

# Appendix 4-1: Preliminary Landscape Assessment of Design Options





# **ORIEL WIND FARM PROJECT**

## **Environmental Impact Assessment Report**

### **Appendix 4-1: Preliminary Landscape Assessment of Design Options**

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## ORIEL WIND FARM PROJECT – PRELIMINARY LANDSCAPE ASSESSMENT OF DESIGN OPTIONS

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# 1 INTRODUCTION

The Oriel Wind Farm Project (hereafter referred to as “the Project”) is a proposed offshore wind farm in the Irish Sea, off the County Louth coast (approximately 22 km east of Dundalk town centre and 18 km east of Blackrock). Oriel Windfarm Ltd (hereafter referred to as “the Applicant”) is proposing to develop the Project.

This report provides a comparative assessment of design options considered for both turbine size and turbine layout for the Project with regards to landscape, seascape and visual perspectives. To inform the comparative assessment, it was necessary to undertake a preliminary assessment of the likely significant effects of the Project design options on potential landscape, seascape and visual receptors (see section 5). Details on the approach to the assessment are provided in section 3 and a description of the baseline landscape, seascape and visual environment is provided in section 2.

The purpose of this report was to inform the selection of turbine size and turbine layout for the Project and therefore also informs the consideration of alternatives (see chapter 4: Consideration of Alternatives (EIAR volume 2A). A complete landscape, seascape and visual amenity assessment of the Project is provided in volume 2C, chapter 27:Seascape, Landscape and Visual Amenity.

The comparative assessment provided in this report relates to the offshore turbines only.

## 1.1 Guidance

The preliminary assessment and comparison of options has been informed by best practice guidance including specifically the following:

- *Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape*, Scottish Natural Heritage, 2012;
- *‘Siting and Designing Wind Farms in the Landscape’*, Scottish Natural Heritage, 2017;
- *Guide to Best Practice in Seascape Assessment*, Maritime Ireland / Wales INTERREG 1994-1999;
- *Wind Energy Development in Northern Ireland’s Landscapes, Supplementary Planning Guidance to Accompany Planning Policy Statement 18 ‘Renewable Energy’*; and
- *Guidelines for Landscape and Visual Impact Assessment*, Landscape Institute and Institute of Environmental Management & Assessment, Third Edition, 2013.

## 2 BASELINE LANDSCAPE, SEASCAPE AND VISUAL AMENITY

Planning policy, specifically in relation to landscape, seascape and visual amenity considered in this preliminary assessment is presented in the Louth County Development Plan 2021-2027 (CDP).

### 2.1 Louth County Development Plan 2021-2027 – Policy Framework Provisions

Relevant policies considered in the preliminary assessment, contained within the CDP are summarised in Table 2.1 below.

**Table 2.1: Summary of policy framework provisions relevant to Landscape, Seascape and Visual Amenity Louth County Development Plan 2021-2027.**

Summary of relevant policy framework
Policy NBG 23 - To ensure the preservation of the uniqueness of a landscape character type by having regard to its character, value and objectives in accordance with national policy and guidelines and the Louth Landscape Character Assessment and by ensuring that new development meets high standards of siting and design and does not unduly damage or detract from the character of a landscape or natural environment.
Policy NBG 24 - To ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types including the retention of important features or characteristics, taking into account the various elements, which contribute to their distinctiveness such as scenic quality, habitats, settlement pattern, historic heritage and land use.
Policy NBG 25 - Where appropriate, require that landscape and visual impact assessments prepared by suitably qualified professionals be submitted with development applications, which may have significant impact on landscape character areas, especially in highly sensitive areas.
Policy NBG 26 - To explore the designation of Landscape Conservation Areas as appropriate, in conjunction with the relevant Government Department and stakeholders to protect specific important landscapes and particularly in respect of Carlingford Mountain SAC.
Policy NBG 28 - To co-operate with adjoining local authorities, both north and south of the border, to ensure that the environment is maintained in a sustainable manner and to support the coordinated designation of sensitive landscapes and policy approaches with adjoining areas and on all aspects of environmental protection, particularly where transboundary environmental vulnerabilities are identified.
Policy NBG 36 - To protect the unspoiled natural environment of the Areas of Outstanding Natural Beauty (AONB) from inappropriate development and reinforce their character, distinctiveness and sense of place, for the benefit and enjoyment of current and future generations.
Policy NBG 37 - To protect the unspoiled rural landscapes of the Areas of High Scenic Quality (AHSQ) from inappropriate development for the benefit and enjoyment of current and future generations.
Policy NBG 38 - Protect and sustain the established appearance and character of views and prospects listed in Tables 8.14 – 8.18 of this Plan that contribute to the distinctive quality of the landscape, from inappropriate development.
Policy NBG 40 - To prohibit inappropriate development which would interfere with or adversely affect the Scenic Routes as identified in Table 8.19 and illustrated on Map 8.20.
Policy BHC 13 - To seek to protect historic and archaeological landscapes including battlefields, from inappropriate development
Policy BHC 15 - To ensure no development which might have significant deleterious impacts upon the character of the World Heritage Site is permitted.
Policy BHC 16 - To protect the northern ridgeline (Chapter 13, Map 13.1) which frames the views within and from the World Heritage Site of Brú na Bóinne from visually intrusive and inappropriate development, subject to the Development Management Assessment Criteria detailed in Chapter 13 and using view-shed analysis as a tool to guide and inform development management.
Policy BHC 38 - To ensure new development will not adversely affect the site, setting or views to and from historic gardens and designed landscapes of heritage significance.

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### 2.1.1 Areas of Outstanding Natural Beauty

Two distinct areas have been designated as Areas of Outstanding Natural Beauty (AONB) by reason of their unspoiled natural landscapes and spectacular scenic quality. These are:

AONB 1 – Carlingford and Feede Mountains Slieve Foye at 588 m AOD and Black Mountain at 508 m AOD are the highest mountains in the range. It is a mountain moorland landscape covered in gorse, bracken and heather, parts of which are designated as Special Area of Conservation (SAC) and proposed Natural Heritage Area (pNHA). The County Development Plan states *‘Spectacular views are available from a number of vantage points over Carlingford Lough to the Mourne Mountains in Northern Ireland and the Ring of Gullion in County Armagh and over Dundalk Bay to central and south County Louth.’*

AONB 2 – Clogherhead and Port Oriel. A coastal headland described in the County Development Plan as *‘Although less rugged and remote than the Carlingford and Feede Mountains, this area, nevertheless, contains equally spectacular views eastwards to the Irish Sea, southwards towards the Boyne Estuary and County Meath and northwards over Dundalk Bay to the Carlingford and Mourne Mountains.’*

### 2.1.2 Areas of High Scenic Quality

Areas of High Scenic Quality (AHSQs) that are of particular relevance to this assessment are listed below as follows

- AHSQ 1 Feede Mountains and Cooley Area – comprising the farmed foothills of the Cooley Mountains; and
- AHSQ 5 Dunany – comprised of an extensive area of lowland coastal farmland.

### 2.1.3 Views and Prospects

The CDP refers to Views and Prospects of Special Amenity Value and states that *‘The scenery and landscapes of the County are of enormous amenity value to tourists and residents alike, contributing to quality of life and constituting a valuable economic asset. The protection of this asset is therefore of importance in developing the potential of the County.’* The CDP also notes that it *‘is not proposed that this should prohibit development, but rather, where development is permitted that it should not hinder or obstruct these views and prospects and be designed and located to minimise impact’.*

Relevant Views and Prospects, and Views and Prospects in Level 3 Settlements considered during the options appraisal are listed in Table 2-2 and Table 2-3 below.

**Table 2-2: Relevant Views and Prospects, Louth County Development Plan 2021-2027 considered in the assessment.**

ID	Name	Location	Description
VP 6	Slieve Foye	Viewpoint at the highest point of Mountain park outside of the Carlingford Settlement Limit.	View of the settling of Carlingford along the coastline and panoramic views of the Lough towards Northern Ireland.
VP18	Dromiskin	sea views across to Dundalk, Cooley and Mourne Mountains	Views of sea across to Cooley and Mourne Mountains and including Dundalk Bay.
VP19	North of Annagassan	Anagassan Village, beach strip between Annagassan Pier and lands to the north of the Saltings,	Coastal beach strip, approximately 250m long, providing uninterrupted sea view looking north across Dundalk Bay towards the Cooley Mountains and the Mourne Mountains.
VP20	Salterstown	Salterstown, along Scenic Route No. 18 northernmost end of local secondary road L6220.	Coastal beach strip, providing uninterrupted sea view looking north across Dundalk Bay towards the Cooley Mountains and the Mourne Mountains.

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ID	Name	Location	Description
VP21	Corstown	Draghanstown, northernmost end of local secondary road L6220.	Uninterrupted sea view looking north cross Dundalk Bay towards the Cooley Mountains and the Mourne Mountains.
VP22	Lurganboy	Lurganboy, beach strip along Scenic Route No. 18 adjacent to public carpark.	Coastal beach strip, providing uninterrupted panoramic sea view. View to north along coast towards Dunany Point. View to the south-east towards Clogherhead Village, Almondstown, Clogher Head and Clogherhead Harbour.

**Table 2-3: Relevant Views and Prospects within Level 3 Settlements (Louth County Development Plan 2021-2027).**

ID	Name	Location	Description
VPCL1	Clogherhead	Clogherhead Harbour	Uninterrupted sea view looking north-west along the coast towards Dunany Point. Distant views to the north towards the Cooley Mountains and the Mourne Mountains.
VPC 1	Carlingford	King Johns Castle	Views east, south and west those of Carlingford Lough, towards Carlingford and Slieve Foye.
VPC 2	Carlingford	Taaffees Castle	Views north east across Carlingford Lough and towards Northern Ireland and the Mourne Mountains from Taaffees Castle.
VPC 3	Carlingford	Holy Trinity Heritage Centre Church	Views north and east Views towards the Bay and Carlingford Lough.
VPC 4	Carlingford	Dominican Friary	View protected into the Dominican Friary with regard to those lands zoned adjacent for town centre use.
VPC 5	Carlingford	The Coast and Harbour	Views South towards Carlingford Village and Slieve Foye

### 2.1.4 Scenic Routes

The CDP refers to Scenic Routes which require protection and states that ‘*Applications for development must carefully consider the siting, design and landscaping of the proposed development to ensure that there are no significant alterations to the character of the area. Any development proposals, which would interfere with or adversely affect these Scenic Routes, will not be permitted*’

Scenic Routes considered in the options assessment are listed in Table 2-4 below.

**Table 2-4: Relevant Scenic Routes (Louth County Development Plan 2021-2027).**

ID	Route
SR 1	Faughart Hill, Faughart Upper
SR 14	Greenore-Carlingford- Omeath
SR 15	Coast Road-Whitestown-Ballagan-Ballytrasna
SR 16	Coast Road, Dromiskin
SR 18	Castlebellingham – Annagassan -Clogherhead – Termonfeckin
SR 22	Mount Oriel (Collon – Belpatrick)

## 2.2 Northern Ireland - Mourne AONB

The Mourne Area of Outstanding Natural Beauty was first designated in 1966 under The Amenity Lands Act (Northern Ireland), 1965 in recognition of its special qualities namely the compact group of twelve mountains at its core. Subsequent legislation in the form of the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 gave statutory recognition to AONBs with emphasis on formulating proposals which



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would follow designation. The Access to the Countryside (Northern Ireland) Order, 1983 was enacted to provide a variety of powers concerning promoting enjoyment of the countryside.

The Mourne mountains are famed in songs and poetry and highly valued at a regional and national level. Designated in 1986, it is one of the most picturesque mountain districts in Ireland. The twelve peaks include Slieve Donard, which at 850 m is Northern Ireland's highest mountain. Beneath the cluster of fine peaks, cliffs and rock pinnacles, the mountain slopes descend through moorland, woodland, field and farm before meeting the coast. Slieve Croob lies as a northern outlier to the main massif.

The Mourne Landscape Action Conservation Plan describes the area as follows;

*'The Mourne Mountains now contain twelve closely grouped peaks over six hundred metres in height and include Slieve Donard, at 850m Northern Ireland's highest mountain. Visually the mountains, as well as rising dramatically from the sea, tend to have a gentle rounded appearance, giving them a welcoming feel than can belie the sometimes harsh conditions. A minority of the peaks have very distinctive exposed granite tors, notably Binnian and Bernagh in the Eastern Mournes and Hen Mountain in the Western Mournes. These summits are wonders in themselves when seen up close, the layers in the rock still almost giving the appearance of flowing molten magma.'*

*A living, working landscape, the Mournes encompass pre-Christian and Christian sites and scheduled monuments; listed buildings; remnants of traditional farming practices and iconic patchwork of dry stone walls; industrial and social history associated with the supply of water to much of Northern Ireland; a tradition of sea fishing; rich folklore; and distinctive vernacular buildings. The legacy of man's interaction with nature and stone can also be seen in the ruined smithies where quarrymen heated and shaped their tools, the mountains once audibly reflecting this hive of industry as they echoed the sounds of hammer on anvil.*

*This very particular heritage deriving from the landscape shaped the settlement pattern and communities in Mourne. These communities have special characteristics, including expertise in traditional skills derived from agriculture, fishing and the use of granite. What we see and appreciate today therefore is a natural wonder moulded by centuries of human activity. A special place with special traditions.'*

PPS18 Wind Energy Supplementary Planning Guidance provides guidance on the sensitivity of Northern Ireland's landscapes to wind energy development. It contains an assessment of the sensitivity of each landscape character area (LCA) with reference to the key characteristics and values.

In terms of coastal landscapes, the guidance states the following:

- 'Areas with complex, varied coastal form, for example areas with cliffs, headlands, islands or intricate rocky shorelines, tend to be highly sensitive to wind energy development;
- Areas with a simple, large scale, flat coastal form generally have better capacity for wind energy development, but are relatively rare in Northern Ireland;
- The settings of distinctive, landmark coastal features may be especially sensitive; and
- Turbine group size should be appropriate to the scale and character of the coastal landscape. It may be relatively large in simple, flat coastal landscapes, but should be smaller in more complex, varied coastal landscapes.'

Landscape character areas within the Mournes AONB of particular relevance include;

- **LCA 73 Kilkeel Coast**, considered to be of High to medium sensitivity to wind energy development;
- **LCA 74 Kingdom of Mourne**, considered to be of high sensitivity to wind energy development; and
- **LCA 75 Mourne Mountains**, considered to be of high sensitivity to wind energy development.

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### 3 APPROACH

#### 3.1 Assessment Approach

The assessment of options considers the wind turbines associated with each of the options and excluded other related onshore and offshore infrastructure. The comparative assessment is supported and informed by graphic outputs as follows:

- Zone of Theoretical Visibility (ZTV) illustrating the theoretical visibility of proposed turbines;
- Wireline outputs from selected viewpoints using industry standard wind farm software.

A layout of 55 turbines, with tip height of 160 m above LAT, was used to generate an initial ZTV, which was used for initial field survey works and as an aid to the selection of potential viewpoint, from which wirelines were generated which in turn were used to aid the development of the Project.

Subsequent design works led to a three stage approach in the development of the turbine layout associated with the Project;

1. Development of seven preliminary options for initial comparative assessment;
2. Development of four interim options for assessment of the potential largest and smallest turbine sizes available; and
3. Design Development / Refinement – reflecting final layout iteration based on turbine sizes available and which would be carried forward for assessment within the SLVIA.

#### 3.2 Selection of assessment viewpoints

Ten viewpoint locations were selected, based on the initial 55 turbine layout, and assessed in the field during June 2019. The viewpoints chosen were considered to be representative of a range of sensitive locations and comprised publicly accessible viewpoints, viewpoints designated in the CDP or representative of promoted views on maps and tourist literature for enjoyment of the coastal landscape.

The viewpoints were selected to capture the effects of the Project from varying distances, elevations and directions. The viewpoints are also considered to represent a range of viewer types such as residents of dwellings, recreational visitors and road users.

Details of the viewpoints and a description of the views are presented in Table 3-1 below.

