to which the landscape performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape.

37. The five-point scale outlined in **Table 7A-1** has been used to help inform the judgements of landscape value for each receptor.

*Table 7A-1. Landscape value criteria*

| Level | Criteria Description |
|---|---|
| Very High | A nationally designated landscape and/or a landscape in very good condition, exceptional scenic quality, very high recreational opportunities, a very high degree of distinctiveness, with very strong perceptual aspects and/or very important natural and cultural heritage features and functional qualities. |
| High | A locally or nationally designated landscape and/or a landscape in good condition with few detracting features, high scenic quality and including good recreational opportunities, a high degree of distinctiveness, with strong perceptual aspects and/or important natural and cultural heritage features and functional qualities. |
| Medium | A locally designated landscape and/or a landscape in reasonable condition and scenic quality and which may include some detracting features, recreational opportunities, a degree of distinctiveness, recognisable perceptual aspects and/or locally important natural and cultural heritage features and functional qualities. |
| Low | An undesignated landscape and/or landscape containing few if any notable elements/features, of poor condition or containing several detracting features and limited aesthetic qualities. Landscapes which have limited recognised associations, natural and cultural heritage features and/or functional qualities |
| Negligible | An undesignated and largely degraded landscape containing no notable positive elements/features and multiple detracting features and very limited aesthetic qualities. No or very limited recognised associations, natural and cultural heritage features and/or functional qualities. |

38. GLVIA explains the susceptibility to change, as ‘the ability of the landscape receptor (whether it be the overall character or quality / condition of a particular landscape type or area, or an individual element and / or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed Project without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies’ (page 88, paragraph 5.40).

39. Susceptibility is appraised through evaluation of the baseline characteristics of the landscape and the nature of the proposed Project and its components, with consideration of a range of interrelated factors, including scale, landform, pattern, landcover, openness/enclosure, location, context and perceptual qualities. The five-point scale outlined in **Table 7A-2** has been used to help inform the judgments of landscape susceptibility.

*Table 7A-2. Landscape susceptibility criteria*

| Level | Criteria Description |
|---|---|
| Very High | Landscape where most physical and/or perceptual attributes are considered intolerant of even minor change of the type proposed without fundamentally altering key characteristics. Likely to be no context of similar development. |
| High | Landscape where many physical and/or perceptual attributes are considered largely intolerant of change of the type proposed without fundamentally altering key characteristics. Likely to be little existing context of similar development. |
| Medium | Landscape where physical and/or perceptual attributes are considered tolerant to some degree of change of the type proposed without fundamentally altering key characteristics. Likely to be some context of similar development. |
| Low | Landscape where physical and/or perceptual attributes are considered tolerant of a large degree of change of the type proposed without fundamentally altering key characteristics. Likely to be context of similar development. |
| Negligible | Landscape where physical and/or perceptual attributes are considered tolerant of extensive change of the type proposed without fundamentally altering key characteristics. Likely to be notable existing context of similar development. |

40. The sensitivity of the landscape to change is determined by employing professional judgement to combine and analyse the identified value and susceptibility and is defined with reference to the criteria outlined in **Table 7A-3.**

*Table 7A-3. Landscape sensitivity criteria*

| Level | Criteria Description |
|---|---|
| Very High | Landscape characteristics or features with no ability to absorb change without fundamentally altering their present character, e.g. within a nationally designated landscape which is an outstanding example of a well-cared for landscape or set of features and with no influence of existing development. |
| High | Landscape characteristics or features with some ability to absorb change without fundamentally altering their present character, e.g. within a nationally designated landscape or a good example of well cared for landscape or set of features and which may be locally influenced by development. |
| Medium | Landscape characteristics or features with some ability to absorb change without fundamentally altering their present character, e.g. within a locally designated landscape or a landscape with characteristics or elements of local importance and/or with a context of existing development. |
| Low | Landscape characteristics or features which are tolerant of a large degree of change without detriment to their present character, e.g. an undesignated landscape with limited local value or an example of a degraded landscape or set of features. |
| Negligible | Landscape characteristics or features which are tolerant of extensive change without detriment to their present character, e.g. an undesignated landscape with no apparent value or an example of a wholly degraded landscape or set of features. |

### *7.7.8. Visual Sensitivity to Change*

41. Visual sensitivity to change is defined through appraisal of the viewing expectation of the viewer/receptor and their susceptibility to change and the value of the existing view as identified in the baseline.

