

# Seagreen S36C Application Environmental Appraisal Report

## Appendix A – Seagreen S36C Application Screening Report

Project Title	Seagreen S36C Application Screening Report
Document Reference Number	LF000012-CST-EV-REP-0001

## Seagreen S36C Application Screening Report

17 January 2022

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Rev	Date	Reason for Issue	Originator	Checker	Approver
00	17/12/2021	Draft For client review	James Memory, Jack Walker	Alex Thompson	Huw Powell
01	15/01/2022	Final	James Memory, Jack Smith	Alex Thompson	Michael Walker

## Executive Summary

This document supports a request by Seagreen Wind Energy Limited (SWEL) for an Environmental Impact Assessment (EIA) Screening Opinion from the Scottish Ministers via the Marine Scotland Licensing Operations Team (MS-LOT) for a proposed variation to the Seagreen Project. SWEL intends to request a variation to the existing section 36 consents under section 36C of the Electricity Act 1989. SWEL also intends to request the associated marine licences are also varied by Scottish Ministers under section 72 of the Marine and Coastal Access Act 2009 and section 30 of the Marine (Scotland) Act 2010.

The Seagreen Project is located in the North Sea, in the outer Firth of Forth and Firth of Tay region. It comprises the Offshore Wind Farms (OWFs), together with associated infrastructure of the Offshore Transmission Asset (OTA). Existing consents for the Seagreen Project are as follows:

1. Seagreen Alpha Marine Licence and Seagreen Alpha S36 Consent for Seagreen Alpha;
2. Seagreen Bravo Marine Licence and Seagreen Bravo S36 Consent for Seagreen Bravo; and
3. Seagreen Offshore Transmission Asset Marine Licence.

(all as varied in 2018, and together referred to as the “2014 Consents”)

The 2014 Consents give permission for the installation and operation of up to 150 Wind Turbine Generators (WTGs), 5 OSPs and associated electrical infrastructure to export to Carnoustie. As described in the 2012 ES and post-consent documentation, it has always been SWEL’s intention to split the build out of the 150 WTGs into two phases. As described in the 2020 Construction Programme, 114 of the 150 consented WTGs are currently under construction (phase 1) (beginning in September 2021) and have a grid connection into Tealing, Angus. To maximise energy generation and facilitate full export capacity for the Seagreen Project, Seagreen 1A Limited obtained a marine licence for an additional export cable (approximately 108 km) from the consented Seagreen Project Area to an identified landfall location at Cockenzie.

SWEL is proposing to vary the 2014 Consents to allow for changes principally to parameters of the consented but not constructed 36 WTGs (phase 2). Varied parameters include an increase in rotor diameter, blade chord width, maximum and minimum tip height and hub height (see Table 1.1 for details). No changes to piling parameters are included in the variation. SWEL are also proposing to vary the 2014 Consents to allow for an increase in steel seabed deposits associated with the OTA Marine Licence. For the purposes of this document, these proposed parameter changes are referred to as ‘the Variation’. The proposed changes are required to maximise supply chain opportunities and the production of renewable energy to meet government targets, and to ensure the most optimal technology solution can be deployed at the site both from an environmental impact and cost of technology perspective.

The Variation does not change the fundamental characteristics of the Seagreen Project and will be completed within the consented ‘red line’ boundary. Additionally, SWEL expect to be able to carry out all

substantive offshore works within the four year indicative construction programme envisaged in the 2012 ES.

As the Variation changes certain WTG parameters compared to the project design envelope assessed in the 2012 ES, further assessment of potential impacts to ornithology, military and civil aviation activities and seascape, landscape and visual receptors has been undertaken as part of this screening report. Based on the Variation not changing parameters associated with piling (i.e. underwater noise), vessel movements or total area of seabed infrastructure, and not increasing the construction programme timeline, compared to the 2012 ES, further assessment of all other topic areas was deemed not necessary.

Collision Risk Modelling (CRM) was undertaken to compare the 150 WTGs as consented to the 114 WTGs being constructed plus the 36 proposed WTGs. Two CRMs were undertaken in order to fully consider the impacts of the Variation, one using the same method as used to inform the 2012 ES assessment to allow for direct comparison of impacts, and the other using up to date methods to account for modelling improvements since the award of the 2014 Consents. Collisions for key seabird species are predicted to be materially the same or significantly lower for the Variation combined with the 114 WTGs being constructed when compared to the project as currently consented. No further ornithological assessment is considered necessary as the Variation is unlikely to cause adverse significant effects on ornithological receptors.