**Table 3-1: Viewpoint details.**

Location	Landscape Type	Designation	Viewer Type	Description of Existing View
Templetown – public car park at Shelling Beach	Cooley Lowlands & Coastal Area	-	Recreational visitors to beach / coast amenity	Panoramic views in an easterly direction out to the Irish Sea and in a southerly direction over Dundalk Bay and Dunany Point. The headland of Clogherhead is visible further afield. In the far distance, a stretch of coastline in the vicinity of Balbriggan is visible only in weather conditions which afford visibility at the distances required.
Ballagan Point -	Cooley Lowlands & Coastal Area	Scenic Route –	Recreational visitors Road users	Panoramic views are available in a northerly direction towards Carlingford Lough and the Mourne Mountains (AONB) and eastwards towards the Irish Sea. Views in a southerly direction are available of the coastline, Dundalk Bay, Dunany Point and the headland at Clogherhead. In the far distance, a stretch of coastline further south is visible only in weather

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Location	Landscape Type	Designation	Viewer Type	Description of Existing View
				conditions which afford visibility at the distances required.
Giles Quay – Car park viewing point	Cooley Lowlands & Coastal Area	-	Recreational visitors at coast.	The beach and small semi-circular bay at Giles Quay is visible at short range with a mountain backdrop partly visible further afield associated with the Carlingford and Feede Mountains. Views further east and south are of the vast expanse of the Irish Sea and Dundalk Bay including Dunany Point and Clogherhead further afield.
Blackrock - – on designated scenic route	Dundalk Bay Coast	Scenic Route –	Residents of dwellings Road users	Panoramic views are available of the Cooley Peninsula to the north and the Irish Sea with beach and coastal grassland in the foreground. The skyline of the Mourne Mountains is clearly visible further afield.
Blackrock – designated scenic route and viewpoint CDP VP18	Dundalk Bay Coast	Scenic Route – CDP VP 18	Recreational visitors to the coast Road users	Expansive views of the beach are available in the foreground. The panorama further afield comprises The Irish Sea framed by the headlands associated with the Cooley Peninsula (Cooley Point) and Clogherhead. The Cooley Mountains are clearly visible together with the Mourne Mountains further afield.
Salterstown – at layby viewing point	Dundalk Bay Coast	Area of High Scenic Quality CDP VP20	Recreational visitors to the coast Road users	Panoramic views are available of the Irish Sea. Further north, the headland associated with Dundalk is visible against the backdrop of the Cooley Peninsula and mountains. This mountainous peninsula extends out to occupy a large proportion of the view. The Mourne Mountains are also visible in the distance.
Clogherhead	Dunany Boyne Estuary Coast	Area of Outstanding Natural Beauty	Recreational visitors to Clogherhead	Panoramic views are available of the Irish Sea and the mountainous Cooley Peninsula with Dunany point in the foreground. The Mourne Mountains are also visible in the distance.
Summit of Slieve Foye (Carlingford and Feede Mountains)	Carlingford Lough Mountains including West Feede Uplands.	Area of Outstanding Natural Beauty	Recreational hillwalkers	Panoramic views are available of the Irish Sea and expansive coastal landscapes associated with the Mourne Mountains, Carlingford Lough, the County Louth Coastline, Clogherhead and the coastline further afield to the south.
A2 Road in Daisyhill	LCA 73 Kilkeel Coast	Mournes AONB	Recreational visitors to the Mourne Mountains and Coast	Panoramic views are available of Dundalk Bay and the Carlingford Peninsula.
Head Road, Foothills of Mourne Mountains	LCA 74 The Kingdom of Mourne	Mournes AONB	Recreational visitors to the Mourne Mountains and Coast	Panoramic views are available of the coastal farmland associated with the Mourne foothills and The Kilkeel Coast in the foreground. Further afield, the skyline of The Carlingford and Feede Mountains is visible.

### 3.3 Criteria used in comparative assessment

From a landscape, seascape and visual perspective, the more favourable wind farm option would generally feature the lowest number of wind turbines of shortest tip height however, in the case of the Project, the options presented in Table 4-1 generally vary between a smaller number of taller wind turbines or a larger number of shorter wind turbines. Thus, a range of factors were considered in the comparison of options as informed by design principles cited in published guidance referred to earlier (see section 1). These factors / design principles are described below within each of the criteria outlined below.

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### 3.3.1 Turbine size

Visibility of wind turbines will increase with increasing height however the relationship between turbine size and visual impact is not necessarily directly proportional.

The size of wind turbines is clearer when seen against a distinct landscape pattern that includes scale indicators. Larger wind turbines would appear out of scale and visually dominant in a smaller scale landscape or settled landscape characterised by the human scale of buildings and features.

These differences in turbine size may be less noticeable in offshore situations where they are seen against the sea horizon and where scale indicators in the surrounding coastline or land areas are less influential in terms of the overall effect. Where the turbines are viewed against an upland landscape or open seascape with coastline, these could appear to conflict with the expansive nature of these areas by introducing a scale factor which previously didn't exist.

### 3.3.2 Turbine layout / array

The layout or array should relate to the particular characteristics of the seascape and landscape. The more favourable layouts tend to have fewer turbines arranged in a simpler layout. A more favourable layout will seek to minimise the horizontal spread of the turbines as viewed from sensitive locations.

A reasonably balanced and consistent pattern of wind turbines to be achieved across the array would ideally be achieved from sensitive viewpoint locations.

A regularly spaced grid layout can lead to a diverse range of visual effects as the viewer moves along the coastline. From one point on the coast, the turbines could be viewed in rows with the sea horizon visible in between turbines whilst at another point, the turbines could appear as a constant mass which may appear confused.

Views from more elevated locations need to be considered with regards to the visual appearance of the array when viewed from elevated locations, such that the array does not appear cluttered or create areas of constant mass which may obscure or impact on views of distant horizons.

### 3.3.3 Turbine grouping

The proposed turbine layout should, where possible;

- Avoid gaps which are larger than the grid spacing on the perimeter wind turbines which could give the impression of a split in the wind farm into two groups or two wind farms;
- Avoiding single outlier wind turbines;
- Provide spacing between turbines so that the sea horizon is visible; and
- Avoid clusters of turbines which appear as a continuous mass or cluster of tangled machines / overlapping blades and / or hubs.

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### 4 WIND TURBINE - PRELIMINARY OPTIONS COMPARATIVE ASSESSMENT

Details of the preliminary options for consideration are presented in Table 4-1 below.

**Table 4-1: Wind turbine options.**

ID	Plan Layout	Wind Turbine Type	Number of turbines	Hub Height above LAT	Blade Tip Height above LAT
Option 1	Plan Layout 1 – regular grid	Haliade X	27	133	243
Option 2	Plan Layout 2 – irregular grid.	Haliade X	27	133	243
Option 3	Plan Layout 3 – regular grid	V164-10.0 MW	34	107	189
Option 4	Plan Layout 3 – regular grid	V174-9.5 MW	34	112	199
Option 5	Plan Layout 3 – regular grid	SG 10.0-193 DD	34	120	216.5
Option 6	Plan Layout 4 – irregular grid.	V164-10.0 MW	33	107	189
Option 7	Plan Layout 4 – irregular grid.	SG 10.0-193 DD	33	120	216.5

In this regard, a total of seven design options for the Project were initially considered (see Table 4-1 above). These varied in terms of turbine type, number and tip height above LAT. The seven options each follow one of four layout options which are illustrated in Figures 3a – 3d in Appendix A.

Initial analysis removed a number of the initial layouts, as these were less favourable in terms of turbine clustering, grouping and general visual discord (options not carried forward are highlighted in Table 4-1 above):

- Option 4 and Option 5 were discarded from further assessment based on overall hub and tip height which was greater than either Option 3 or Option 6, with no additional benefit in capacity; and
- Option 7 discarded based on overall hub and tip height.

The following options detailed in Table 4-2 below were examined further in the comparative assessment.

**Table 4-2: Wind Turbine Layout Options**

ID	Plan Layout	Wind Turbine Type	Number of machines	Hub Height above LAT	Blade Tip Height above LAT
Option 1	Plan Layout 1 – regular grid	Haliade X	27	133	243
Option 2	Plan Layout 2 – irregular grid.	Haliade X	27	133	243
Option 3	Plan Layout 3 – regular grid	V164-10.0 MW	34	107	189
Option 6	Plan Layout 4 – irregular grid.	V164-10.0 MW	33	107	189

ZTVs were prepared for the smallest and largest turbines to understand and assess the difference/variation in the areas in which the Project would be theoretically visible. A series of wirelines illustrating the proposed array from selected viewpoints were generated for both options (as illustrated in Figures 2a – 2f). The following figures (ZTV's and Wirelines) are provided in Appendix A;

- Figure 1a – Tip Height Zone of Theoretical Visibility (ZTV) to 60 km radius Option 1 (Layout 1) 27 no. wind turbines, 243 m tip height above LAT;

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- Figure 1b - Tip Height Zone of Theoretical Visibility (ZTV) to 60km radius Option 3 (Layout 3) 34 no. wind turbines, 189 m tip height above LAT;
- Figure 2a - Templetown, Wireline - Option 1 (Layout 1);
- Figure 2b –Clogherhead, Wireline - Option 1 (Layout 1);
- Figure 2c - Carlingford Mountain, Wireline - Option 1 (Layout 1);
- Figure 2d - Templetown, Wireline - Option 3 (Layout 3);
- Figure 2e - Clogherhead, Wireline - Option 3 (Layout 3); and
- Figure 2f - Carlingford Mountain - Wireline - Option 3 (Layout 3).

Four wind farm layout options were included in the comparative assessment and these are illustrated in Figures 3a-3d as follows (see Appendix A).

- Figure 3a – Landscape, Seascape and Visual Baseline, Layout Option 1;
- Figure 3b – Landscape, Seascape and Visual Baseline, Layout Option 2;
- Figure 3c - Landscape, Seascape and Visual Baseline, Layout Option 3; and
- Figure 3d – Landscape, Seascape and Visual Baseline, Layout Option 4.

## 5 PRELIMINARY ASSESSMENT OF EFFECTS ON LANDSCAPE, SEASCAPE AND VISUAL AMENITY

The purpose of the preliminary assessment is to provide a high level assessment of the potential landscape, seascape and visual effects arising from the introduction of the Project offshore infrastructure into the surrounding landscape, seascape and visual amenity.

The assessment considers the potential impacts on designated areas (see section 5.1) and potential visual impacts (see section 5.2) below and considers the wind turbines only and is provided in order to highlight potential significant affects associated with the project in its current format.

### 5.1 Policy and Designations

#### 5.1.1 Louth County Development Plan 2021-2027 Policy

Whilst policy in the CPD provides for offshore wind energy, this must recognise the need to protect sensitive landscape and visual resources as reflected section 2.1 previously.

#### 5.1.2 Louth AONBs

Two AONBs are identified along the coast at Clogherhead and also associated with the Carlingford and Feede Mountains. These areas are considered to be of value at a local level as reflected in their designation in the Louth CDP. The value attributed to these areas is also attributed to the presence of a number of designated scenic routes and protected views.

These areas are considered to be highly vulnerable to change of the type proposed. The coastal experience is intrinsic to these areas and their scenic quality which currently features no large scale detracting elements. Thus, the introduction of offshore wind farm development has the potential to significantly and adversely affect the character of these areas. Furthermore, these areas, in particular the Carlingford and Feede Mountains are located within the setting of the Mourne AONB in Northern Ireland.

The Landscape Character assessment for Co. Louth described the Carlingford and Feede Mountains as a 'dramatic mountainous area where the visual impact is increased, by its location on a peninsula'. The landscape character assessment classifies this area as being of international value due to its very high landscape quality and scenic quality along with views towards the Mourne.

#### 5.1.3 Louth Areas of High Scenic Quality

These Areas of High Scenic Quality apply to a stretch of coastal farmland at Dunany and to the foothills of the Carlingford and Feede Mountains. These areas are of local value due to their designation at County level. They are also considered to be vulnerable to change of the type proposed due to their strong relationship with the coast.

Effects are predicted to occur within these designated areas and these are likely to be significant as they are close to the coastline. Further inland, the influence of the Project would be more limited due to vegetation and built structures.

#### 5.1.4 Louth Designated Scenic Routes and Protected Views

A number of designated scenic routes and protected views are located along the coast. The scenic routes which afford unobstructed and panoramic views of the coastline are likely to be the most affected by the proposed Project and effects are predicted to be significant at a range of locations.

These are valued at local level as reflected in their county level designation. The value of these scenic routes and protected views is also attributed to the scenic quality associated with the available views of the coastline, the Irish Sea and their location within the setting of the Carlingford and Feede Mountains and the Mourne AONB. The proposed change would result in the introduction of wind turbines within an area of open

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sea. The wind turbines would present as a change of considerable scale in these existing views and is predicted to result in significant adverse effects on these designated scenic routes.

### 5.2 Preliminary assessment at selected viewpoint locations

The preliminary assessment of each of the options 1, 2, 3 and 6 is presented below with reference to viewpoints listed in Table 3-1 above. The findings from the comparative assessment of options 1, 2, 3 and 6 is tabulated below for each viewpoint. The evaluation findings in respect of turbine size, layout and turbine grouping are presented in separate columns. Findings in relation to a particular option are highlighted in bold and underlined where they are considered to be more favourable.

#### 5.2.1 Templetown – public car park at Shelling Beach

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 5 km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view and will intrude upon views across the sea between Cooley Point and Clogherhead. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following tables outline the preliminary assessment of each option at this particular viewpoint.

**Table 5-1: Templetown – public car park at Shelling Beach – Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Noticeably larger to the viewer than options 3 or 6	<b><u>More compact than options 2,3 or 6.</u></b>	Gaps subdivide wind farm into groups. Dense cluster of turbines in centre of array
Option 2 0- Layout 2	Haliade X	27	133	243	Noticeably larger to the viewer than options 3 or 6.	More extensive horizontal spread than option 1. Similar extent as options 3 and 6	<b><u>Some consistency of pattern.</u></b> <b><u>Clusters apparent but less dense than in option1.</u></b> <b><u>Isolated turbine at the end on the left hand part of the view.</u></b>
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Noticeably smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2 and 6	<b><u>Some consistency of pattern.</u></b> <b><u>Clusters apparent but less dense than in option 1.</u></b> <b><u>Isolated turbine at the end on the left hand part of the view.</u></b>
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Noticeably smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2 and 3	<b><u>Some consistency of pattern.</u></b> <b><u>Clusters apparent but less dense than in option 1.</u></b> <b><u>Isolated turbine at the end on the left hand part of the view.</u></b>



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### 5.2.2 Ballagan Point

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 6.3 km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and will be seen alongside the Mourne AONB and the Carlingford and Feede Mountains AONB resulting in significant adverse effects on the setting of these landscapes. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

**Table 5-2: Ballagan Point - Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Noticeably larger to the viewer than options 3 or 6.	<b><u>More compact than options 2,3 or 6.</u></b>	Small gaps occur in the array although the wind farm does read as a single development on the skyline.  The pattern in the array is complex and varied. Two tightly spaced clusters of turbines are visually prominent.
Option 2 0- Layout 2	Haliade X	27	133	243	Noticeably larger to the viewer than options 3 or 6.	More extensive horizontal spread than option 1. Similar extent as options 3 and 6.	Gaps occur in the array and these are more obvious than in option1 although the wind farm does read as a single development on the skyline.  At least 4-5 clusters of tightly spaced wind turbines apparent.
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Noticeably smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2 and 6.	Noticeable gaps in the array although the wind farm reads as a single development.  Pattern in the array is complex. One tightly packed cluster of wind turbines will read as a prominent feature on the skyline. Other clusters apparent but less dense than in option1. Isolated turbine at the end on the left hand part of the view.
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Noticeably smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2 and 3.	<b><u>This appears as a single development with limited gaps compared with the other options.</u></b>  <b><u>The pattern is complex.</u></b>  <b><u>One tightly grouped cluster in the centre of the array.</u></b>

### 5.2.3 055 – Giles Quay – Car park viewing point

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 10 km from

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the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and will be seen alongside the Clogherhead AONB resulting in significant adverse effects on the setting of this landscape. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

**Table 5-3: Giles Quay - Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Noticeably larger to the viewer than options 3 or 6.	<b><u>More compact than options 2,3 or 6.</u></b>	Gaps are noticeable at each end resulting in a single outlier on the left of the view and an isolated group of 2 turbines on the right.  The pattern in the array is linear and relatively simple. Some slight clustering of turbines in the array is apparent.
Option 2 0- Layout 2	Haliade X	27	133	243	Noticeably larger to the viewer than options 3 or 6.	More extensive horizontal spread than option 1. Similar extent as option 6.	Noticeable gaps occur in the array although the wind farm does read as a single development on the skyline.  Pattern in the array is more complex than in option 1. At least 2 clusters of wind turbines apparent.
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Noticeably smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Slightly smaller extent than options 2 and 6.	Noticeable gaps in the array although the wind farm reads as a single development.  Pattern in the array is more complex than in option 1. Some clustering of wind turbines apparent.
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Noticeably smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2.	<b><u>This appears as a single development with limited gaps compared with the other options.</u></b>  <b><u>The pattern is relatively simple compared with other options.</u></b>  <b><u>Some clustering of turbines apparent but not as noticeable as in other options.</u></b>

### 5.2.4 Blackrock - on designated scenic route

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 18 km from viewers at Blackrock Promenade and will be seen with coastal rough grassland areas in the foreground. The proposed wind farm will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view and will intrude upon views across the Irish Sea and will be seen alongside the Mourne AONB and the Carlingford and Feede Mountains AONB resulting in significant

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adverse effects on the setting of these landscapes. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

**Table 5-4: Blackrock - on designated scenic route - Preliminary Assessment**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	<b><u>Slightly more compact than options 2,3 or 6.</u></b>	Gaps are noticeable in the right hand part of the array.  The pattern in the array is complex due to gaps and variable spacing between turbines as these appear in the view. Tight clustering of turbines in the array is clearly apparent.
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	Slightly more extensive horizontal spread than option 1. Similar extent as options 3 and 6.	Some gaps are apparent but these are less noticeable than in option 1. As a result the pattern appears simpler and more uniform. Some slight clustering of turbines is apparent.
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	Slightly more extensive horizontal spread than option 1. Slightly smaller extent than options 2 and 6.	Gaps are scarcely noticeable resulting in a more consistent pattern and simpler array than in options 1 and 2.  Some slight clustering of wind turbines apparent.
Option 6 – Layout 4	V164- 10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	Slightly more extensive horizontal spread than option 1. Similar extent as options 2 and 3.	<b><u>One gap apparent however the wind farm reads very much as a single development.</u></b> <b><u>The pattern is more uniform and simpler than in any of the other options.</u></b> <b><u>Clustering of turbines is scarcely apparent.</u></b>

### 5.2.5 Blackrock – designated scenic route and viewpoint CDP VP18

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 18km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and will be seen alongside the Mourne AONB and the Carlingford and Feede Mountains AONB resulting in significant adverse effects on the setting of these landscapes. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

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**Table 5-5: Blackrock – designated scenic route and viewpoint CDP VP18 – Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6	<b><u>Similar extent or spread as option 2.</u></b> <b><u>More compact than options 3 or 6.</u></b>	Gaps are very noticeable in the left hand part of the array.  The pattern in the array is varied and complex due to gaps and variable spacing between turbines as these appear in the view.  Tight clustering of turbines in the array is clearly apparent. Two very tight clusters on the left part of the array will appear more prominent.
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6	<b><u>Similar extent or spread as option 1.</u></b> <b><u>More compact than options 3 or 6.</u></b>	<b><u>Some gaps are apparent. One noticeable gap in the right hand part of the array.</u></b> <b><u>The pattern is more consistent and simpler than in option 1.</u></b> <b><u>Some clustering of turbines. One cluster in particular in the right hand part of the array.</u></b>
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than options 1 and 2. Similar to option 6	This option is quite similar to option 1.
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than options 1 and 2. Similar extent as option 3.	Gaps are very apparent in the right hand part of the array.  Pattern is complex comprising lines of turbines in the left part of the array and clusters on the right hand part of the array.