42. The value of the view is an appraisal of the value attached to views and is often informed by the appearance on Ordnance Survey (OS) or tourist maps and in guidebooks, literature or art or identified in policy. Value can also be indicated by the provision of parking or services, signage, and interpretation. The nature and composition of the view and its scenic quality is also an indicator.

43. It is important to note that the absence of view recognition does not preclude local value, as a view may be important as a resource in the local or immediate environment due to its relative rarity or local importance.

44. The five-point scale outlined in **Table 7A-4** has been used to help inform the judgements of value of the view for each receptor location.

*Table 7A-4. Visual value criteria*

| Level | Criteria Description |
|---|---|
| Very High | Views protected by designation and/or are nationally recognised or iconic view of the Welsh landscape, promoted on maps and in guidebooks or with very strong cultural associations, and/or very high scenic qualities. |
| High | Regionally or locally recognised view which may be promoted as a visitor destination or route in due to the scenic quality or strong cultural associations and with few, if any, detracting elements. |
| Medium | Locally recognised view, or unrecognised but pleasing and well composed view, unlikely to be promoted for scenic qualities or cultural associations and/or including some detracting elements. |
| Low | Views which are not documented or protected, with minimal or no cultural associations and no facilities and/or interpretation. Views that exhibit low scenic qualities relating to content and composition of the view. |
| Negligible | View primarily defined by composition of negative features and elements. |

45. The susceptibility of visual receptors is a function of the occupation or activity of people experiencing the view and the extent to which their attention or interest is focussed on the view and the visual amenity they experience at a particular location. For example, residents in their home, walkers whose interest may tend to be focused on the landscape or a particular view, or visitors at an attraction where views are an important part of the experience, may indicate a higher level of susceptibility. Whereas receptors occupied in outdoor sport where views are not important or at their place of work could be considered less susceptible to change. Visual susceptibility has been determined with reference to the five-point scale set out in **Table 7A-5.**

*Table 7A-5. Visual susceptibility criteria*

| Level | Criteria Description |
|---|---|
| Very High | Receptors for which the view is of primary importance and the principal reason for being at that location and includes no existing context of similar development. Receptors are likely to notice even minor change. |

| Level | Criteria Description |
|---|---|
| High | Receptors for which the view is important and contributes to the reason for being at that location and may include some existing context of similar development. Receptors likely to be tolerant of minor change. |
| Medium | Receptors for which the view is important but not the primary focus and may include some existing context of similar development. Receptors tolerant of some change. |
| Low | Receptors for which the view is incidental or unimportant and may or may not include context of existing development. Receptors tolerant of a high degree of change. |
| Negligible | Receptors for which the view is irrelevant and entirely unrelated to the purpose of being at that location. Receptors tolerant of extensive change. |

46. Visual sensitivity to change is determined by employing professional judgement to combine and analyse the identified value and susceptibility and is defined with reference to the criteria outlined in **Table 7A-6.**

*Table 7A-6. Visual sensitivity criteria*

| Level | Criteria Description |
|---|---|
| Very High | Iconic and highly valued and well composed view with no detracting features, where receptors would notice even minor change, e.g. visitors to nationally recognised or promoted scenic viewpoints. |
| High | Highly valued impressive or well composed view with few detracting features, where receptors would notice change, e.g. residents in dwellings or users of outdoor recreational facilities on recognised national cycling or walking routes, within nationally designated landscapes. |
| Medium | A valued view which generally represents a pleasing composition with some detracting features, tolerant of a degree of change, e.g. users of transport routes, orientated towards the proposed Project, likely to be travelling for other purposes than just the view. |
| Low | Incidental and unimportant or poorly composed view with numerous detracting elements, tolerant of a large degree of change, e.g. people engaged in activities or travelling for purposes other than the view. |
| Negligible | Unimportant view defined by negative features and elements and tolerant of extensive change e.g. people engaged in work activities indoors. |

### *7.7.9. Landscape Magnitude of Impact*

47. Magnitude of impact refers to the extent to which the proposed Project would alter the existing characteristics of the landscape. It is an expression of the size or scale of change to the landscape, the geographical extent of the area influenced, distance from the receptor and the duration and reversibility of the change. The variables involved are described below:

- Whether the effect changes the key characteristics of the landscape which are integral to its distinctive character;
- The extent of existing landscape elements that would be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the landscape;
- The extent to which aesthetic or perceptual aspects of the landscape are altered either by removal of existing components or by addition of new ones;

- The geographic area over which the landscape impacts would be felt (within the Onshore Substation site or OnECC, the Onshore Development Area, the immediate setting of the Onshore Development Area or at the scale of the landscape character area);
- The distance from the landscape receptor and the influence this has on the level of change experienced; and
- The duration of the impact (short term, medium term or long term) and the reversibility of the effect (whether it is permanent, temporary or partially reversible).

48. An overall assessment of the magnitude of impact resulting from the proposed Project on the landscape receptor is made combining the above judgements using evidence and professional judgement. The levels of magnitude of impact are described as being high, medium, small or negligible with reference to the criteria outlined in **Table 7A-7.**

*Table 7A-7. Landscape magnitude of impact criteria*

| Level | Criteria Description |
|---|---|
| High | Large alteration to the landscape receptor, with impact to an extensive area or unique and important characteristics. May be longer term impacts, permanent or reversible. |
| Medium | Partial alteration to the landscape receptor, with impact to a wide area or several key characteristics. May be medium to long term impacts, permanent or reversible. |
| Small | Slight alteration to the landscape receptor or may impact a restricted area and/or few key characteristics. May be short to medium term impacts, permanent or reversible. |
| Negligible | Little or no perceptible change to the landscape characteristics. |

### *7.7.10. Visual Magnitude of Impact*

49. The magnitude of visual impact resulting from the proposed Project at any particular viewpoint or receptor is based on the size or scale of change in the view, the geographical extent of the area influenced, the distance from the receptors and its duration and reversibility. The variables involved are described below:

- The scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed Project;
- The degree of contrast or integration of any new features or changes in the form, scale, composition and focal points of the view;
- The nature of the view of the proposed Project, in relation to the amount of time over which it would be experienced and whether views would be full, partial or glimpses;
- The angle of view in relation to the main activity of the receptor, distance of the viewpoint from the proposed Project, and the extent of the area over which the changes would be visible; and
- The duration of the impact (short-term, medium-term or long-term) and the reversibility of the impact (whether it is permanent, temporary or partially reversible).

50. An overall assessment of the magnitude of impact resulting from the proposed Project on the view is made combining the above judgements using evidence and professional judgement. The levels of magnitude of impact are described as being high, medium, small or negligible with reference to the criteria outlined in **Table 7A-8.**

*Table 7A-8. Visual magnitude of impact criteria*

| Level | Criteria Description |
|---|---|
| High | Introduction of highly incongruous development which would result in considerable change, affecting a wide extent of the view and becoming a prominent or dominant feature. Likely to occupy the foreground of the view and may be longer term, permanent or reversible. |
| Medium | Introduction of new development or elements which would result in noticeable change to a wide and important part of the view, distracting from the existing focus. Likely to be in the middle ground and may be medium to long term, permanent or reversible. |
| Small | Introduction of new development or elements which would result in a slight change to a limited part of the view, unlikely to distract from the existing focus. Likely to be in the middle or background and may be short to long term, permanent or reversible. |
| Negligible | Barely perceptible or not discernible change to the view. |