Wireline visualisations were completed to compare the 150 WTGs as consented to the 114 WTGs being constructed plus the 36 proposed larger turbines, which also took account of other projects that had the potential to cause cumulative impacts. As the wireline visualisations show no further significant seascape, landscape and visual impacts including the Variation compared to the as consented project, no further assessment is considered necessary, as the Variation is unlikely to cause significant effects on seascape, landscape and visual receptors.

SWEL has undertaken engagement with National Air Traffic Services (NATS) and Civil Aviation Authority (CAA) and reached agreement in principle that existing mitigation measures are acceptable to mitigate impacts from the Variation on relevant aviation activities. SWEL expects to submit evidence of Ministry of Defence's (MOD's) confirmation that mitigation for the Variation does not need to be agreed through the EIA process with the S36C variation application. Residual impacts of the Variation are therefore considered not significant and it is proposed military and civil aviation is screened out of the requirement for an EIA.

Based on the technical assessments summarised above and completed in Section 4, the Variation will not give rise to any likely significant adverse environmental effects, alone or in combination with other projects, compared to the consented Seagreen Project assessed in the 2012 ES.

The Variation is not likely to have significant effects on the environment. Based on paragraph 31 of MS-LOT (2019) "*where the proposed variation is unlikely to have significant environmental effects, no EIA Report or process would be required in respect of the variation application*", SWEL propose the S36C variation

application does not require an EIA under the Electricity Works EIA Regulations or the Marine Works EIA Regulations and that the Variation should be screened out of the requirement for EIA.

SWEL propose to accompany the S36C variation application with a supporting Environmental Appraisal Report which will:

- Summarise technical information presented in this Screening Report;
- Provide any additional information reasonably requested by stakeholders during pre-application consultation; and
- Provide any relevant updates between writing this Screening Request and the submission of the S36C variation application.

## Key Terms & Definitions

Term	Definition
2012 ES	When referring to the original 2012 ES produced for the Seagreen Project with reference <a href="#">2012 ES</a> .
2014 Consents	<a href="#">Seagreen Alpha S36 Consent</a> , <a href="#">Seagreen Alpha Marine Licence</a> , <a href="#">Seagreen Bravo S36 Consent</a> , <a href="#">Seagreen Bravo Marine Licence</a> and <a href="#">Offshore Transmission Asset Marine Licence</a> (all as varied).
the Variation	The project activities outlined in the project description in this scoping report comprising the:  WTG parameter changes in respect of 36 WTGs comprising: <ul style="list-style-type: none"> <li>Maximum rotor diameter: 167 m to 242 m</li> <li>Maximum blade chord width: 5.4 m to 7.6 m</li> <li>Maximum tip height above LAT: 209.7 m to 285 m</li> <li>Minimum air gap above LAT: 29.8 m to 34 m</li> <li>Maximum hub height above LAT: 126.2 m to 165 m</li> </ul> Maximum steel/iron seabed deposits: 13,000 tonnes to 22,560 tonnes.
Offshore Transmission Asset (OTA) to Carnoustie	Cable corridor and assets running from the west of Seagreen Project Area red line boundary landing to Carnoustie.
Optimised Design Application	<a href="#">Optimised Design Application</a> , scoped in 2017, submitted in 2018, currently under determination.
Seagreen 1A or SG1A Project	The transmission asset to Cockenzie.
Seagreen Alpha	Seagreen Alpha Offshore Wind Farm (OWF) within the phase 1 development area of the Firth of Forth round 3 offshore wind zone.
Seagreen Alpha Marine Licence	The marine licence dated December 2019 with reference: <a href="#">Marine Licence - 04676/19/0</a> .
Seagreen Alpha S36 Consent	The section 36 consent dated August 2018 with reference <a href="#">Seagreen Alpha S36 Consent</a> .
Seagreen Bravo	Seagreen Bravo OWF within the phase 1 development area of the Firth of Forth round 3 offshore wind zone.
Seagreen Bravo Marine Licence	The marine licence dated December 2019 with reference <a href="#">Marine Licence - 04677/19/0</a> .
Seagreen Bravo S36 Consent	The section 36 consent dated August 2018 with reference <a href="#">Seagreen Bravo S36 Consent</a> .
Seagreen Alpha and Bravo Transmission Asset Marine Licence	Seagreen Transmission Asset connecting from Seagreen Alpha and Bravo to grid connection point, Marine Licence dated March 2019 with reference <a href="#">Marine Licence - 04678/19/0</a> .
Seagreen Project	The total project as currently consented, comprising the Seagreen Alpha, Seagreen Bravo consents and Offshore Transmission Asset to Carnoustie.
Seagreen Project Area	Area of the Seagreen Alpha and Seagreen Bravo OWF (red line boundary) within the phase 1 development area of the Firth of Forth round 3 offshore wind zone.