### 5.2.6 Salterstown – at layby viewing point

At this location the existing view is very much focussed on the Mourne AONB and the Carlingford and Feede Mountains AONB. The proposed wind turbines will be clearly visible as a built element located approximately 13.8 km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. Significant adverse effects on the setting of the Mourne AONB and the Carlingford and Feede Mountains AONB are predicted to arise. Significant adverse effects on landscape and visual amenity are predicted to arise as a result of the Project.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

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**Table 5-6: Salterstown – at layby viewing point CDP VP18 - Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	<b><u>More compact than options 2,3 or 6.</u></b>	<p>Gaps are very noticeable in the right hand part of the array.</p> <p>The pattern in the array is varied and somewhat complex comprised of turbines in a row followed by clusters with large gaps.</p> <p>Tight clustering of turbines in the array is clearly apparent. Three tight groupings on the right hand part of the array will appear more prominent.</p>
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	More extensive horizontal spread than option 1. Similar extent as options 3 and 6.	<p>Some gaps are apparent in the array.</p> <p>The pattern is relatively complex due to variable spacing between turbines as these appear in the view.</p> <p>Some clustering of turbines add to the overall complexity of the array as seen in the view.</p>
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2 and 6.	<p>Similar to Option 1</p> <p>Gaps are very noticeable in the right hand part of the array.</p> <p>The pattern in the array is varied and somewhat complex comprised of turbines in a row followed by clusters with large gaps.</p> <p>Tight clustering of turbines in the array is clearly apparent. Three tight groupings on the right hand part of the array will appear more prominent.</p>
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1. Similar extent as options 2 and 3.	<p><b><u>Gaps are less noticeable than in other options. One small gap in the right hand part of the array.</u></b></p> <p><b><u>Pattern presents a simpler and more consistent spread of turbines than in other options. Only slight clustering of turbines apparent.</u></b></p>

### 5.3 Clogherhead (Clogherhead AONB)

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The closest wind turbine will be located approximately 13.9km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and some of the turbines will intrude upon the end of the Cooley Peninsula. The proposed wind farm will be seen from within the Clogherhead AONB and alongside, the Carlingford and Feede Mountains

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AONB and the Mourne AONB further afield resulting in significant adverse effects on the setting of these landscapes. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

**Table 5-7: Clogherhead - Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	<b>More compact than options 2, 3 or 6.</b>	A noticeable gap in the left hand part of the array.  The pattern in the array appears as a relatively consistent line of turbines with relatively consistent spacing apart from the one noticeable gap. Some clustering of turbines is apparent in the middle of the array.
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	Larger extent or spread than option 1,3 or 6.	Noticeable gaps resulting in an inconsistent and complex pattern overall. Some clustering of turbines is apparent.
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1 and. Similar to option 3. Smaller extent than option 2	<b><u>Similar to option 1. A noticeable gap in the left hand part of the array.</u></b>  <b><u>The pattern in the array appears as a relatively consistent line of turbines with relatively consistent spacing apart from the one noticeable gap.</u></b> <b><u>Some clustering of turbines is apparent in the middle of the array.</u></b> <b><u>Isolated turbine at the end on the edge of the view.</u></b>
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1 and. Similar to option 6. Smaller extent than option 2.	Gaps are very apparent in the left hand part of the array resulting in a relatively complex pattern. Tight clusters of turbines apparent one of which obstructs views of the tip of the Cooley Peninsula.  Pattern is complex comprising lines of turbines in the left part of the array and clusters on the right hand part of the array. <b><u>Isolated turbine at the end on the left hand part of the view.</u></b>

### 5.3.1 Summit of Slieve Foye (Carlingford and Feede Mountains AONB)

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 13.5 km

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from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and will be seen alongside the wider coastline of Dundalk Bay, Clogherhead AONB and further afield. Significant adverse effects on the setting of the Carlingford and Feede AONB, the Clogherhead AONB and the Mourne AONB are predicted to arise. Significant adverse effects on landscape and visual amenity are predicted to arise in general.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

**Table 5-8: Summit of Slieve Foye (Carlingford and Feede Mountains) - Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	<b><u>More compact than options 2, 3 or 6.</u></b>	Wind turbines present in the view with a strong geometric pattern comprised of avenues of turbines with gaps between turbine groups some of which present as dense clusters.
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	More extensive horizontal spread than option 1 and similar to options 3 and 6.	<b><u>A more dispersed pattern is present.</u></b> <b><u>There is some consistency in the turbine spacing resulting in limited clustering of machines.</u></b>
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1 and similar to options 2 and 6.	<b><u>This option is quite similar to option 2 although some barely noticeable gaps occur in the array.</u></b>
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	More extensive horizontal spread than option 1 and similar to options 2 and 3.	The pattern in this array is a little more complex than options 2 and 3 and as a result some clustering of turbines is apparent.

### 5.3.2 A2 Road in Daisyhill (Mournes AONB)

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 13.7km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and will be seen alongside Carlingford Lough and the wider coastline of Dundalk Bay and Carlingford and Feede Mountains AONB and further afield. Significant adverse effects on the setting of the Carlingford and Feede AONB and the Mournes AONB are predicted to arise. Significant adverse effects on landscape and visual amenity are predicted to arise at this particular viewpoint.

The following table outlines the preliminary assessment of each option at this particular viewpoint.

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**Table 5-9: A2 Road in Daisyhill (Mournes AONB) - Preliminary Assessment.**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6.	All options have a similar extent and horizontal spread.	Wind turbines present in the view with a complex pattern comprised of a line of turbines across the horizon along with clusters and noticeable gaps in the right hand part of the array.  Clusters of densely grouped wind turbines appear at the right hand end of the array.
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6	All options have a similar extent and horizontal spread.	The pattern of the array is varied with dense clusters of turbines in the right hand part of the array. Gaps occur between the clusters at the right hand part of the array.
Option 3 - Layout 3	V164- 10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	All options have a similar extent and horizontal spread.	<b><u>Option 3 follows a linear pattern of wind turbines with some slight gaps apparent in the array with groups of more closely spaced turbines.</u></b>
Option 6 - Layout 4	V164- 10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2.</u></b>	All options have a similar extent and horizontal spread.	This option presents as a linear arrangement of wind turbines. One cluster is present on the left hand part of the array which is somewhat detached from the remainder of the array

### 5.3.3 Head Road, Foothills of Mourne Mountains (Mourne AONB)

The proposed wind turbines will be clearly visible as a built element in a landscape and seascape which currently features no development of this scale. The wind turbines will be located approximately 13.5km from the viewer and will introduce a scale reference which would undermine the expansive and relatively unspoilt aspects of the existing view. The proposed wind farm will intrude upon views across the Irish Sea and will be seen alongside the wider coastline of Dundalk Bay, Clogherhead AONB and further afield. Significant adverse effects on the setting of the Carlingford and Feede AONB, the Clogherhead AONB and the Mournes AONB are predicted to arise. Significant adverse effects on landscape and visual amenity are predicted to arise.

The following table outlines the preliminary assessment of each option at this particular viewpoint.



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**Table 5-10: Head Road, Foothills of Mourne Mountains (Mournes AONB) - Preliminary Assessment**

Option	Wind Turbine Type	No.	Hub	Blade Tip	Assessment – Turbine Size	Assessment Turbine Layout	Assessment Turbine Grouping
Option 1 - Layout 1	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6	All options have a similar extent and horizontal spread.	Wind turbines present in the view with a complex pattern comprised of a line of turbines across the horizon to the left along with tight clusters of wind turbines interspersed with noticeable gaps in the right hand part of the array. Clusters of densely grouped wind turbines almost fully overlapping appear at the right hand end of the array.
Option 2 0- Layout 2	Haliade X	27	133	243	Turbines appear slightly larger to the viewer than options 3 or 6	All options have a similar extent and horizontal spread.	<b><u>The wind farm appears broadly as a line of wind turbines. Some noticeable gaps occur in the right hand part of the array resulting in some tighter groupings of wind turbines.</u></b>
Option 3 -Layout 3	V164-10.0 MW	34	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2</u></b>	All options have a similar extent and horizontal spread.	The wind farm appears as a linear arrangement in the left part of the array. The right hand part of the array features noticeable clusters of wind turbines with noticeable gaps in between.
Option 6 - Layout 4	V164-10.0 MW	33	107	189	<b><u>Turbines appear slightly smaller to the viewer than options 1 or 2</u></b>	All options have a similar extent and horizontal spread.	The pattern in this array presents as a line of wind turbines albeit with some gaps in the array.

### 5.3.4 Summary of Preliminary Assessment of Layouts 1, 2, 3 & 4

The summary of the preliminary assessment is as follows:

- Both option 1 and option 2 feature 27 wind turbines with an overall tip height of 243 m. The height difference between these and the wind turbines associated with options 3 (34 wind turbines with overall tip height of 189 m) and 6 (33 wind turbines with an overall tip height of 189 m) is clearly apparent at the closer viewpoints. The turbines in options 1 and 2 are likely to be more prominent in views than those associated with options 3 and 6 primarily due to the difference in tip height above LAT;
- Options which present the most favourable layout as seen from the maximum number of viewpoints will have the following;
  - Consistent and simple pattern with consistent spacing between individual wind turbines and avoiding gaps which appear to split the wind farm;
  - Minimal clustering of wind turbines which present in the view as a dense grouping of structures that would be more visible than single turbines aligned in a line;
- The comparative assessment of options 1, 2, 3 and 6 documented above concludes that further design work would need to be undertaken to resolve complex patterns in the proposed array to mitigate landscape and visual effects.

## ORIEL WIND FARM PROJECT – PRELIMINARY LANDSCAPE ASSESSMENT OF DESIGN OPTIONS

The preliminary assessment indicated that significant visual impacts were predicted to arise at a number of viewpoint locations at the coast. The potential adverse visual effects are predicted due to the introduction of wind turbines into these views. This as a result of:

- Open, coastal views currently feature no large scale development;
- The turbines will introduce a scale reference into a landscape and seascape where currently no scale indicators exist and thus, the expansiveness of the area would be undermined;
- In some cases, the turbines will intrude upon views of the open sea to the horizon; and
- In some cases, the turbines will intrude and partially obstruct views of the coastline along the Cooley Peninsula including the Carlingford and Feede Mountains and Mourne Mountains.

## 6 DESIGN REFINEMENT

### 6.1 Layout 5

A workshop was held in August 2019 with the landscape assessment and the design team to discuss layout design and options to refine the layout in the interest of landscape, seascape and visual amenity. The design refinement exercise was undertaken based on a layout comprising of 33 wind turbines. The design workshop resulted in a revised layout (Layout 5) as illustrated in Figures 3e – Landscape, Seascape and Visual Baseline, Layout Option 5 in Appendix B.

Zones of theoretical visibility (ZTVs) were developed for Layout 5 using two possible turbine options and are illustrated in Figures 1c and 1d, and a series of wirelines of the proposed views of both options from three viewpoint locations as illustrated in Figures 2g – 2m: These figures, listed below are included in Appendix B.

- Figure 1c – Tip Height Zone of Theoretical Visibility (ZTV) to 60 km radius Option 8 (Layout 5) 33 no. wind turbines, 243 m tip height above LAT;
- Figure 1d - Tip Height Zone of Theoretical Visibility (ZTV) to 60 km radius Option 9 (Layout 5) 33 no. wind turbines, 189 m tip height above LAT;
- Figure 2g - Templetown, Wireline - Option 8 (Layout 5);
- Figure 2h –Clogherhead, Wireline - Option 8 (Layout 5);
- Figure 2j - Carlingford Mountain, Wireline - Option 8 (Layout 5);
- Figure 2k - Templetown, Wireline - Option 9 (Layout 5);
- Figure 2l - Clogherhead, Wireline - Option 9 (Layout 5); and
- Figure 2m - Carlingford Mountain - Wireline - Option 9 (Layout 5).

In this regard, the design process sought to achieve the following.

- Reduce overall spread of the turbine layout as seen from the viewpoints documented in the comparative assessment above;
- Repositioning of up to four turbines in the north western part of the array to avoid intrusion of turbines upon the Cooley Peninsula and South Down Coast as seen from viewpoints further south including that at Clogherhead;
- Adjustments to the turbine layout in order to separate out dense clusters of overlapping turbines;
- Micro siting of turbines in order to have a more even distribution of turbines throughout the layout and achieve an overall consistent pattern of turbines as would be seen from the viewpoint locations; and
- Micro siting of turbines to bring single isolated wind turbines closer to the remainder of the layout.

Some improvements in the Project layout are anticipated to arise from the majority of the viewpoints studied in the comparative assessment as a result of the design exercise. This exercise showed that there was however scope for further improvements to the design of the Project in terms of refinement of exact positions of the wind turbines. These further design iterations were strongly recommended. Whilst the design improvements did result in noticeable changes to the array as presented in the wirelines, the overall size and scale of the proposed wind farm remains relatively unchanged and as a consequence the significance of effects predicted to arise, as identified in Section 5 above remains unchanged.

Note that the layout indicated in Figure 3e was subject to further refinement by the designers.

## ORIEL WIND FARM PROJECT – PRELIMINARY LANDSCAPE ASSESSMENT OF DESIGN OPTIONS

### 6.2 Layout 6

Subsequent to the design workshop undertaken in August 2019, further consideration of the proposed turbine layout was undertaken in 2020 for the purposes of assessing potential landscape and visual impacts arising from advances in turbine technology and turbines available to the project team, one such option allowed a 25 turbine array to be considered. The design workshop resulted in a new layout (Layout 6) being proposed as illustrated in Appendix C; Figure 3a.

This subsequent design refinement was undertaken on a proposed layout of 25 wind turbines, with maximum tip height of 270 m above LAT, which sought to adopt the following principles;

1. All surface offshore infrastructure, including the offshore substation shall be confined within the offshore wind farm area;
2. The wind turbine layout will, where possible, avoid clustering of wind turbines from key viewpoints;
3. The reduction in turbine numbers, increases the distance to the closest turbine to 6 km approximately from the nearest land area (e.g. Templetown); and
4. The wind turbine layout will, where possible, avoid visual overlap with land, particularly the Cooley Peninsula from southern viewpoints.

An accompanying ZTV was produced for Layout 6 (refer Appendix C; Figure 3a) to enable comparison between previous design layout options.

A series of comparison wirelines from selected viewpoint locations were generated and are provided at Appendix C; Figure 3b to Figure 3d. The selected comparison viewpoints included the following locations;

1. Cooley Point;
2. Blackrock Promenade;
3. Clogher Head; and
4. Skerries Headland

The above viewpoint locations were considered appropriate for comparison as they are illustrative of potential for landscape and visual impacts at various locations and distances within the ZTV.