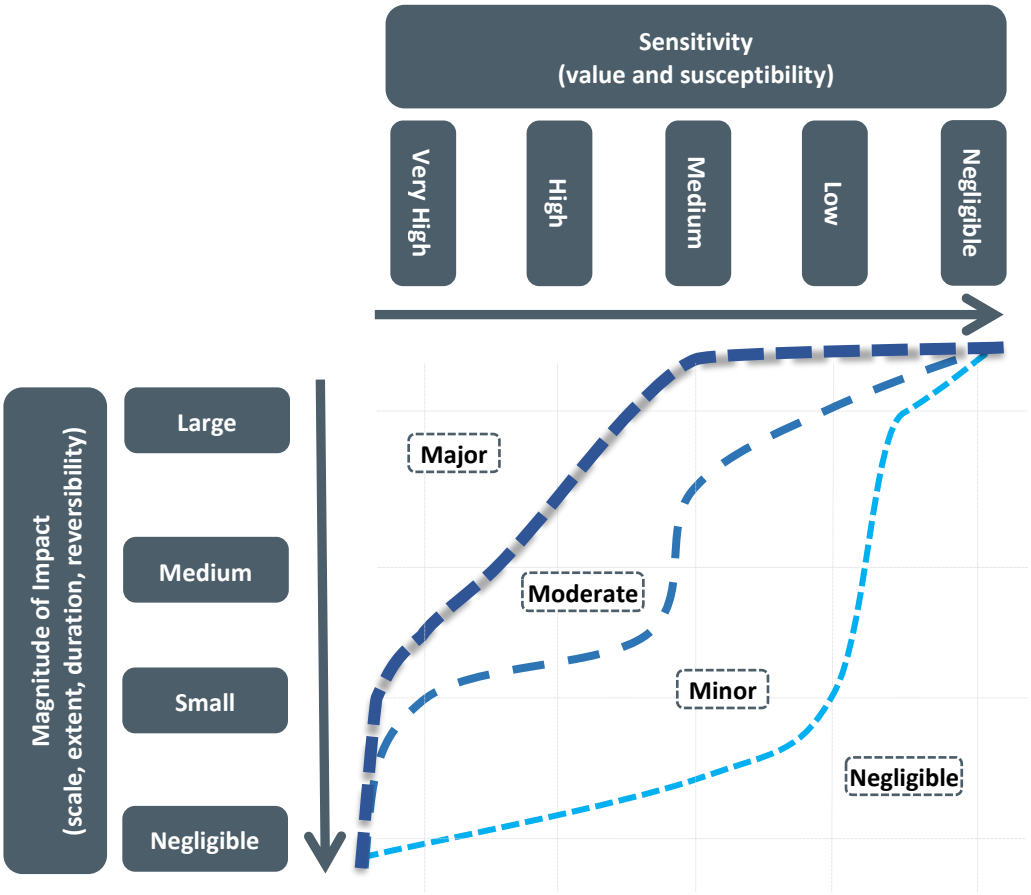
### *7.7.11. Significance of Landscape and Visual Effects*

51. Determination of the significance of landscape and visual effects has been undertaken by employing professional judgement and experience to combine and analyse the magnitude of impact against the identified sensitivity of the receptor.

52. The landscape assessment takes account of direct and indirect change on existing key physical and perceptual characteristics and evaluate the extent to which these would be lost or modified, in the context of their importance in determining the existing baseline character.

53. The visual assessment considers likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure, or focus of the existing view.

54. The below diagram provides an indication of how sensitivity and magnitude are considered together to inform the determination of the significance of effect.




55. Levels of effect significance are described on a scale ranging from major to negligible, with reference to the criteria set out in **Table 7A-9.** Assignment of significance is carried out with consideration of embedded mitigation measures.

*Table 7A-9. Categories of landscape and visual significance of effect*

| Level | Description of Landscape Effect | Description of Visual Effect |
|---|---|---|
| Major | Highly noticeable change affecting key characteristics of a very highly sensitive landscape, resulting in a fundamental change to its character. | Considerable change affecting a large extent of a very highly sensitive view and becoming a dominant feature. |
| Moderate | Noticeable change affecting some key characteristics in a highly sensitive landscape or very noticeable change in a medium sensitivity landscape, resulting in a change to the overall impression of its character. | Noticeable change affecting an important part of a highly sensitive view or a wider extent of a medium sensitivity view, becoming prominent or detracting from the existing focus. |
| Minor | Small change affecting few characteristics in a medium to highly sensitive landscape or noticeable change to a less sensitive landscape, resulting in a limited or localised change to the impression of its character. | Small change affecting a limited and/or unimportant part of a medium to highly sensitive view or an important part of a less sensitive view, unlikely to distract from the existing focus. |

| Level | Description of Landscape Effect | Description of Visual Effect |
|---|---|---|
| Negligible | Very little change from baseline conditions, resulting in a barely distinguishable or indistinguishable change. | Where there is no discernible improvement or deterioration in the existing view. |

56. For the purposes of this assessment, major and moderate levels of effect are defined as significant in EIA terms, and where relevant additional mitigation measures may be required where possible, whilst minor or negligible effects are defined as not significant.