## References to Historical Key Documents

Reference	Summary	Location*
Optimised Design Application Appropriate Assessment	2018 Appropriate Assessment (AA) to accompany the 2018 Optimised Design Application (ODA).	<a href="#">Optimised Design Application AA</a>
Optimised Design Application Scoping Report	Pre-application scoping report submitted to MS-LOT in 2017 to inform the ODA EIA.	<a href="#">Optimised Design Application Scoping Report</a>
Optimised Design Application Environmental Impact Assessment	2018 ODA Environmental Impact Assessment (EIA), submitted to vary the 2014 consent for Alpha and Bravo, application undetermined.	<a href="#">Optimised Design Application EIA</a>
Optimised Design Application Scoping Opinion	Pre-application scoping opinion provided by MS-LOT to SSE in 2017 to inform the ODA EIA in response to the ODA Scoping report.	<a href="#">Optimised Design Application Scoping Opinion</a>
2012 Environmental Statement	Original 2012 Seagreen Alpha and Bravo Environmental Statement (ES) to accompany the marine Licence and Section 36 applications.	<a href="#">2012 ES</a>
2012 ES Scoping Opinion	Pre-application scoping opinion provided by MS-LOT to SSE in 2010 to inform the 2012 ES in response to the 2012 ES Scoping report.	<a href="#">2012 ES Scoping Opinion</a>
2014 Marine Protected Area Assessment	MS-LOT Marine Protected Area (MPA) Assessment associated with the 2012 ES.	<a href="#">2014 MPA Assessment</a>
2014 Appropriate Assessment	2014 AA to accompany the 2012 ES.	<a href="#">2014 AA</a>
2020 Piling Strategy	The overall aims and objectives of the OWF Piling Strategy are to provide detailed information on the piling activities for installation of the WTG foundations, including setting out the anticipated timing, location, duration and maximum hammer energy to be used.	<a href="#">2020 Piling Strategy</a>
Seagreen Bravo Marine Licence 2014	Marine Licence granted to Seagreen Bravo Wind Energy Limited (SBWEL) following submission of Application in 2012.	<a href="#">Seagreen Bravo Marine Licence 2014</a>
Seagreen Alpha Marine Licence 2014	Marine Licence granted to Seagreen Bravo Wind Energy Limited (SBWEL) following submission of Application in 2012.	<a href="#">Seagreen Alpha Marine Licence 2014</a>
Seagreen Transmission Asset Marine Licence 2014	Marine Licence granted to Seagreen Alpha Wind Energy Limited (SAWEL) and Seagreen Bravo Wind Energy Limited (SBWEL).	<a href="#">Seagreen Transmission Asset Marine Licence 2014</a>

Reference	Summary	Location*
2018 Seascape, Landscape and Visual Impact Assessment (SLVIA)	Seascape, Landscape and Visual Impact Assessment Chapter in the 2018 ODA.	<a href="#">2018 Seascape, Landscape and Visual Impact Assessment (SLVIA)</a>
2012 Navigational Risk Assessment (NRA)	NRA Technical Appendices to accompany the 2012 ES.	<a href="#">2012 Navigational Risk Assessment (NRA)</a>
2018 Navigational Risk Assessment	Navigational Risk Assessment (NRA) Technical Appendices to accompany the 2018 ODA.	<a href="#">2018 Navigational Risk Assessment</a>
2021 Design Statement	This design statement is designed to identify final OWF designs, and sets out changes in the design and layout, set out key criteria that have informed final designs, indicate how seascape, landscape and visual impacts have been addressed and mitigated, illustrate through a set of agreed representative viewpoint locations the final OWF and OTA design and layout.	<a href="#">2021 Design Statement</a>
2020 Development Specification and Layout Plan	The aims and objectives of the Development Specification and Layout Plan are to provide details of the proposed specification and layout in so far as it relates to the 150 WTGs, spare locations and their associated foundations, across the Site and Inter-array Cables	<a href="#">2020 Development Specification and Layout Plan</a>
2020 Construction Programme	The overall aim of the Construction Programme is to set out the intended construction programme for the Seagreen Project.	<a href="#">2020 Construction Programme</a>
Marine Pollution Contingency Plan	The overall aims and objectives of the MPCP are to provide detailed information to those involved in the construction of the Seagreen Project on the actions and reporting requirements in the event of a pollution incident originating from offshore operations relating to the Seagreen Project.	<a href="#">Marine Pollution Contingency Plan</a>
Construction Environmental Management Plan	The overall aims and objectives of the Offshore CEMP are to detail to those involved in the construction of the Seagreen Project, the series of measures and requirements to manage environmental aspects based on commitments made by Seagreen and the requirements of the consents conditions.	<a href="#">Construction Environmental Management Plan</a>