The wirelines generated from each of the above locations included comparison between; Preliminary Layout of 55 turbines (160 m tip), Layout of 34 Turbines (216.5 m tip) and the proposed array layout of 25 turbines (270 m tip) whilst also allowing for an assessment of the proposed layout options when viewed in combination with important landscape features such as The Mourne. The following figures used for comparison purposes are provided at Appendix C;

- Figure 3b – Cooley Point Baseline and Wireline;
- Figure 3c – Blackrock Promenade Baseline and Wireline;
- Figure 3d – Clogher Head Baseline and Wireline; and
- Figure 3e - Skerries Headland Baseline and Wireline.

The following points are noted when comparing initial layout, interim layout and proposed array layouts from Cooley Point;

- i. The horizontal field of view containing turbines is similar for the initial layout and the proposed 25 turbine layout with the proposed 25 turbine layout less in extent than the interim turbine layout;

## ORIEL WIND FARM PROJECT – PRELIMINARY LANDSCAPE ASSESSMENT OF DESIGN OPTIONS

- ii. Fewer overlapping turbines apparent in the proposed 25 turbine layout when compared against the initial and interim turbine layouts;
- iii. Turbine spacing within the proposed 25 turbine layout is more evenly spaced across the field of view when compared against the initial and interim layouts with fewer instances of increased spacing; and
- iv. Both the Preliminary Layout and the Interim Layout appear to be visually bunched within the central portion of the view when compared against the proposed 25 turbine layout.

The following points are noted when comparing initial layout, interim layout and proposed array layouts from Blackrock Promenade;

- i. The horizontal field of view containing turbines is similar for the initial layout and the proposed 25 turbine layout with the proposed 25 turbine layout less in extent than the interim turbine layout;
- ii. There is a larger separation distance perceived between turbines proposed as part of the 25 turbine layout and the Mourne Mountain range (to left of view) when compared against the interim turbine layout;
- iii. Fewer overlapping turbines are apparent in the proposed 25 turbine layout when compared against the initial and interim turbine layouts; and
- iv. Turbine spacing within the proposed 25 turbine layout more evenly spaced across the field of view when compared against the initial and interim layouts with fewer instances of increased spacing.

The following points are noted when comparing initial layout, interim layout and proposed array layouts from Clogher Head;

- i. The horizontal field of view containing turbines is less for the proposed 25 turbine layout when compared against the initial and interim layouts;
- ii. Turbines associated with the 25 turbine layout do not overlap with the important horizon feature formed by The Mourne Mountains;
- iii. Similar to the interim layout, the turbines associated with the proposed 25 turbine layout are perceived at a similar height to The Mourne Mountains and are not perceived to 'overtop' the horizon line;
- iv. Fewer overlapping turbines apparent in the proposed 25 turbine layout when compared against the initial and interim turbine layouts; and
- v. Turbine spacing within the proposed 25 turbine layout more evenly spaced across the field of view when compared against the initial and interim layouts with fewer instances of increased spacing.

The following points are noted when comparing initial layout, interim layout and proposed array layouts from Skerries Headland;

- i. The horizontal field of view containing turbines is less for the proposed 25 turbine layout when compared against the initial and interim layouts;
- ii. Turbines associated with all layouts are perceived, to varying degrees, in front of The Mourne Mountains, which form the distinct backdrop / horizon;
- iii. Similar to the interim layout, the turbines associated with the proposed 25 turbine layout are perceived at a similar height to The Mourne Mountains and are not perceived to 'overtop' the horizon line;
- iv. Fewer overlapping turbines apparent in the proposed 25 turbine layout when compared against the initial and interim turbine layouts, though as such distances instances of overlapping turbines are difficult to perceive in the view; and

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- v. Turbine spacing within the proposed 25 turbine layout more evenly spaced across the field of view when compared against the initial and interim layouts with fewer instances of increased spacing.

Whilst the design improvements, as illustrated in Appendix C, have resulted in noticeable changes to the array particularly in relation to the horizontal field of view containing turbines and a larger separation distance between the turbines and the important horizon feature formed by the distinctive outline of the Mourne Mountains, the overall significance of effects as reported are considered to remain unchanged.

## 7 CONCLUSIONS

The offshore wind farm area has been selected on the basis of a detailed analysis and consideration of a range of alternatives as the optimum area that provides a balance between other environmental constraints such as; subsea geological conditions, shipping movements, fishing grounds, water depth, navigational constraints etc. and there are no identified options available that provide an increased separation between coastal areas to the north-west. As a consequence of the nature of the identified offshore wind farm project area, it is considered that the proposed Project will result in localised significant adverse effects on landscape, seascape and visual amenity.

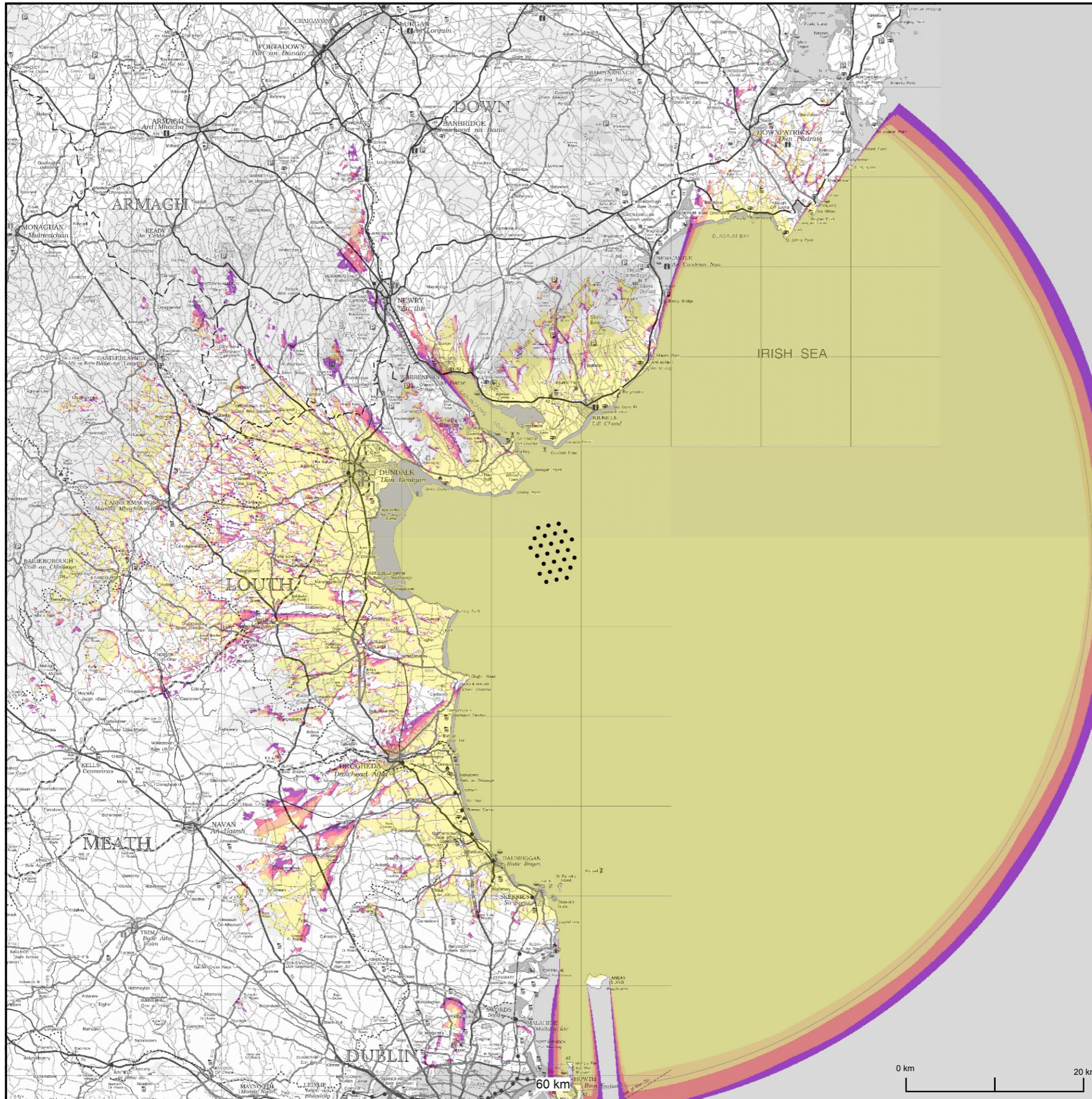
In terms of the appearance of the array from the viewpoint locations studied, improvements to the extent of horizontal field of view containing turbines has been undertaken when compared against the preliminary and interim turbine layouts. The proposed 25 turbine array also reduced the instances of overlapping turbines visible, creating a more visually cohesive layout when viewed from a number of viewpoints. It is also considered that spacing of the turbines within the proposed 25 turbine array is more even when compared against the interim and initial layouts. Spacing of the turbines appears more even across the view, which further reduce the instances of overlapping and clustering of turbines, and aiding in providing a more visually cohesive layout when viewed from sensitive viewpoint location.

It is therefore considered that the proposed array, comprised of 25 turbines to 270 m tip height above LAT provides an improved layout when compared against the interim and preliminary layouts.

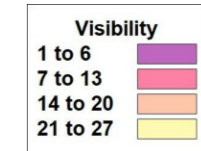
## Appendix A

Drawings – Design Layout Options 1-4





**Legend**



Rev	Description	By	Ckd	Date
0	Draft Review		PM	July 2019

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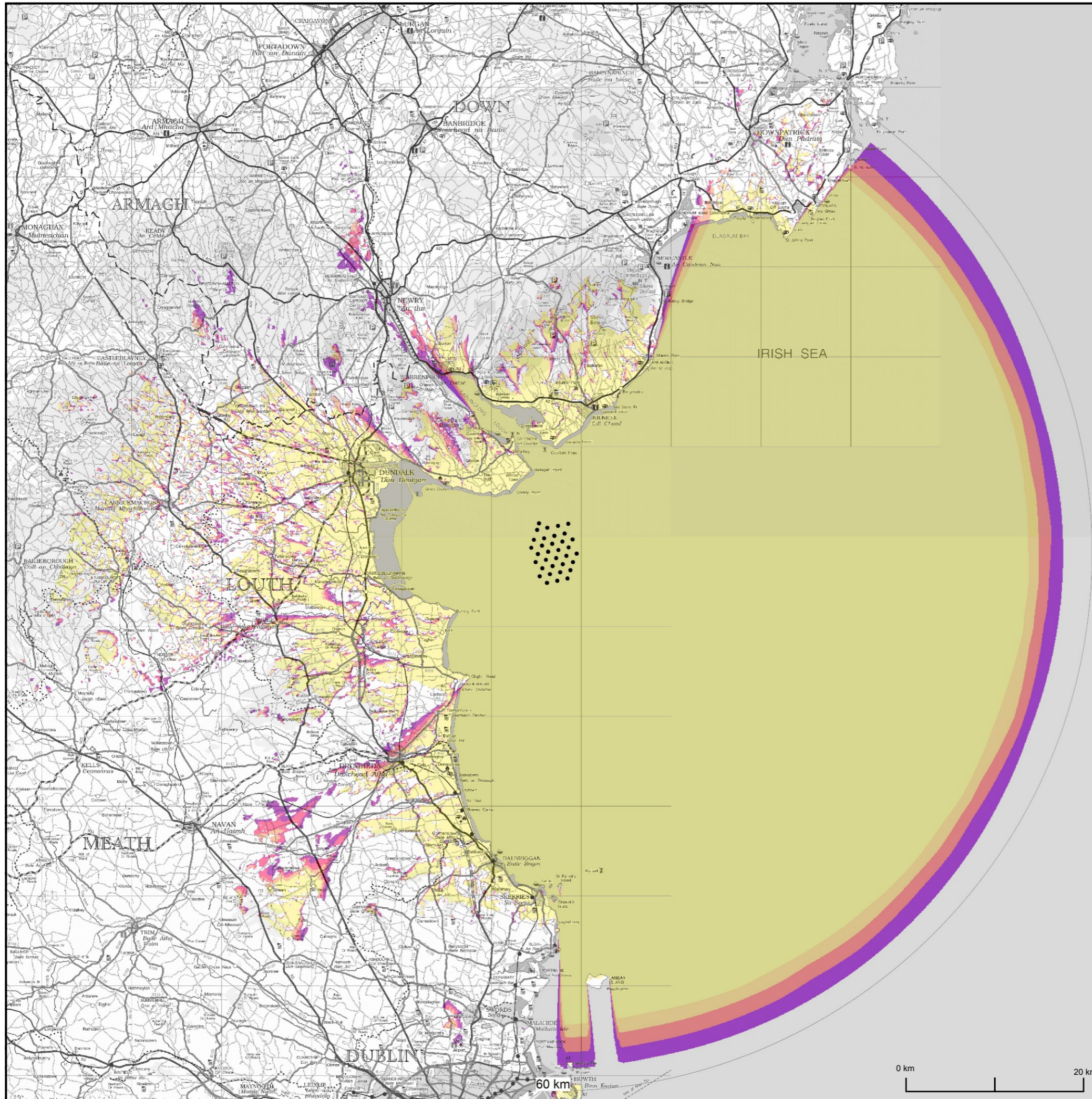
Project: **ORIEL WIND FARM**  
 Dundalk Bay, Co. Louth

Title: **TIP HEIGHT ZTV to 60 km RADIUS**  
 Option 1 (Layout 1) x 27 WTGs  
 243 m tip height above LAT  
 Rotor 220 m x Hub 133 m

Fig No: **1A**

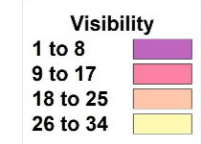
Status: Final  
 Scale: On map  
 Date: July 2019

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**Legend**



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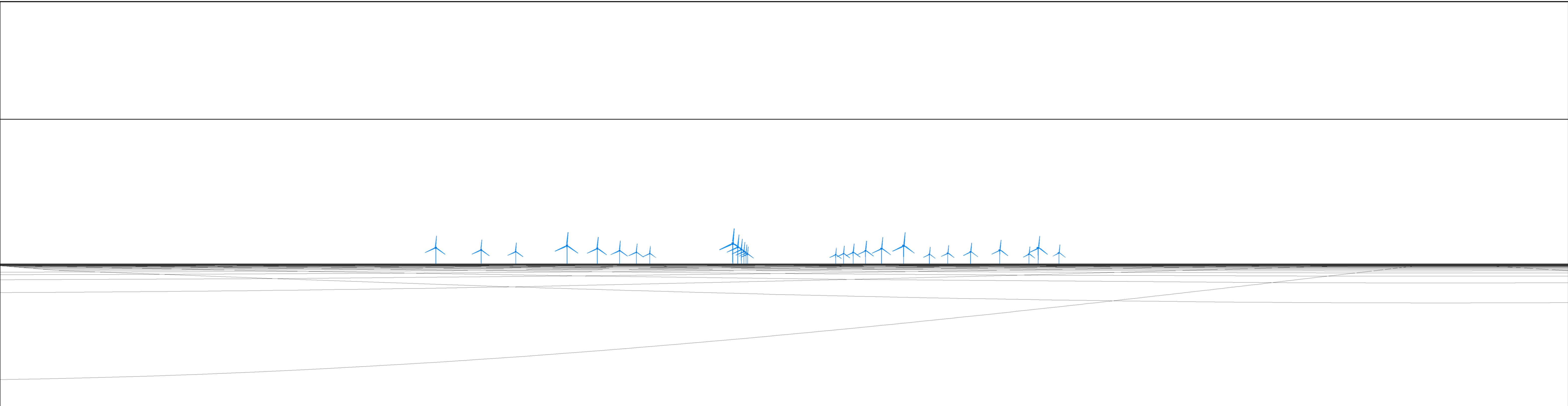
Title: **TIP HEIGHT ZTV to 60 km RADIUS**  
 Option 3 (Layout 3) x 34 WTGs  
 189 m tip height above LAT  
 Rotor 164 m x hub 107 m