## 7.8 Method of Cumulative Assessment

57. The approach used to determine cumulative effects has drawn on Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2021). This states that *'Cumulative impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together*'.

58. The assessment of cumulative effects follows a similar process to that described above, first identifying and describing the baseline, followed by an assessment of the magnitude of impact and significance of effect.

### *7.8.12. Cumulative Baseline*

59. The cumulative baseline includes other relevant nearby onshore developments that are either operational, consented/under construction or for which a consent application has been submitted and is not yet determined or is under appeal. A number of potential developments at the pre-application stage and for which an EIA Scoping request has been submitted have also been included where relevant and/or as requested by NRW.

60. An initial long list of potential cumulative projects was identified through desk study of planning applications and submissions. This list was then refined through initial analysis and modelling in order to identify a short list of cumulative projects for inclusion in the detailed assessment. The short list of projects includes those nearby developments located within the 1 km and 3 km Study Areas (as agreed with NRW) and with the potential to contribute to a cumulative effect with the proposed Project. The remaining projects on the long list were scoped out due to the distance from the proposed Project, lack of available information and/ or being of an unrelated type of development.

61. The cumulative situation changes frequently as applications are made, determined or withdrawn. Layouts of developments at scoping or for which applications have been submitted may also change prior to being constructed. For the purposes of assessment, therefore, it is necessary to determine a cut-off date when the projects to be included in a cumulative assessment are 'frozen' in terms of layout/design and status. The cut-off date for information considered by this cumulative assessment was 31st October 2023 and any changes in the cumulative situation after this date are not assessed. The details of cumulative developments to be included in the assessment have been compiled from known planning applications.

62. Consideration is given to a series of different cumulative scenarios that relate to various different combinations of cumulative project status.

63. The consideration of existing operational developments is incorporated within the assessment of existing baseline conditions and the resulting effects described within the non-cumulative

landscape and visual assessments. Two further scenarios are considered within the cumulative assessments, as follows:

- Scenario 1: The cumulative effects of the proposed Project introduced into a baseline which includes relevant nearby projects which have been consented in addition to existing operational schemes; and
- Scenario 2: The cumulative effects of the proposed Project introduced into a baseline which includes select scoping stage schemes in addition to those which are consented or existing and operational.

64. A third scenario related to application stage developments was scoped out of the assessment as no related application stage developments were identified within the Study Area.

*7.8.13. Magnitude of Cumulative Impact*

65. The cumulative assessment focuses on the potential change and impacts resulting from the addition of the onshore elements of the proposed Project to that experienced in the identified cumulative scenarios. However, an overview of potential total cumulative effects resulting from all of the shortlisted cumulative projects in combination with the proposed Project is also provided.

66. Cumulative landscape and visual effects may result from additional changes to the baseline landscape or visual resources, as a result of the proposed Project, in conjunction with other relevant nearby developments.

67. It is important to note that cumulative effects may vary from the effects of the proposed Project considered in isolation. For example, it is possible for a scheme to have effects that are judged of relatively high significance on a particular receptor when taken on its own, but when considered together with the effects of other developments the additional cumulative effect of the scheme may be lower.

68. The cumulative landscape and visual magnitude of impact is determined with reference to the criteria set out in **Table 7A-7 and Table 7A-8** and include the following considerations:

- The number of visible existing and/or potentially visible cumulative developments;
- The distance to existing and/or proposed cumulative developments;
- The direction and/or distribution of existing and proposed cumulative developments; and
- The landscape setting, context and/or degree of visual coalescence of existing and proposed cumulative developments.

*7.8.14. Significance of Cumulative Effects*

69. Determination of the significance of cumulative landscape and visual effects has been undertaken by employing professional judgement to combine and analyse the cumulative magnitude of impact against the identified sensitivity to change. It should be noted that the cumulative assessment is the result of the addition of the proposed Project to the identified cumulative scenario.

70. The significance of cumulative landscape and visual effects are described with reference to the criteria set out in **Table 7A-10.** For the purposes of this assessment, effects of moderate or greater are considered to be 'significant' in relation to the EIA Regulations.