\*It was agreed with Marine Scotland Licencing Operations Team in pre-application discussions that the above documents could be referenced in the report text and a hyperlink provided to their website where a copy of the document is located.



Acronym / Abbreviation	Full Text
AA	Appropriate Assessment
AD	Air Defence
BPEO	Best Practicable Environmental Option
CAA	Civil Aviation Authority
CAPEX	Capital Expenses
CEMP	Construction Environmental Management Plan
EIA	Environmental Impact Assessment
ERM	Environmental Resource Management
ES	Environmental Statement
GBS	Gravity Based Structure
HRA	Habitats Regulations Appraisal
km	Kilometres
LAT	Lowest Astronomical Tide
Ltd	Limited
m	Metre
MCA	Marine Coastguard Agency
MMMP	Marine Mammal Mitigation Plan
MMO	Marine Mammal Observer
MOD	Ministry of Defence
MPA	Marine Protected Area
MS-LOT	Marine Scotland – Licensing Operations Team
MW	Mega Watt
NATS	National Air Traffic Services
NCN	National Cycle Network
NLB	Northern Lighthouse Board
NM	Nautical Mile
NTS	National Trust for Scotland
OPEX	Operating Expenses
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PAD	Protocol for Archaeological Discovery
PEXA	Military Practice and Exercise Areas
PRMS	Primary Radar Mitigation Scheme
PTS	Permanent Threshold Shift
RRH	Remote Radar Heads
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAR	Search and Rescue
SAWEL	Seagreen Alpha Wind Energy Limited
SBWEL	Seagreen Bravo Wind Energy Limited
SEMP	Site Environmental Management Plan
SEPA	Scottish Environmental Protection Agency
SG1A	Seagreen 1A
SNH	Scottish Natural Heritage
UK	United Kingdom

Acronym / Abbreviation	Full Text
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator

**Table of Contents**

1.	Introduction .....	12
1.1	Background .....	12
1.2	Proposed Seagreen Project Variation .....	15
1.3	Report Purpose .....	16
1.4	Report Structure .....	16
2.	Consent Background and Approach .....	17
2.1	Consent Background .....	17
2.2	Proposed Consenting Approach .....	21
3.	Project Description .....	28
3.1	Proposed Variation .....	28
3.2	WTGs .....	28
3.3	OSPs .....	31
3.4	Consented WTG Overview .....	32
4.	Technical Assessment .....	33
4.1	Introduction .....	33
4.2	Fish and Shellfish .....	33
4.3	Marine Mammals .....	37
4.4	Physical Environment (Metocean, Bathymetry, Seabed Sediments and Sediment Transport) .....	41
4.5	Water and Sediment Quality .....	44
4.6	Benthic & Intertidal Ecology .....	46
4.7	Commercial Fisheries .....	49
4.8	Archaeology and Cultural Heritage .....	52
4.9	Socioeconomic, Tourism and Recreation .....	55
4.10	Other Marine Users .....	57
4.11	Ornithology .....	59
4.12	Shipping and Navigation .....	66
4.13	Seascape, Landscape and Visual .....	68
4.14	Military and Civil Aviation Activities .....	73



4.15	HRA Methodology.....	75
5.	Screening Summary Table .....	79
6.	References .....	93

## 1. Introduction

### 1.1 Background

Seagreen Wind Energy Ltd (SWEL) is a joint venture between SSE Renewables (49%) and Total Energies (51%). SWEL was awarded exclusive development rights in the Firth of Forth Round 3 Offshore Wind Zone (the “Firth of Forth Zone”) by The Crown Estate in 2010. The Firth of Forth Zone is located in the North Sea, beyond the 12 nautical miles (NM) Scottish territorial waters limit. SWEL currently has the benefit of the following consents for the Seagreen Project:

1. Seagreen Alpha Marine Licence<sup>1</sup> and Seagreen Alpha S36 Consent<sup>2</sup> for Seagreen Alpha;
2. Seagreen Bravo Marine Licence<sup>3</sup> and Seagreen Bravo S36 Consent<sup>4</sup> for Seagreen Bravo; and
3. Seagreen Offshore Transmission Asset Marine Licence<sup>5</sup>.