Fig No: **1B**

Status: Final  
 Scale: On map  
 Date: July 2019

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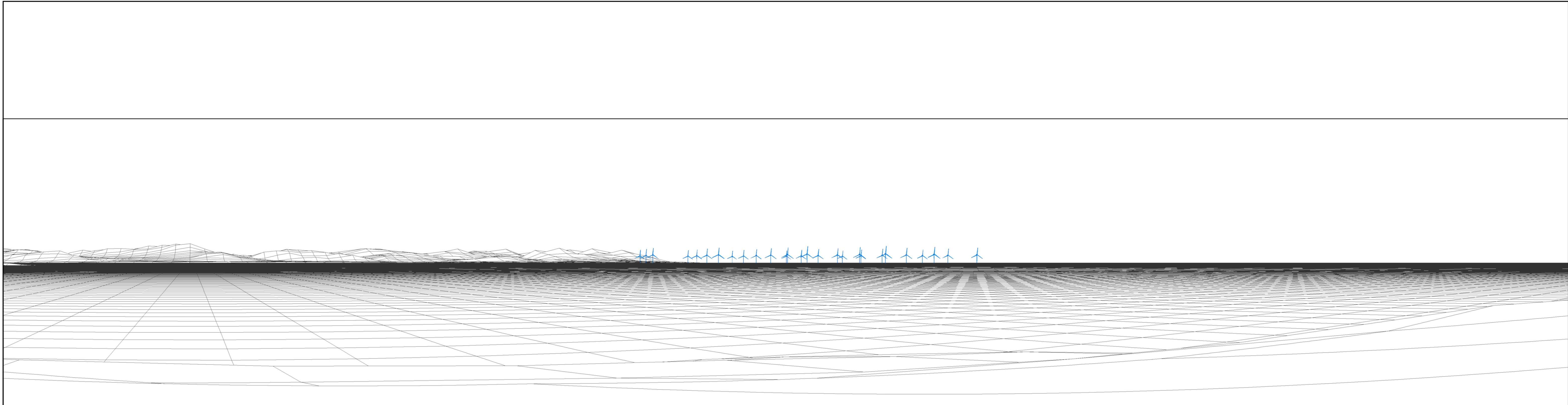
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AOD	3 m	Viewing distance	522 mm	Rotor dia	220 m
Direction	142°	Paper size	831 X 154 mm	Hub height	133 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	243 m LAT

**Appendix A - Figure 2A**  
**Viewpoint 052 Templetown**  
 Wireline - Option 1 (Layout 1)

Turbines:	27 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	July 2019

Project:  
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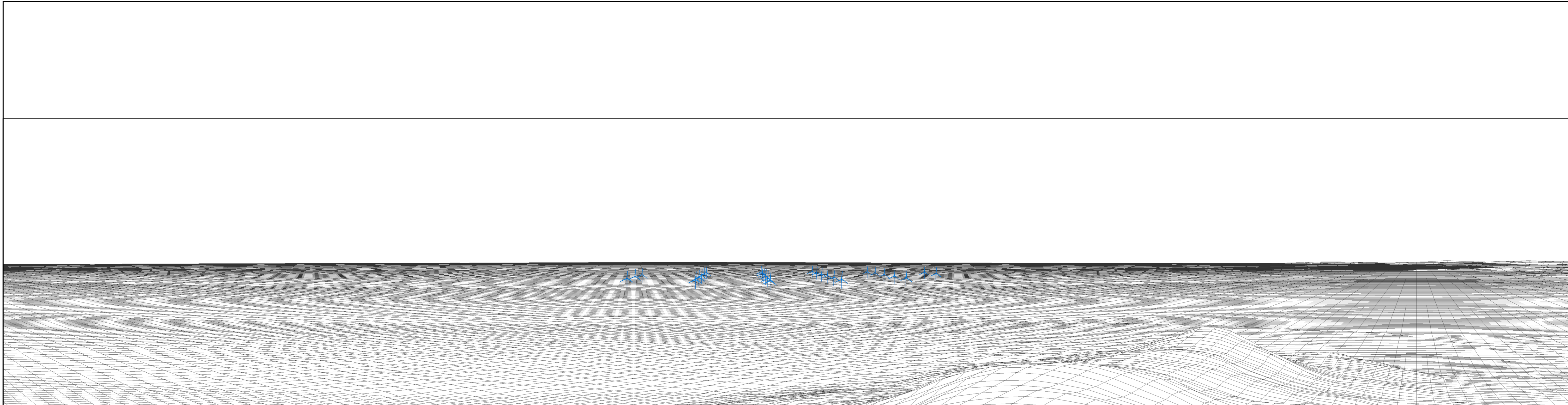
OS Reference	317131E 284265N	Nearest turbine	13973 m	Turbine type	GE Haliade-X
AOD	37 m	Viewing distance	522 mm	Rotor dia	220 m
Direction	34°	Paper size	831 X 154 mm	Hub height	133 m
Field of View	90°	Printed image size	320 X 260 mm	Tip height	243 m LAT

**Appendix A - Figure 2B**  
**Viewpoint 065 Clogherhead**  
 Wireline - Option 1 (Layout 1)

Turbines:	27 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	July 2019

Project: **Oriel Wind Farm**  
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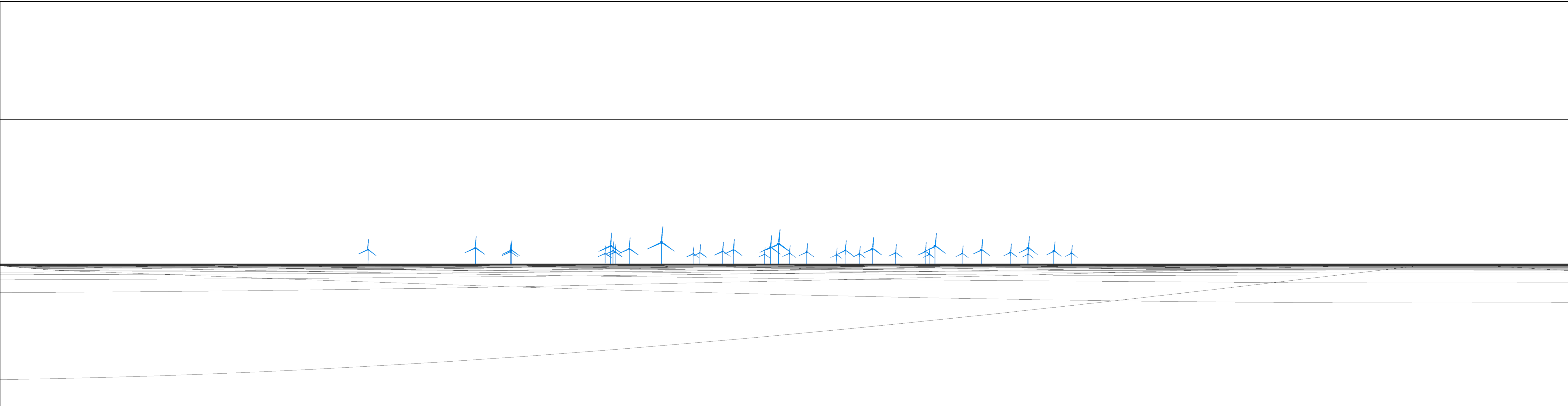
OS Reference	317050E 311801N	Nearest turbine	13542 m	Turbine type	GE Haliade-X
AOD	547 m	Viewing distance	522 m	Rotor dia	220 m
Direction	144°	Paper size	831 X 154 mm	Hub height	133 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	243 m LAT

**Appendix A - Figure 2C**  
**Viewpoint 067 Carlingford Mountain**  
 Wireline - Option 1 (Layout 1)

Turbines:	27 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	July 2019

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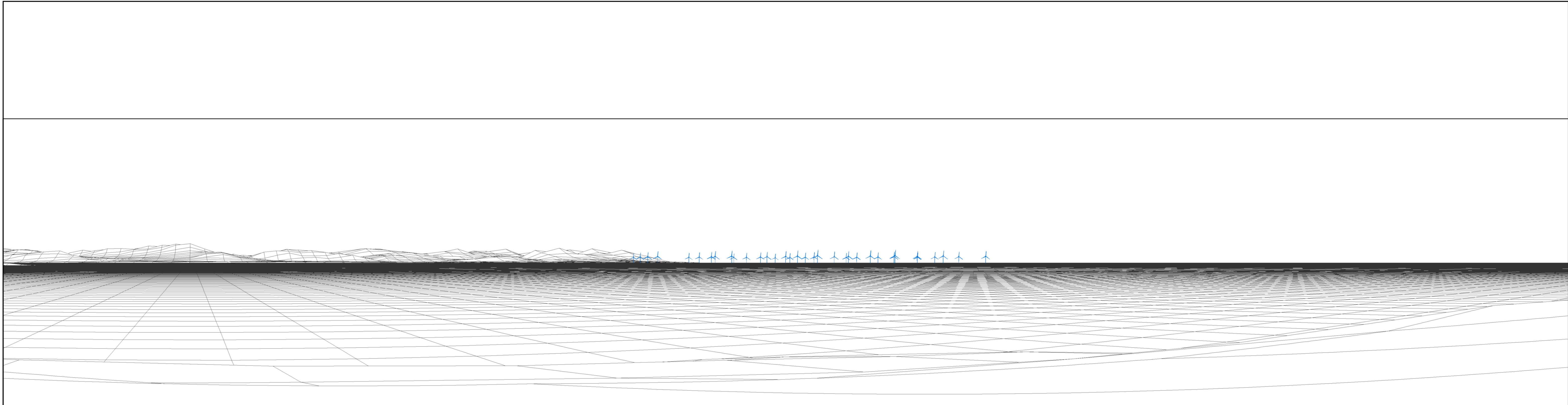
OS Reference	321633E 305210N	Nearest turbine	5241 m	Turbine type	Vestas V164
AOD	3 m	Viewing distance	522 mm	Rotor dia	160 m
Direction	142°	Paper size	831 X 154 mm	Hub height	107 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	189 m LAT

**Appendix A - Figure 2D**  
**Viewpoint 052 Templetown**  
**Wireline - Option 3 (Layout 3)**

Turbines:	34 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	July 2019

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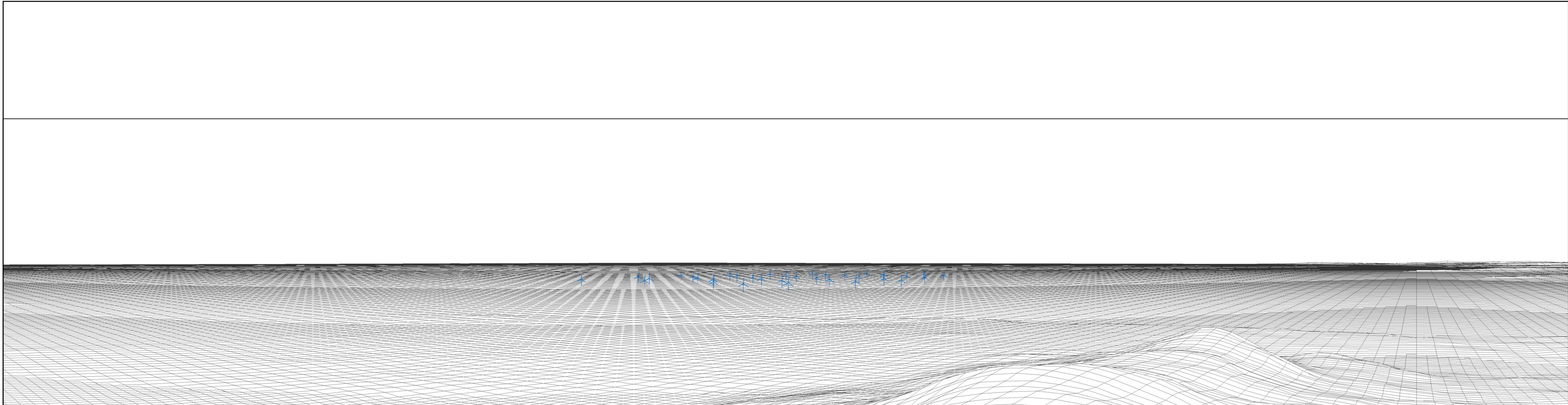
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AOD	37 m	Viewing distance	522 mm	Rotor dia	160 m
Direction	34°	Paper size	831 X 154 mm	Hub height	107 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	189 m LAT

**Appendix A - Figure 2E**  
**Viewpoint 065 Clogherhead**  
 Wireline - Option 3 (Layout 3)

Turbines:	34 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	July 2019

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OS Reference	317050E 311801N	Nearest turbine	13222 m	Turbine type	Vestas V164
AOD	547 m	Viewing distance	522 mm	Rotor dia	160 m
Direction	144°	Paper size	831 X 154 mm	Hub height	107 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	189 m LAT

**Appendix A - Figure 2F**  
**Viewpoint 067 Carlingford Mountain**  
 Wireline - Option 3 (Layout 3)

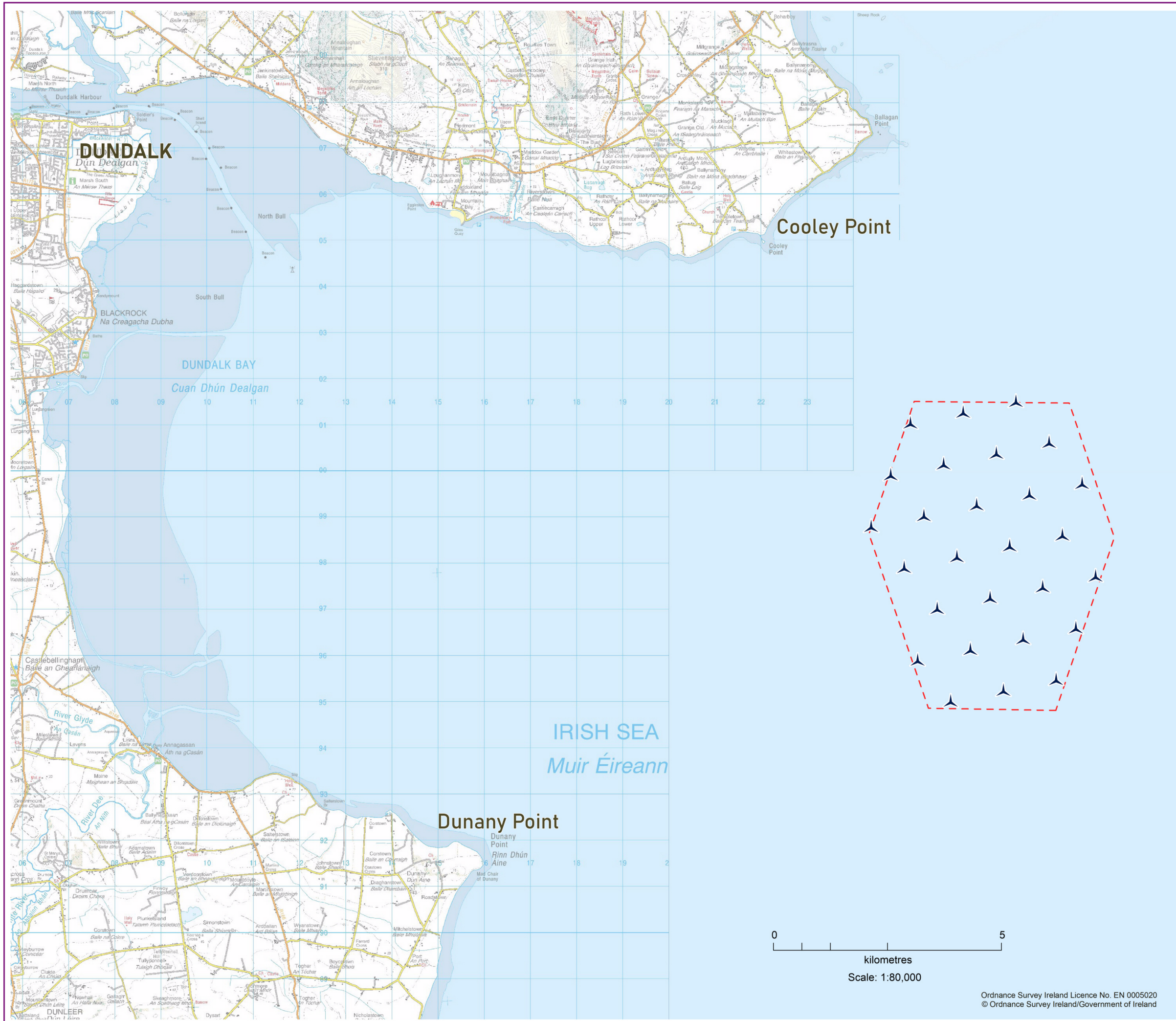
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Revision:	00	Checked:	E.O'C
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Status:	For Review	Date:	July 2019

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**Legend**

- Oriel Windfarm Lease area
- Turbine

**Design Details**

ID:	Option 01
Grid;	Regular grid
Turbine type;	Haliade X
Number;	X 27
Rotor dia;	220 m
Hub height;	133 m (above LAT)
Blade tip;	243 m (above LAT)



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Project: ORIEL WIND FARM PROJECT