*Table 7A-10. Categories of cumulative landscape and visual significance of effect*

| Level | Description of Landscape Effect | Description of Visual Effect |
|---|---|---|
| Major | The addition of the proposed Project into the cumulative scenario would result in energy development in the landscape becoming a dominant and character defining feature. | The addition of the proposed Project to the cumulative scenario would result in a very noticeable increase in energy development to the extent whereby it would become a dominating or obstructive feature within the view. |
| Moderate | The addition of the proposed Project into the cumulative scenario would result in energy development becoming locally dominant or characteristic but would not result in them becoming a character defining feature. | The addition of the proposed Project to the cumulative scenario would result in a noticeable increase in energy development to the extent whereby they would become prominent but would not dominate or obstruct the view. |
| Minor | The addition of the proposed Project into the cumulative scenario would not result in a noticeable change to key landscape characteristics. | The addition of the proposed Project to the cumulative scenario would result in a perceptible increase in energy development but not to the extent that they would become a prominent feature in the view. |
| Negligible | The addition of the proposed Project, into the cumulative scenario would not result in any discernible change to key landscape characteristics. | The addition of the proposed Project to the cumulative scenario would not result in any discernible increase in the appearance of energy development in the view. |

## 7.9 Assumptions and Limitations of the Assessment

71. The duration of all operational effects is assumed to be long-term (30-year operational lifespan) and theoretically reversible upon decommissioning. This is not repeated for every receptor but is considered as part of the judgement of magnitude of change.

72. ZTVs and visualisations have been provided as part of the LVIA. These are graphic tools intended to aide understanding of the assessment reporting and therefore should be read in conjunction with the assessment text and should be viewed in the field and with an understanding of their inherent limitations. Details of the use and limitations of these graphic tools are provided in **Section 7.10**, below.

73. The cumulative situation changes frequently as applications are made, determined, or withdrawn. Layouts for developments at scoping and application stages may also change prior to being constructed. For the purposes of the cumulative assessment, it is therefore necessary to determine a cut-off date when the sites to be included are assumed to be frozen in terms of layout and status. The cut-off date for information considered in the cumulative assessment was 31 October 2023 and any changes in the cumulative situation after this date are not assessed.

74. The cumulative assessment focuses on potential cumulative effects relating to the main permanent structures and other associated features of each cumulative development. A higher level assessment of potential cumulative effects of construction and decommissioning

is provided due to the high level of uncertainty of the timing of construction activities for each cumulative development.

75. A specific assessment of night-time impacts of lighting has not been undertaken due to the design approach to minimise potential lighting at the Onshore Substation. However, potential impacts from lighting have been considered as part of overall judgements relating to magnitude of impact and significance of effect for each landscape and visual receptor. There is generally lower appreciation of landscape character at night when physical characteristics are less apparent and as such the assessment focuses on considers potential impacts of lighting on dark sky characteristics, where relevant. Night-time baseline described is informed by daytime observations and from targeted night-time survey focused on locations where receptors are more likely to experience views at night.

76. The precise location of the Onshore Substation within the identified Onshore Substation Site is not yet known. The LVIA has therefore been undertaken based on a realistic worst case scenario with the Onshore Substation positioned on more elevated parts of the identified Onshore Substation Site, while allowing space for potential mitigation measures, if required. The Onshore Substation location used to inform the LVIA is shown on **Volume 5: Figure 7-8**.

## 7.10 Visual Representation Methodology

77. The following provides details of the production and limitation of the graphic material produced in support of the landscape and visual assessments. It should be noted that they are tools to aide in understanding of the assessment and are not used to determine the potential significance of effects.

### *7.10.15. Zone of Theoretical Visibility*

78. The ZTV defines the effective boundaries within which views of the proposed Project could potentially be obtained. ZTVs have been prepared using specialist computer software, ArcGIS. This produces an analysis of a computer-based model that uses landform as the key determinant of availability or obstruction of view.

79. The landform model is based on points at 5 m intervals derived from OS Terrain 5 Digital Terrain Model (DTM) tiles. The ZTVs are based on a viewer height of 1.8 m above ground level and take account of the curvature of the earth. It should be noted that the computer model does not consider surface features such as trees or woodland, buildings and other structures or local landform which can vary the ZTV locally and therefore the ZTV is not representative of visual effects in itself.

80. ZTVs also do not allow for the decrease in visibility that occurs with an increase in distance. Furthermore, it is important to note that there can be a wide variation in visibility shown in a ZTV, with views from different locations ranging from only the top of the tallest structure to full visibility of the Onshore Substation. Nevertheless, the ZTV is a valuable tool in assisting with the identification of areas of potential visual impact. However, they must be verified in the field and used in conjunction with other visualisations to determine the actual extent of potential visibility.