(all as varied in 2018, and together referred to as the “**2014 Consents**”)

The Seagreen Project is located in the North Sea, in the outer Firth of Forth and Firth of Tay region. It comprises the Offshore Wind Farms (OWFs) (which includes the Wind Turbine Generators (WTGs), their foundations and associated array cabling), together with associated infrastructure of the Offshore Transmission Asset (OTA) (which includes the Offshore Substation Platforms (OSPs) and their foundations and the offshore export cable which will make landfall at Carnoustie and connect to the Tealing substation). The consents described above give permission for the installation and operation of up to 150 WTGs, 5 OSPs and associated electrical infrastructure to export to Carnoustie. As described in the 2020 Construction Programme<sup>6</sup>, 114 of the 150 consented WTGs are currently under construction (beginning in September 2021) and have a grid connection into Tealing, Angus.

To maximise energy generation and facilitate full export capacity for the Seagreen Project, Seagreen 1A (SG1A) Limited obtained a marine licence for an additional export cable (approximately 108km) from the consented Seagreen Project Area to an identified landfall location at Cockenzie. This will include one high voltage export cable to mean high water springs (MHWS), cable landfall and connection to the onshore infrastructure. This connection is planned to support the connection of additional export capacity to accommodate the remaining 36 consented but not constructed WTGs

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<sup>1</sup> [Seagreen Alpha Marine Licence](#)

<sup>2</sup> [Seagreen Alpha S.36 Consent](#)

<sup>3</sup> [Seagreen Bravo Marine Licence](#)

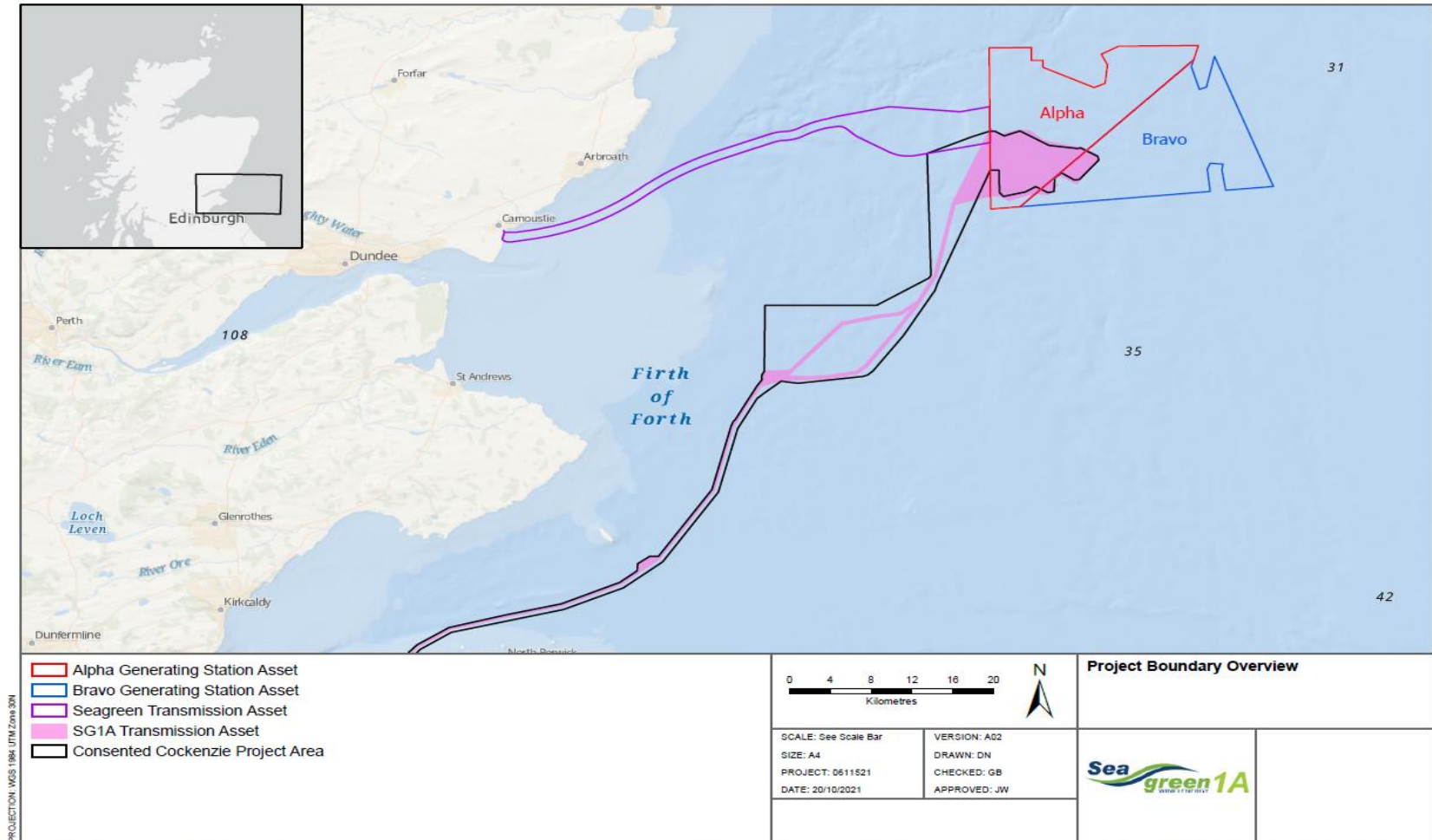
<sup>4</sup> [Seagreen Bravo S.36 Consent](#)