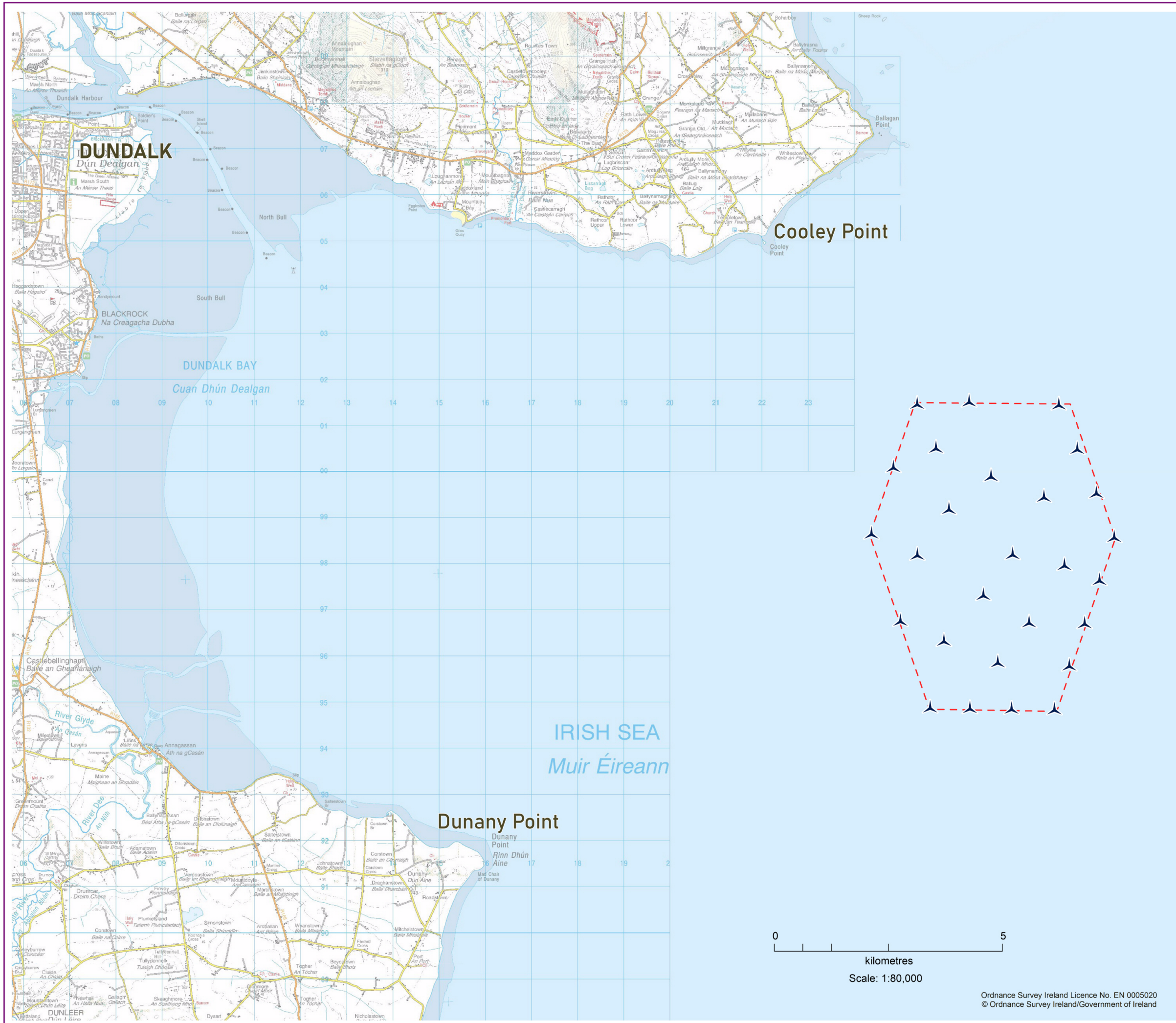
Title: L&S Visual Baseline  
Turbine Layout 01

Fig No: 3a

Status: Final Date: Nov 2019

Drawn: PM Ckd: SA

IRENET 95  
 1:80,000 - Scale @ A3  
 RPS Project Number NI 2124



### Legend

- Oriel Windfarm Lease area
- Turbine

### Design Details

ID: Option 02  
 Grid; Irregular grid  
 Turbine type; Haliade X  
 Number; X 27  
 Rotor dia; 220 m  
 Hub height; 133 m (above LAT)  
 Blade tip; 243 m (above LAT)



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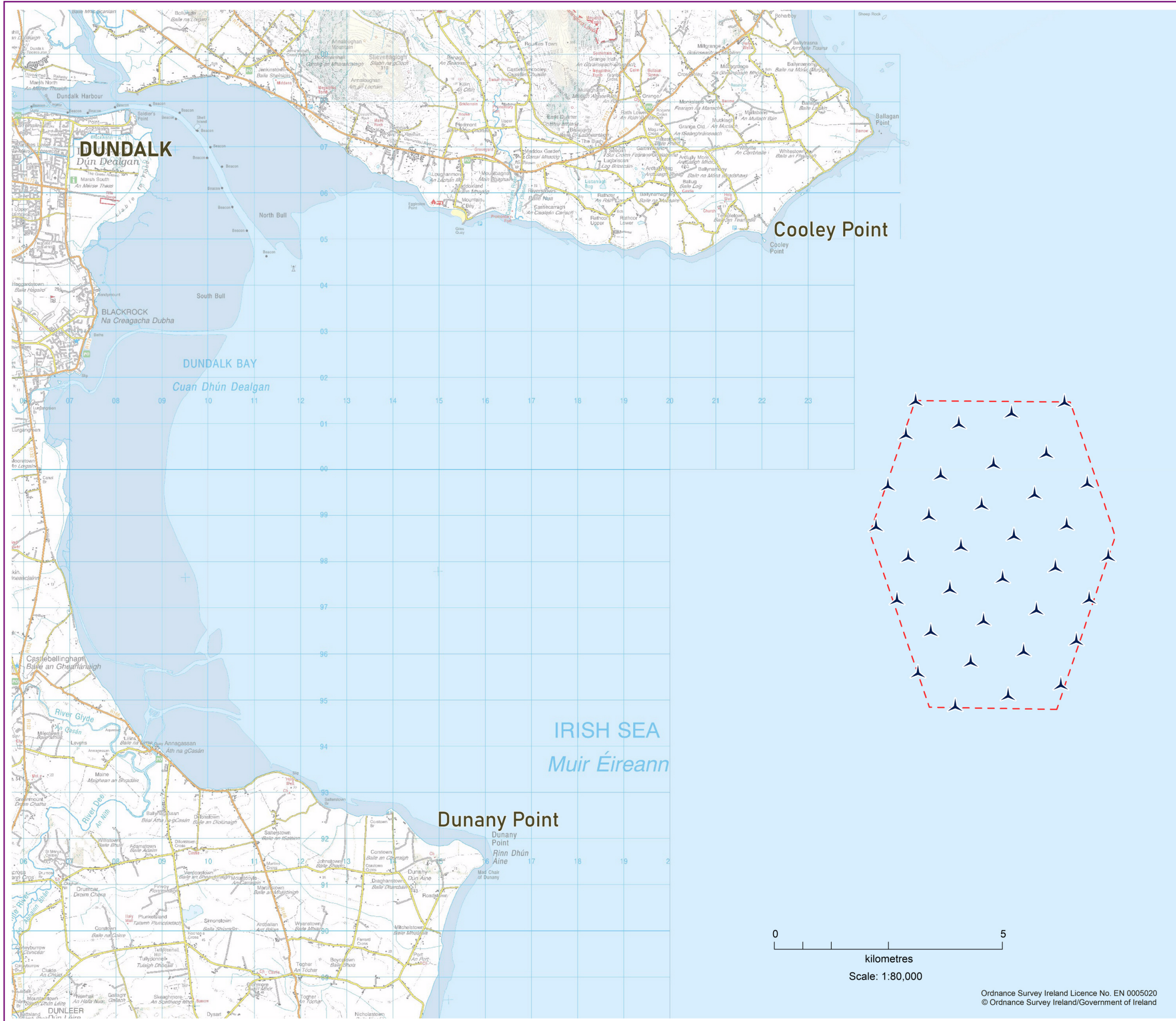
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 Turbine Layout 02

Fig No: 3b

Status: Final Date: Nov 2019

Drawn: PM Ckd: SA

IRENET 95  
 1:80,000 - Scale @ A3  
 RPS Project Number NI 2124



**Legend**

- Oriel Windfarm Lease area
- Turbine

**Design Details**

ID: Option 03  
 Grid; Regular grid  
 Turbine type; V164 - 10 MW  
 Number; X 34  
 Rotor dia; 164 m  
 Hub height; 107 m (above LAT)  
 Blade tip; 189 m (above LAT)



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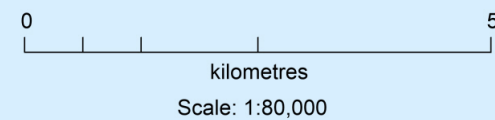
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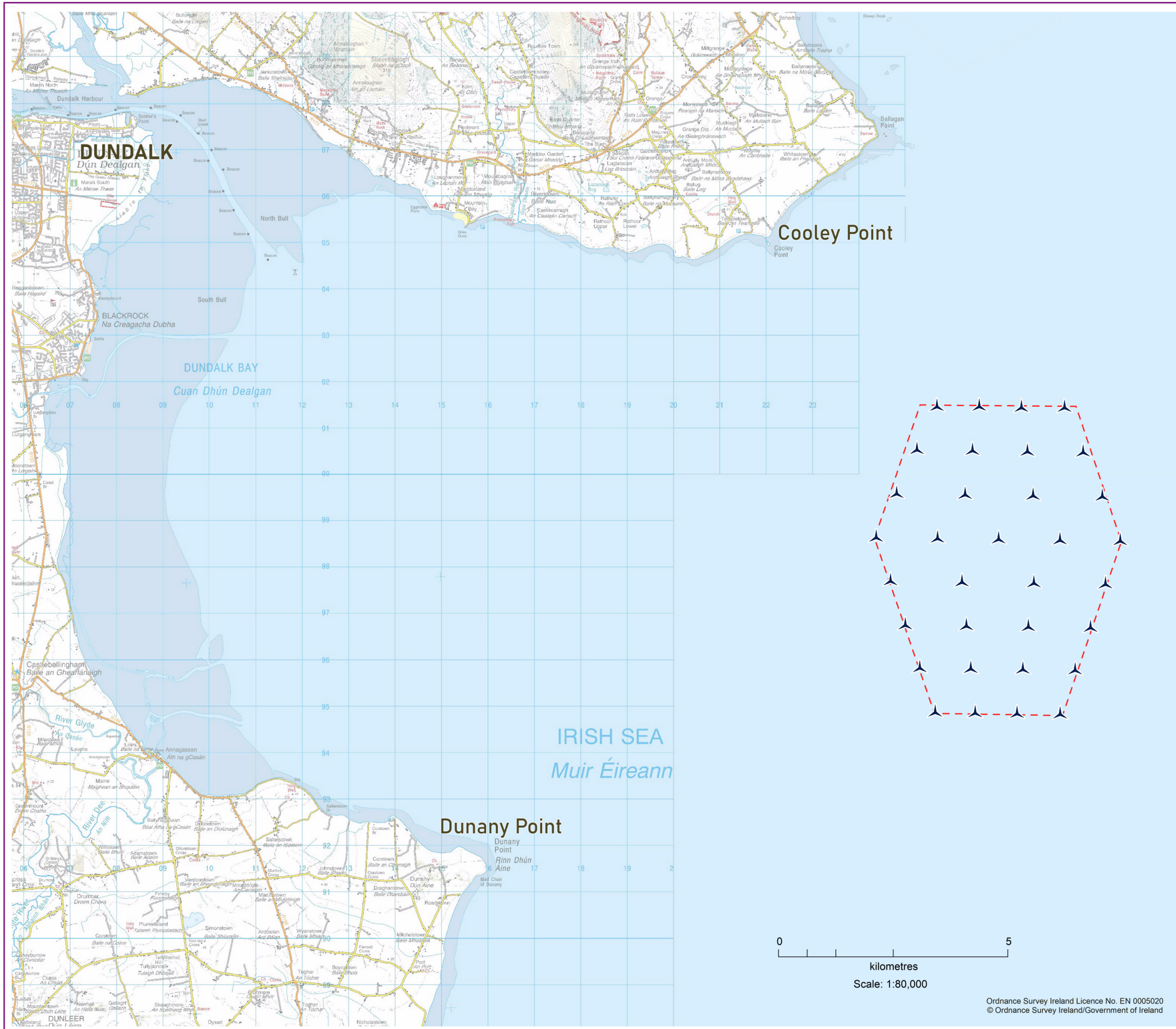
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Status: Final Date: Nov 2019



Drawn: PM Ckd: SA

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 RPS Project Number NI 2124



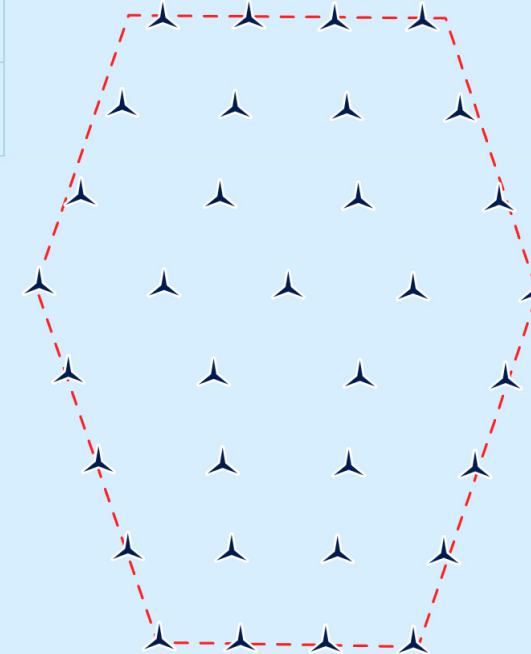


**Legend**

-  Oriel Windfarm Lease area
-  Turbine

**Design Details**

ID: Option 06  
 Grid; Irregular grid  
 Turbine type; V164 - 10 MW  
 Number; X 33  
 Rotor dia; 164 m  
 Hub height; 107 m (above LAT)  
 Blade tip; 189 m (above LAT)



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Title: L&S Visual Baseline  
 Turbine Layout 04

Fig No: 3d

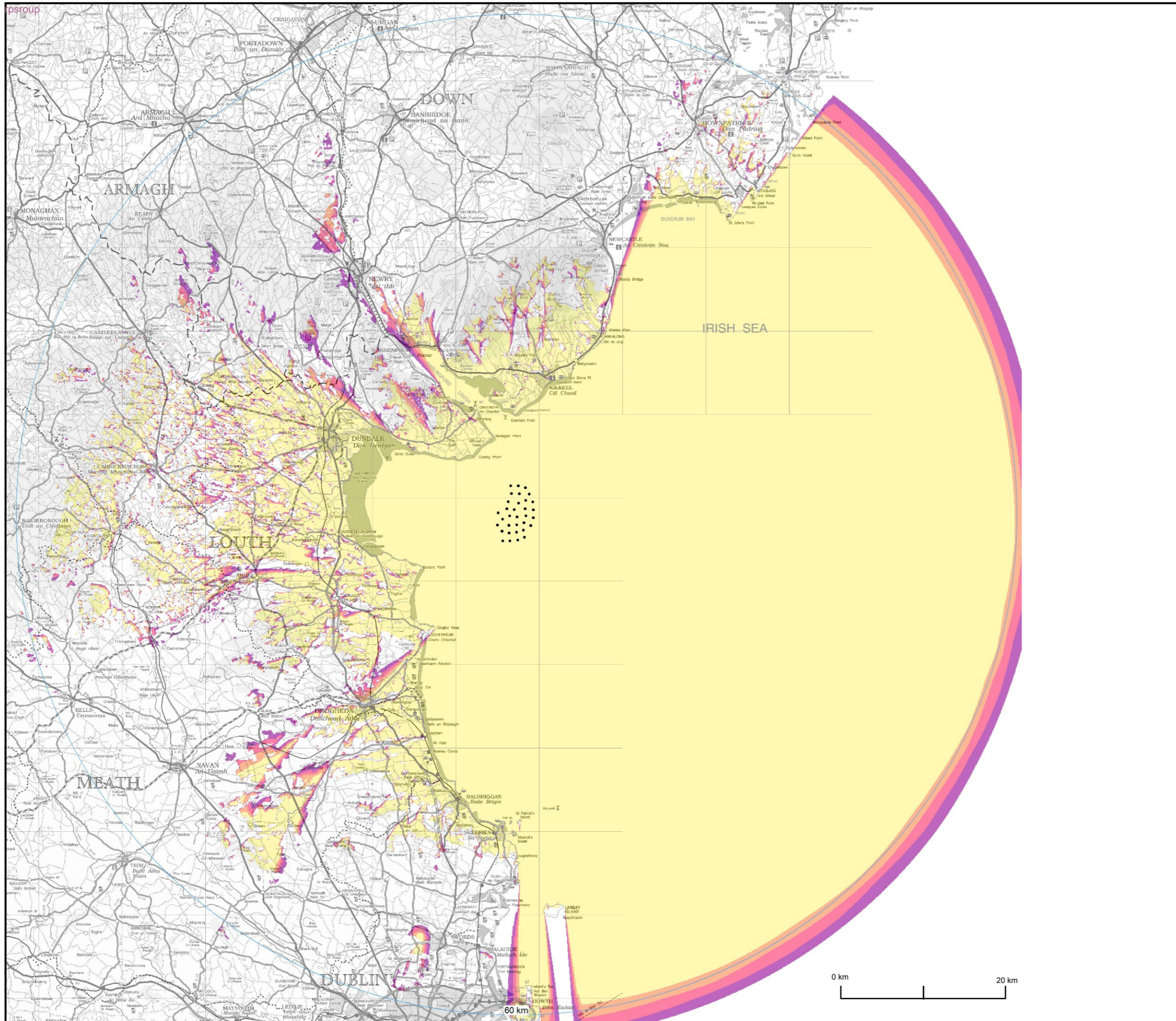
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Drawn: PM Ckd: SA