81. A range of ZTV diagrams have been produced to aid in the assessment of effects and support the written report. The following provides a brief description of these ZTVs:

- **Volume 5: Figure 7-7** provides a ZTV calculated based on the identified maximum parameters of the Onshore Substation, with a height of up to 15 m above an indicative platform level of 65 m Above Ordnance Datum; and

- **Volume 5: Figure 7-10** provides cumulative ZTV, comparing the potential visibility of the proposed Project with that of Greenlink Converter Station and Erebus Substation, as requested by NRW.

*7.10.16. Visualisation*

82. The visual assessment is supported by a series of visualisations from each of the visual assessment viewpoint locations. Visualisations include annotated baseline panoramas and/or photomontages and have been produced in accordance with Visual Representation of Development Proposals, Technical Guidance Note 06/19 (Landscape Institute, 2019).

83. The photography used to produce the baseline panoramas and photomontages have been taken using a Canon EOS Digital camera with a 50 mm fixed lens, mounted on a tripod at a height of approximately 1.5 m above ground level. The camera has a full frame (35 mm negative size) sensor as per good practice guidance. The photography at each location consists of a series of overlapping photographs, taken at 15 - 20° intervals.

84. Baseline panoramas showing the existing view annotated to highlight notable landmarks and give an indication of the location of the Onshore Substation have been produced for each of the assessment viewpoints. The baseline panoramas are intended to show the existing view and provide landscape and visual context to each viewpoint. Due to the wide angle of view the baseline panoramas are shown in cylindrical projection.

85. Specialist panorama stitching software was used to combine the individual photographic frames into panoramas and perform the geometric conversion to a cylindrical projection. The alignment of frames was hand checked in Adobe Photoshop.

86. Photomontages have been produced for select viewpoints. These are prepared using a 3D model of the proposed Onshore Substation based on the defined maximum parameters which is then aligned to the camera locations and placed into the photography through use of survey and digital mapping data. Where appropriate, objects in the landscape such as dwellings, field boundaries, roads or electricity pylons were used as additional markers.

87. Each view is then rendered, considering the conditions in the photograph and sun position at the time and date the photograph was taken. The rendered structures are then carefully blended into the baseline photograph and sections of structures which would appear behind foreground features are masked to create the photomontage image.

88. Two versions of the photomontages are provided, showing an indication of how the proposed Project would appear at winter of year 1 of operation and at summer of year 15 of operation. The photomontages for year 1 assume that all construction activities would be completed, with all temporary structures and elements removed, earthworks reprofiling completed and grass seeding established. The photomontages for year 15 are intended to provide an indication of how the proposed Project would appear in the longer term once proposed mitigation planting as indicated on **Volume 5: Figure 7-8** has established. A conservative approach to growth rates of proposed planting has been applied, with trees and woodland indicated at a height of up to 8 m and scrub planting at a height of up to 4 m, at year 15.

89. Each of the visualisation images are then imported into page layout software where the final information, annotation and drawing frames are applied to create the final figures. The sizes of all images are presented in accordance with Landscape Institute guidance.

90. There are a number of limitations with visualisations that should be considered and acknowledged when using them to help inform a judgement on a proposed development. These include:

- A visualisation can never show exactly what the development would 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 and distance of the Onshore Substation, but can never be 100% accurate;
- 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 proposed Project these images are best viewed at the viewpoint location shown;
- The images must be printed at the right size to be viewed properly; and
- The images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, the viewer should stand at arm's length from the image presented.

## 7.11 References

The Landscape Institute and Institute of Environmental Management and Assessment, 2013. Guidelines for Landscape and Visual Impact Assessment (Third Edition)

Landscape Institute, 2021. Assessing landscape value outside national designations, Technical Guidance Note 02/21

Natural Resources Wales, 2016. LANDMAP Guidance Note 46: Using LANDMAP in Landscape and Visual Impact Assessments

Scottish Natural Heritage (NatureScot), 2021. Assessing the Cumulative Impact of Onshore Wind Energy Developments

Landscape Institute, 2019. Visual Representation of Development Proposals, Technical Guidance Note 06/19