<sup>5</sup> [Seagreen Transmission Asset Marine Licence](#)

<sup>6</sup> [2020 Construction Programme](#)

under the 2014 Consents. Figure 1.1 provides an overview of the location of the components described above.

Figure 1.1 Project Location Overview and Components



PROJECTION: WGS 1984 UTM Zone 30N

OceanWise, Esri, DeLorme, NaturalVue, Esri UK, Esri, HERE, Garmin, FAO, NOAA, USGS, Esri UK, Esri, HERE, Garmin, FAO, METI/NASA, USGS

Path: \\UKLDCFS01\data\London\Projects\0611521 Consolidated Scottish & Southern SSE SeaGreen EIA\PI\GIS\Maps\0611521\_SSESeagreen.aprx\0611521 - Project Boundary Overview

## 1.2 Proposed Seagreen Project Variation

SWEL is proposing to vary the 2014 Consents to allow for changes principally to parameters of the consented but not constructed 36 WTGs (as set out in Table 1.1). The remaining 114 of the 150 consented WTGs are currently under construction. SWEL are also proposing to vary the 2014 Consents to allow for an increase in steel seabed deposits associated with the OTA Marine Licence.

As such, SWEL is proposing to submit a variation application to the Seagreen Alpha S36 Consent and the Seagreen Bravo S36 Consent under section 36C of the Electricity Act 1989. SWEL is also requesting that should the variation of the section 36 consents be granted, the Seagreen Alpha Marine Licence and the Seagreen Bravo Marine Licence are also varied by Scottish Ministers under section 72 of the Marine and Coastal Access Act 2009 and section 30 of the Marine (Scotland) Act 2010. This is consistent with the approach taken by the Scottish Ministers in granting the current consents through section 36C of the Electricity Act 1989 and the Marine and Coastal Access Act 2009 in 2018. SWEL are also proposing to submit a variation application for the OTA Marine Licence to accommodate the increased steel deposits.

The proposed changes are required to maximise supply chain opportunities and the production of renewable energy to meet government targets, and to ensure the most optimal technology solution can be deployed at the site both from an environmental impact and cost of technology perspective. Table 1.1 summarises the proposed parameter changes, with further details provided in Section 3.

**Table 1.1 Summary of Proposed Parameter Changes**

Change Description	Parameter	Consented (2014 Consents)	Proposed
Increased size of 36 of the consented WTGs	Maximum rotor diameter	167 m	242 m
	Maximum blade chord width	5.4 m	7.6 m
	Maximum tip height (above LAT)	209.7 m	285 m
	Minimum tip height (air gap) (above LAT)	29.8 m	34 m
	Maximum hub height (above LAT)	126.2 m	165 m
Increased weight of seabed steel deposits associated with the OSPs	Steel seabed deposits	13,000 tonnes	22,560 tonnes



Additionally, SWEL expect to be able to carry out all substantive offshore works within the four year indicative construction programme envisaged in the 2012 ES. For the purposes of this document, these proposed parameter changes are referred to as 'the Variation'.

### **1.3 Report Purpose**

This Screening Report has been prepared by Environmental Resource Management Limited (ERM) on behalf of SWEL to support a request for a Screening Opinion for the Variation from the Scottish Ministers via the Marine Scotland Licensing Operations Team (MS-LOT). The document describes the Variation in further detail, explains the proposed consenting approach, and provides justification and supporting information to evidence the conclusion that the Variation does not require an Environmental Impact Assessment (EIA) in support of the S36C variation application.