  
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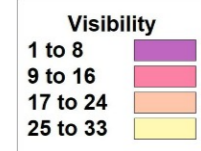
## Appendix B

Drawings – Design Layout Option 5 - August  
Design Workshop



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**Legend**



• Turbine

0	Draft Review	PM	18/09/19	
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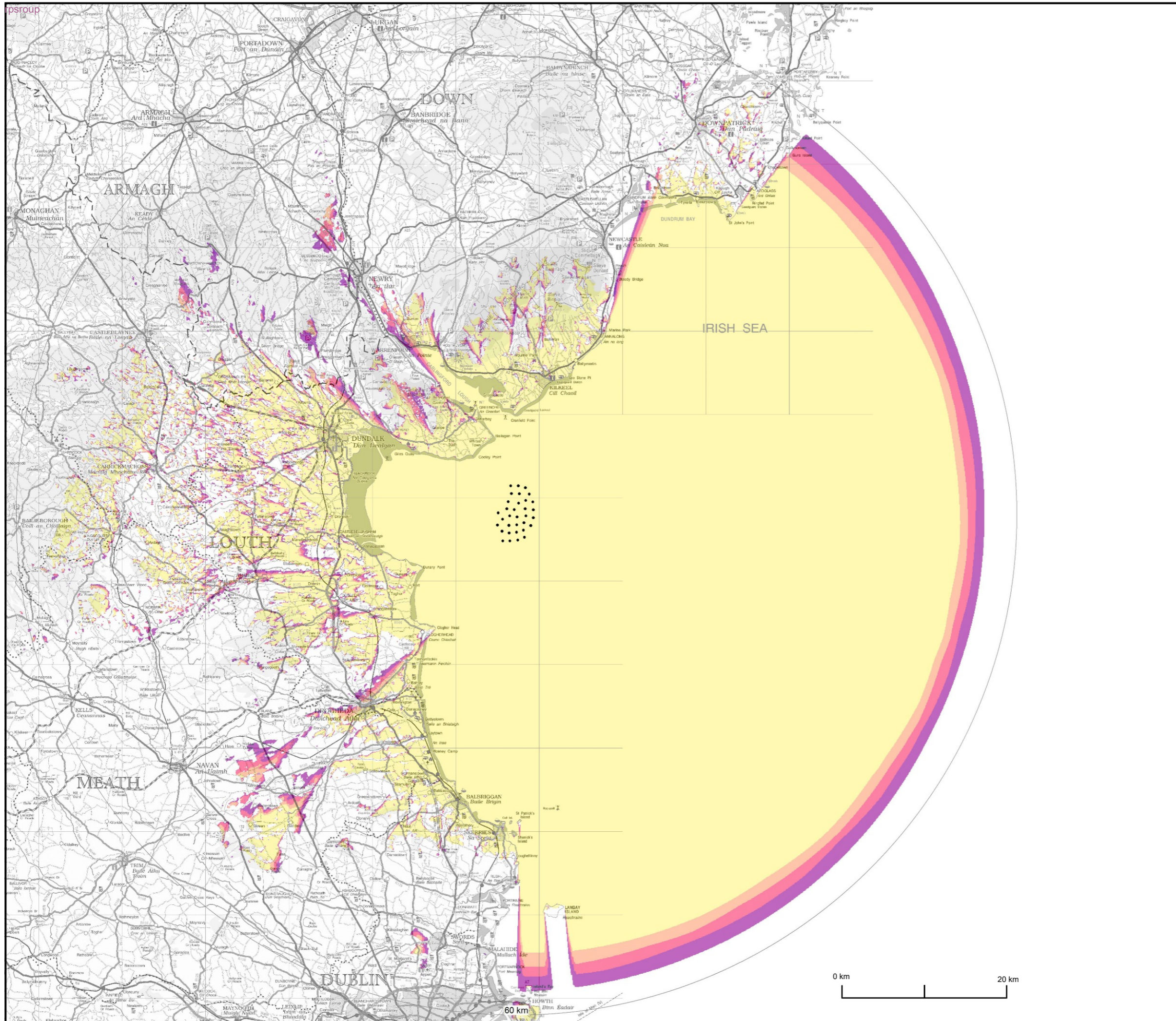
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**Option 8 (Layout 5, August Design**  
**Workshop) x 33 WTGs,**  
**243 m tip height above LAT**  
 Rotor 220 m x Hub 133 m

Fig No: **1C**

Status: Final  
 Scale: On map  
 Date: Sept 2019

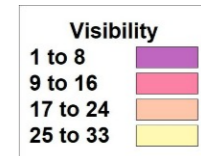
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**Legend**



• Turbine

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Title: **TIP HEIGHT ZTV to 60 km RADIUS**  
**Option 8 (Layout 5, August Design**  
**Workshop) x 33 WTGs,**  
**189 m tip height above LAT**  
**Rotor 164 m x Hub 107 m**

Fig No: **1D**

Status: Final  
 Scale: On map  
 Date: Sept 2019

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OS Reference	321633E 305210N	Nearest turbine	5530 m	Turbine type	GE Haliade-X
AOD	3 m	Viewing distance	522 mm	Rotor dia	220 m
Direction	142°	Paper size	841 X 297 mm	Hub height	133 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	243 m LAT

**Appendix B - Figure 2G**  
**Viewpoint 052 Templetown**  
 Wireline - Option 8 (Layout 5)  
 August Design Workshop

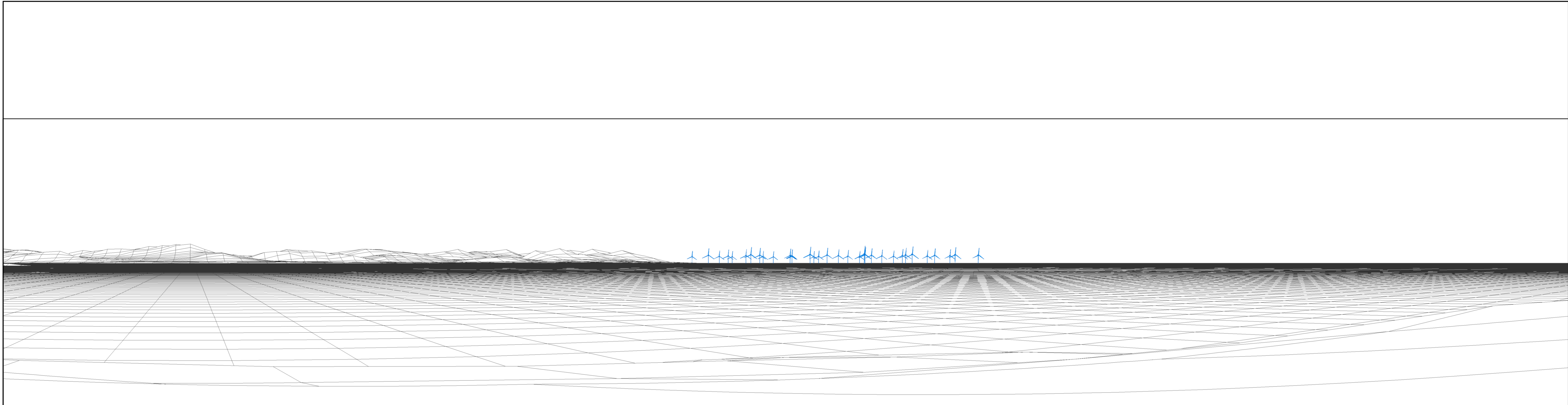
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Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	Sept 2019

Project:  
**Oriel Wind Farm**  
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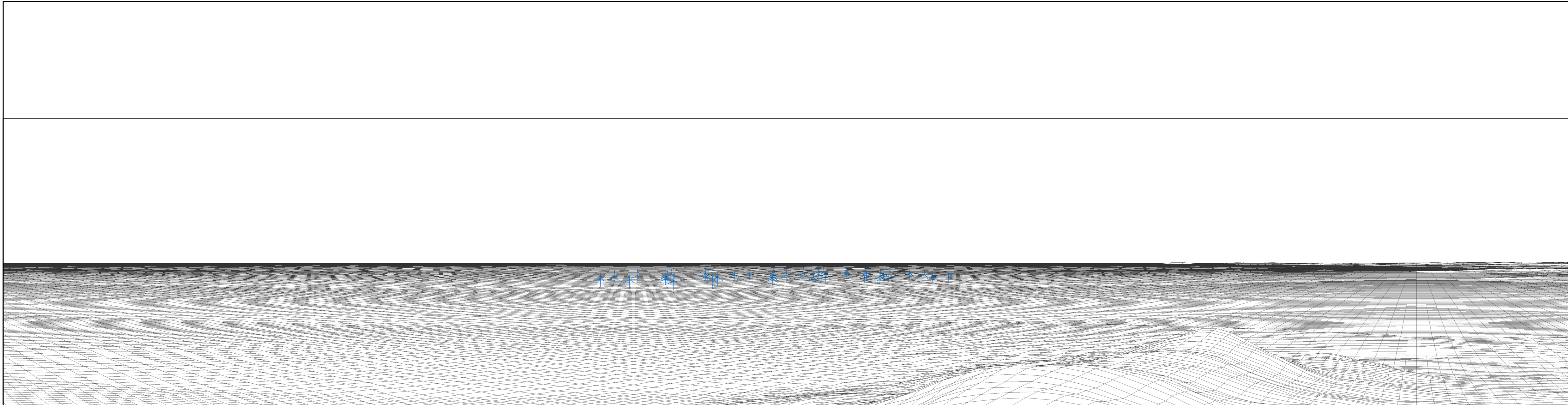
OS Reference	317131E 284265N	Nearest turbine	13973 m	Turbine type	GE Haliade-X
AOD	37 m	Viewing distance	522 mm	Rotor dia	220 m
Direction	34°	Paper size	841 X 297 mm	Hub height	133 m
Field of View	90°	Printed image size	320 X 260 mm	Tip height	243 m LAT

**Appendix B - Figure 2H**  
**Viewpoint 065 Clogherhead**  
 Wireline - Option 8 (Layout 5)  
 August Design Workshop

Turbines:	33 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	Sept 2019

Project: **Oriel Wind Farm**  
 Dundalk Bay, Co. Louth

Client:  Oriel Windfarm Limited




OS Reference	317050E 311801N	Nearest turbine	13542 m	Turbine type	GE Haliade-X
AOD	547 m	Viewing distance	522 mm	Rotor dia	220 m
Direction	144°	Paper size	841 X 297 mm	Hub height	133 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	243 m LAT

**Appendix B - Figure 2J**  
**Viewpoint 067 Carlingford Mountain**  
 Wireline - Option 8 (Layout 5)  
 August Design Workshop

Turbines:	33 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	Sept 2019

Project:  
**Oriel Wind Farm**  
 Dundalk Bay, Co. Louth

Client:  
 Oriel Windfarm Limited

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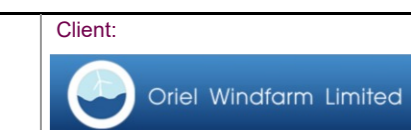


OS Reference	321633E 305210N	Nearest turbine	5241 m	Turbine type	Vestas V164
AOD	3 m	Viewing distance	522 mm	Rotor dia	164 m
Direction	142°	Paper size	841 X 297 mm	Hub height	107 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	189 m LAT

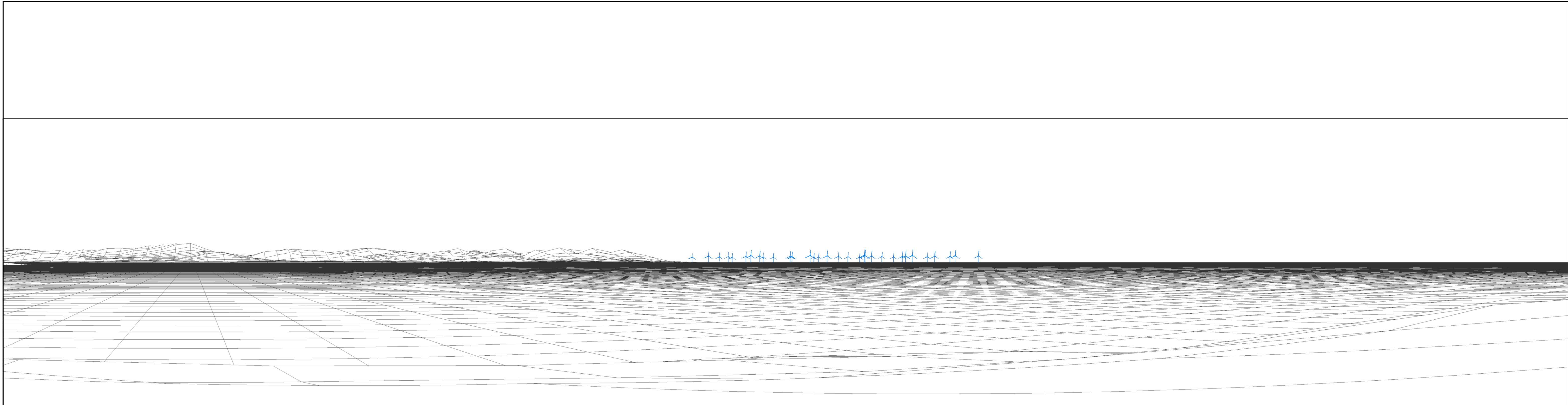
**Appendix B - Figure 2K**  
**Viewpoint 052 Templetown**  
 Wireline - Option 9 (Layout 5)  
 August Design Workshop

Turbines:	33 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	Sept 2019

Project:  
**Oriel Wind Farm**  
 Dundalk Bay, Co. Louth



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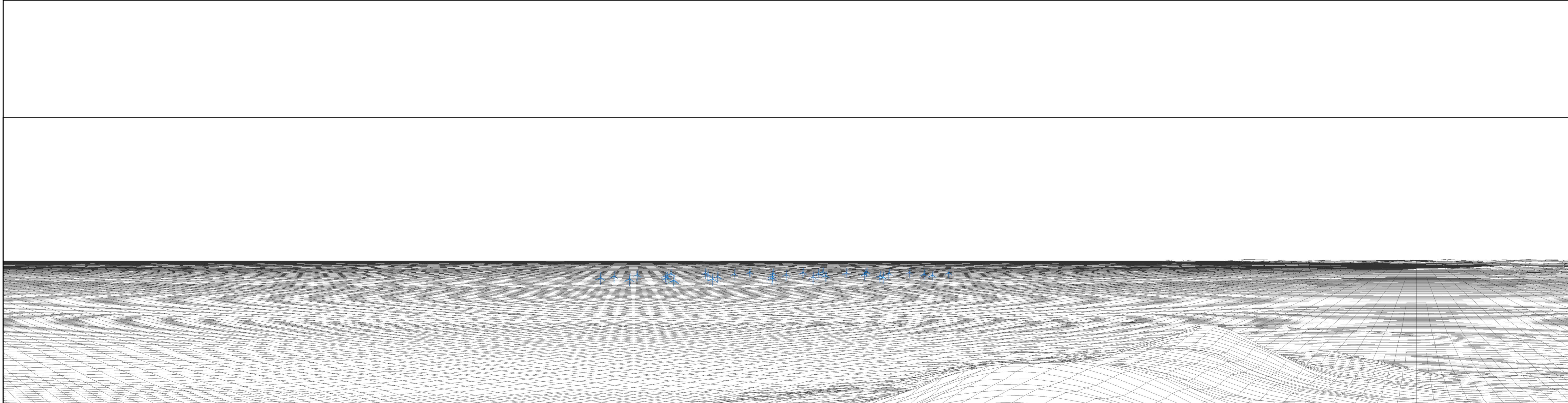
OS Reference	317131E 284265N	Nearest turbine	13935 m	Turbine type	Vestas V164
AOD	37 m	Viewing distance	522 mm	Rotor dia	164 m
Direction	34°	Paper size	841 X 297 mm	Hub height	107 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	189 m LAT

**Appendix B - Figure 2L**  
**Viewpoint 065 Clogherhead**  
 Wireline - Option 9 (Layout 5)  
 August Design Workshop

Turbines:	33 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	Sept 2019

Project: **Oriel Wind Farm**  
 Dundalk Bay, Co. Louth

Client:  
 Oriel Windfarm Limited



OS Reference	317050E 311801N	Nearest turbine	13542 m	Turbine type	Vestas V164
AOD	547 m	Viewing distance	522 mm	Rotor dia	164 m
Direction	144°	Paper size	841 X 297 mm	Hub height	107 m
Field of View	90 °	Printed image size	320 X 260 mm	Tip height	189 m LAT

**Appendix B - Figure 2M**  
**Viewpoint 067 Carlingford Mountain**  
 Wireline - Option 9 (Layout 5)  
 August Design Workshop

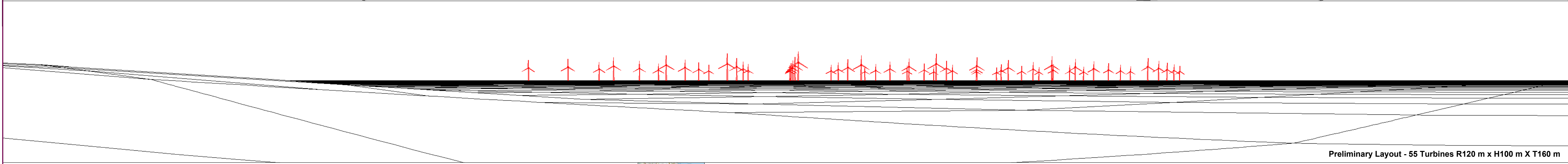
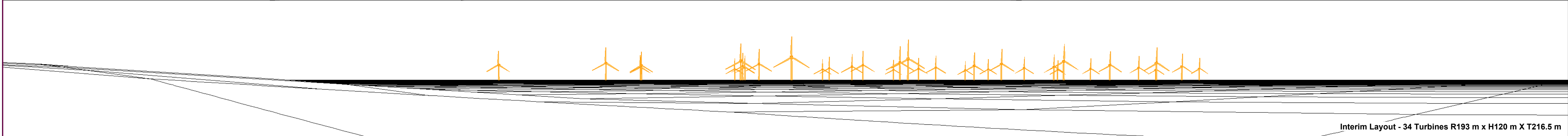
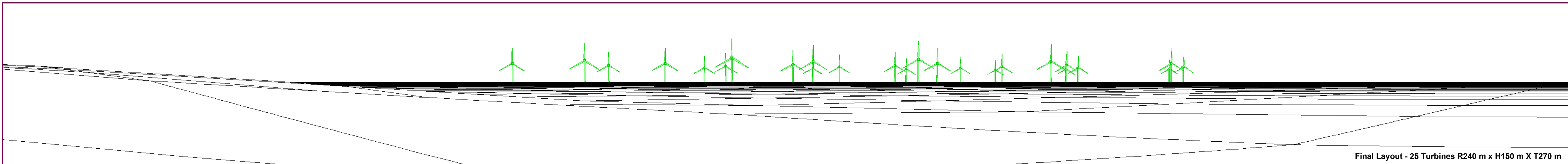
Turbines:	33 Nr	Drawn by:	PM
Revision:	00	Checked:	E.O'C
Data Source:	RPS 2019	Job Ref:	NI 2124
Status:	For Review	Date:	Sept 2019

Project:  
**Oriel Wind Farm**  
 Dundalk Bay, Co. Louth

Client:  
 Oriel Windfarm Limited

## Appendix C

Drawings – Design Layout Option - 6



90 Degree Wireline



Turbine	Generic 3-blade	Camera	Nikon D600	Easting	721558
Rotor dia	NA	Date	NA	Northing	805221
Hub height	NA	View elevation	3 m ASL	Direction	135°
Tip height	NA	Field of View	90°	Distance	Varies

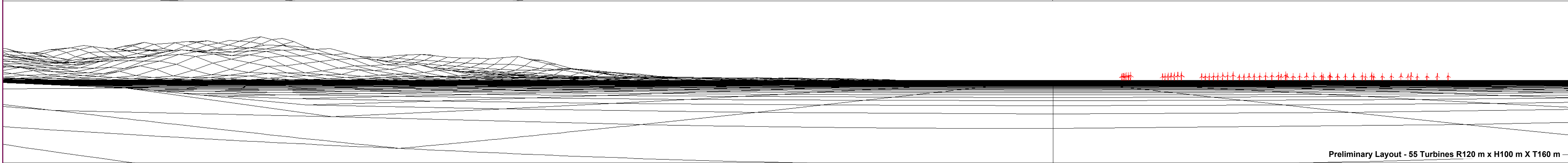
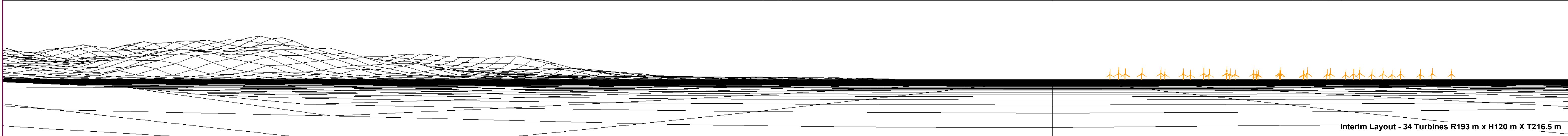
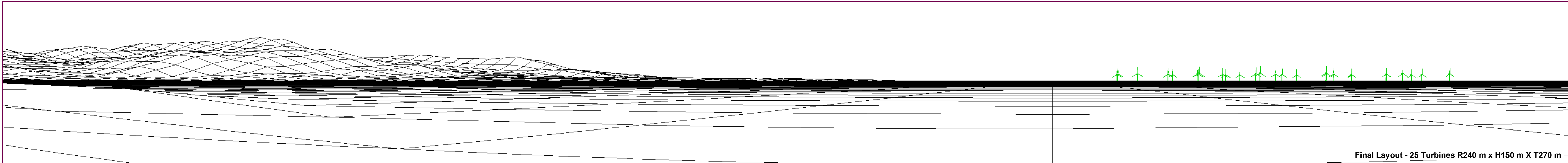
Title: **Figure 3b**  
Cooley Point  
Baseline & Wireline

ITM IRENET 95	Drawn by:	PM
Data Source: RPS 2021	Checked:	SA
Status: Final	Job Ref:	NI 2124
	Date:	January 2023

Project  
**ORIEL WINDFARM**

Client  
**ORIEL WINDFARM**  
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90 Degree Wireline



Turbine	Generic 3-blade	Camera	Nikon D600	Easting	707211
Rotor dia	NA	Date	NA	Northing	802662
Hub height	NA	View elevation	4 m ASL	Direction	75°
Tip height	NA	Field of View	90°	Distance	Varies

Title: **Figure 3c**  
Blackrock Promenade  
Baseline & Wireline

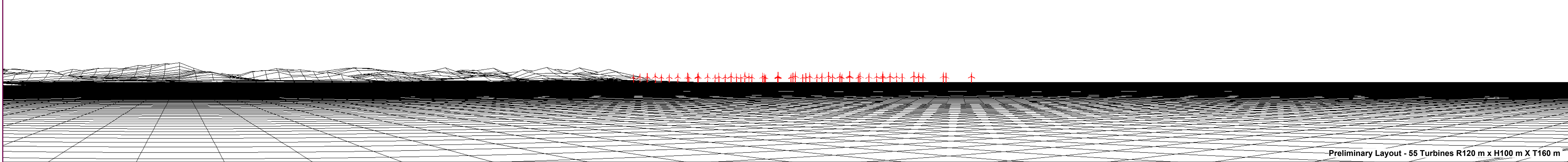
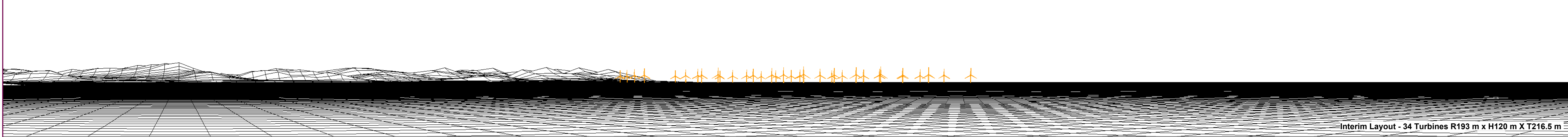
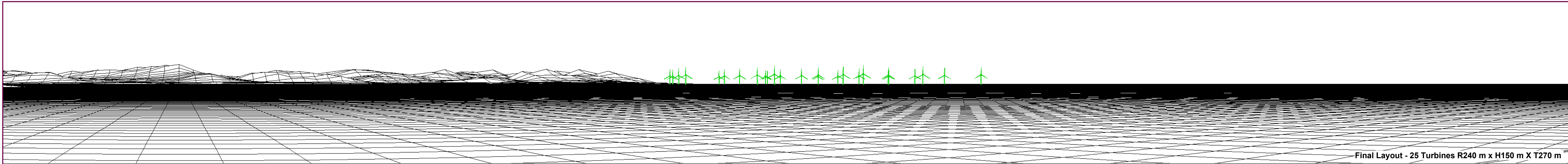
ITM IRENET 95	Drawn by:	PM
Data Source: RPS 2021	Checked:	SA
Status: Final	Job Ref:	NI 2124
	Date:	January 2023

Project  
**ORIEL WINDFARM**

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90 Degree Wireline



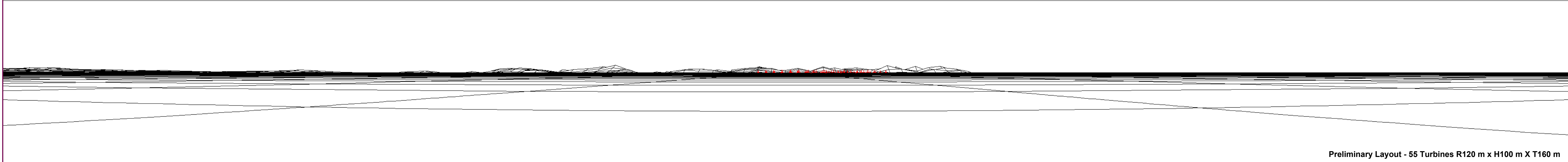
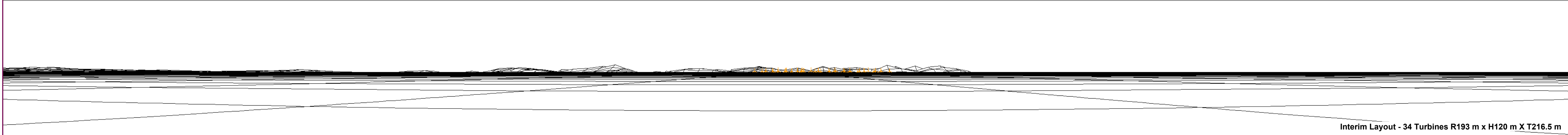
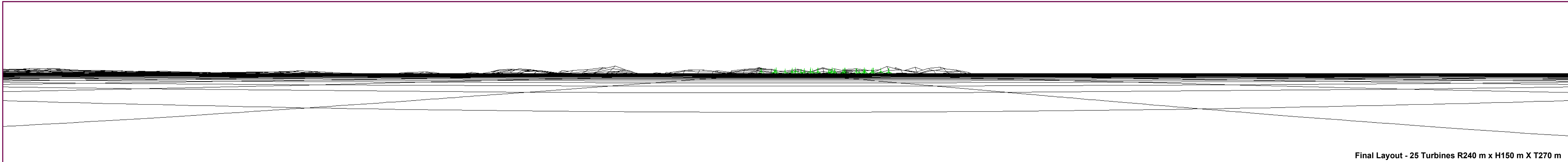
Turbine	Generic 3-blade	Camera	Nikon D600	Easting	717051
Rotor dia	NA	Date	NA	Northing	784281
Hub height	NA	View elevation	45 m ASL	Direction	35°
Tip height	NA	Field of View	90 °	Distance	Varies

Title: **Figure 3d**  
Clogher Head  
Baseline & Wireline

ITM IRENET 95	Drawn by:	PM
Data Source: RPS 2021	Checked:	SA
Status: Final	Job Ref:	NI 2124
	Date:	January 2023

Project  
**ORIEL WINDFARM**





90 Degree Wireline



Turbine	Generic 3-blade	Camera	Nikon D600	Easting	725551
Rotor dia	NA	Date	NA	Northing	761218
Hub height	NA	View elevation	4 m ASL	Direction	0°
Tip height	NA	Field of View	90 °	Distance	Varies

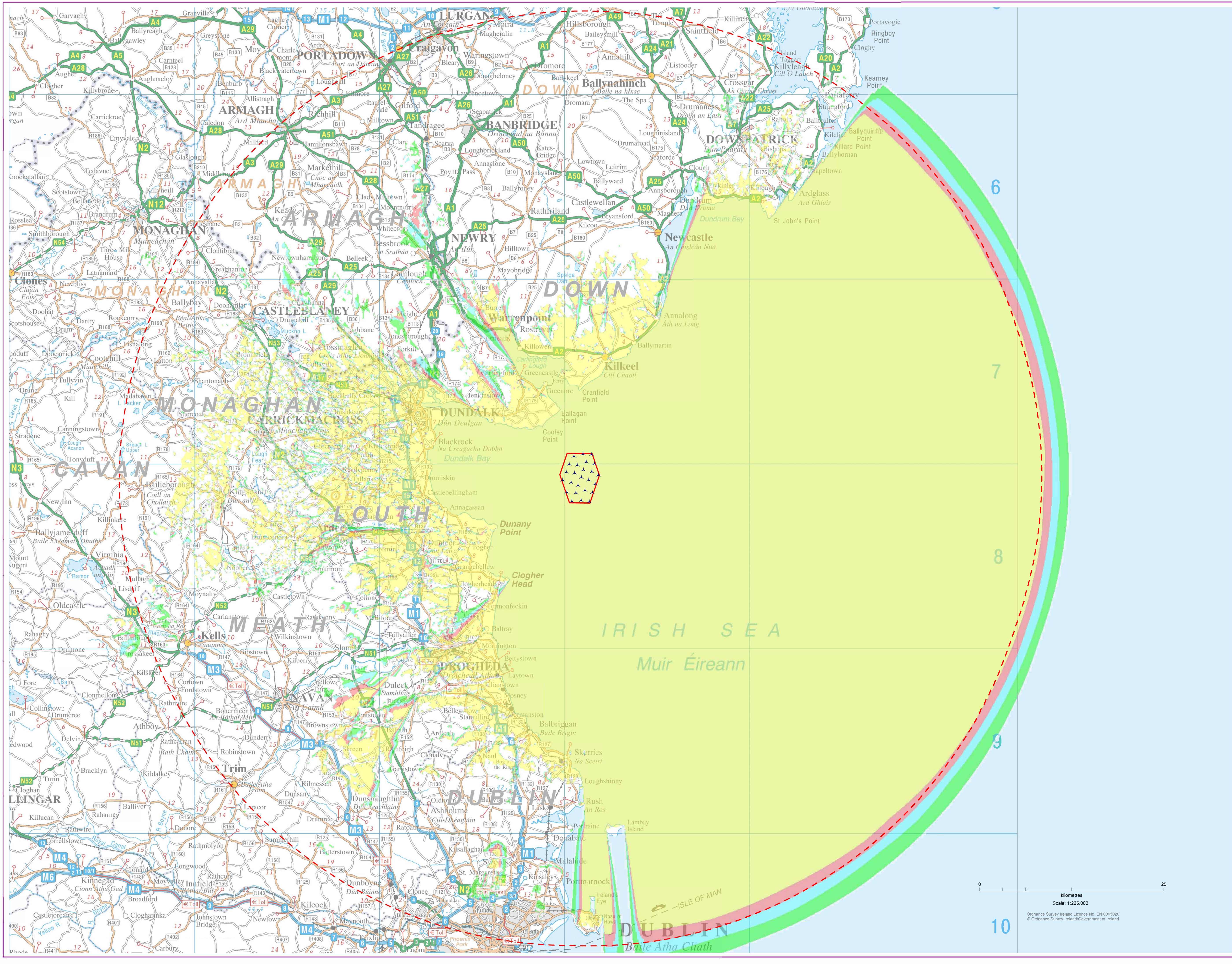
Title: **Figure 3d**  
Skerries Headland  
Baseline & Wireline

ITM IRENET 95	Drawn by:	PM
Data Source: RPS 2021	Checked:	SA
Status: Final	Job Ref:	NI 2124
	Date:	January 2023

Project  
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**Legend**

- Oriel Lease Area
- 60 km Study Area
- Turbines

**Turbine Visibility Oriel Wind Farm**

- 1 to 6
- 7 to 12
- 13 - 18
- 19 - 25

**Turbine Data**

- Rotor 240 m
- Hup height 150 m
- Tip height 270 m

**RPS**

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Client: ORIEL WINDFARM

Project: ORIEL WIND FARM  
Dundalk Bay Co., Louth

Title: 60 km ZTV

Fig No: 3a

Status: Final Date: April 2021  
Drawn: PM Ckd: SA

Scale: 1:225,000

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RPS Project Number: NI 2124

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