### **1.4 Report Structure**

The structure of this Screening Report is as follows:

- Consenting background and approach;
- Project description;
- Consideration of relevant technical topics; and
- Recommendations for progression of the Seagreen S36C variation application.

## 2. Consent Background and Approach

### 2.1 Consent Background

In 2010, SWEL was awarded exclusive development rights to the Firth of Forth Zone by the Crown Estate, under its third round of offshore wind licensing arrangements.

In 2012, SWEL submitted a suite of applications for development consent, under Section 36 of the Electricity Act 1989 and associated Marine Licences, under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009, to construct and operate the Seagreen Project.

Consents and licences for the Seagreen Project were awarded by Scottish Ministers in October 2014. In 2018, the Seagreen Project's OWF licences were varied to remove the consented OWF capacity limits to allow the installation of higher rated WTGs. In 2019, the OTA to Carnoustie licence was varied to accommodate an alternative landfall installation method.

In 2018, SWEL applied for new consents for an optimised project design within the same red line boundary as the originally consented project to accommodate advances made within the offshore wind industry, including increases in WTG size and capacity, improvements to foundation design and energy optimisation ('the Optimised Design Application' (ODA)). As part of the ODA, MS-LOT provided a scoping opinion in 2017 and published an Optimised Design Appropriate Assessment (AA) in 2019. At the time of writing this screening document, the ODA is under determination. Where relevant, information used in the ODA is referenced for the purpose of supporting information in this Screening Report.

In December 2021, SG1A was awarded consent for a new Marine Licence to construct offshore infrastructure required to facilitate the export of power from the Seagreen Project's OWFs to landfall at Cockenzie (SG1A Project). The onshore export cable from landfall at Cockenzie to a new substation was subject to a separate planning permission in principle application under the Town and Country Planning (EIA) (Scotland) Regulations 2017 and was granted by East Lothian Council in August 2021.

Since the award of the 2014 Consents (as varied), SWEL have submitted documentation to Marine Scotland to discharge Marine Licence and Section 36 consent conditions. These post-consent documents have been used to inform this Screening Report, specifically the 2020 Piling Strategy<sup>7</sup>, 2020 Development Specification and Layout Plan<sup>8</sup> and the 2021 Design Statement<sup>9</sup>.

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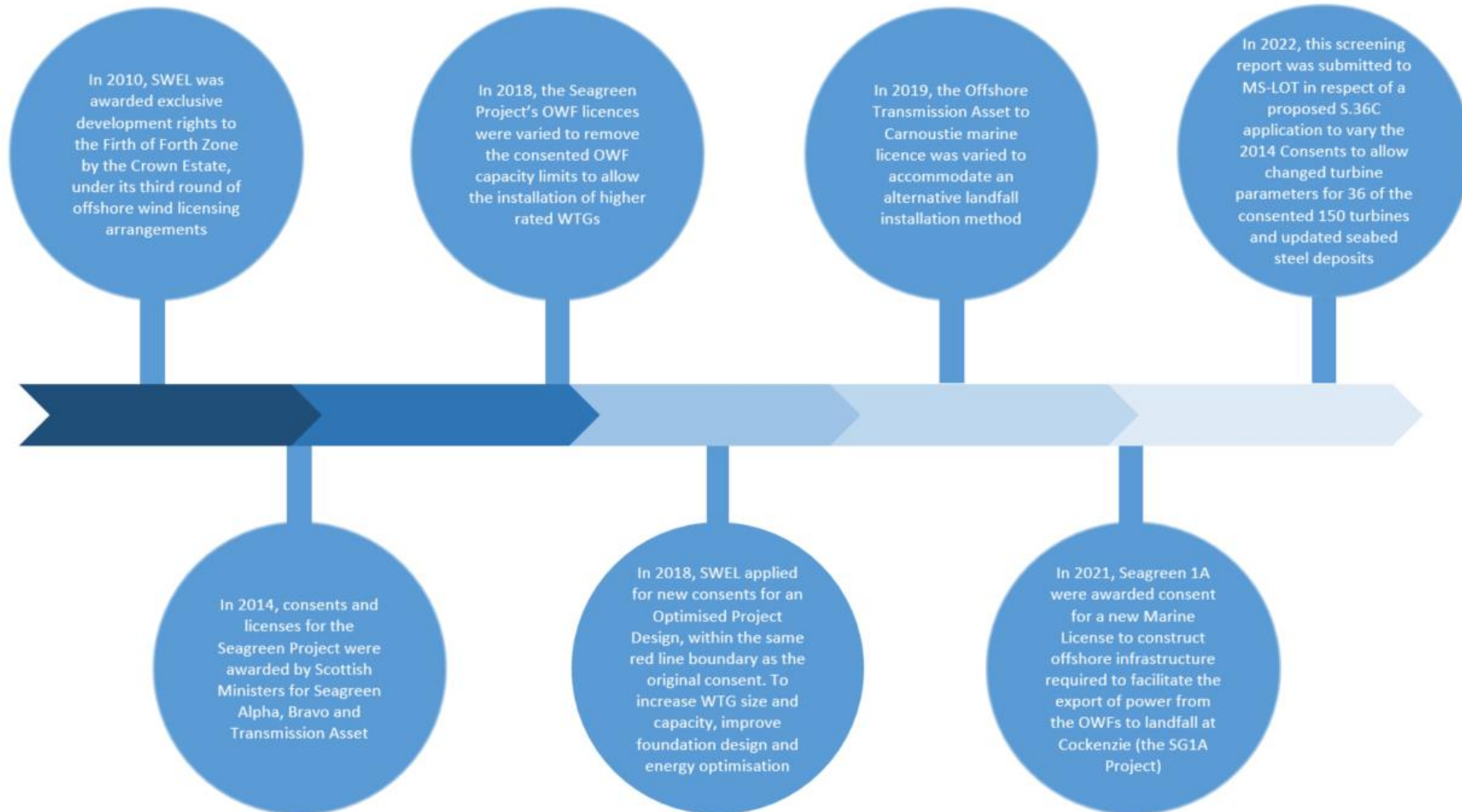
<sup>7</sup> [2020 Piling Strategy](#)

<sup>8</sup> [2020 Development Specification and Layout Plan](#)

<sup>9</sup> [2021 Design Statement](#)

Table 2.1 and Figure 2.1 below presents a high-level overview of the existing consents and timeline in relation to the Seagreen Project.

**Figure 2.1 Consent Background Timeline**



**Table 2.1 High Level Overview of Existing Consents**

Asset	Consent	Status	Notes
Seagreen Alpha Generating Asset	Seagreen Alpha S36 Consent (as varied in 2018 to remove capacity cap)	Under Construction	Consent for the installation and operation of: <ul style="list-style-type: none"> <li>- Up to 75 WTGs, including foundations, substructures, fixtures, fittings, fixings and protections.</li> <li>- Associated infrastructure including; inter array cables and cables up to and onto the OSPs; up to 3 metrological masts; up to 3 wave buoys; and transition pieces including ladders, fences and landing platforms.</li> <li>- WTG and metrological mast foundation options include:               <ul style="list-style-type: none"> <li>o A four leg steel jacket with driven piles;</li> <li>o A four leg steel jacket with suction piles; and</li> <li>o Gravity base structure.</li> </ul> </li> </ul>
	Seagreen Alpha Marine Licence (as varied in 2018 to remove capacity cap)		
Seagreen Bravo Generating Asset	Seagreen Bravo S36 Consent (as varied in 2018 to remove capacity cap)	Under Construction	Consent for the installation and operation of: <ul style="list-style-type: none"> <li>- Up to 75 WTGs, including foundations, substructures, fixtures, fittings, fixings and protections.</li> <li>- Associated infrastructure including; inter array cables and cables up to and onto the OSPs; up to 3 metrological masts; up to 3 wave buoys; and transition pieces including ladders, fences and landing platforms.</li> <li>- WTG and metrological mast foundation options include:               <ul style="list-style-type: none"> <li>o A four leg steel jacket with driven piles;</li> <li>o A four leg steel jacket with suction piles; and</li> <li>o Gravity base structure.</li> </ul> </li> </ul>
	Seagreen Alpha Marine Licence (as varied in 2018 to remove capacity cap)		
OTA to Carnoustie	2014 Consent – Marine Licence	Under Construction	Consent for the installation and operation of offshore transmission infrastructure including: <ul style="list-style-type: none"> <li>- Up to 5 OSPs. Substructure and foundation design for the OSPs will be either tubular pile, suction pile or gravity base foundations.</li> </ul>

Asset	Consent	Status	Notes
			<ul style="list-style-type: none"> <li>- A network of subsea power cables providing inter connections between OSPs.</li> <li>- Up to 6 export cable trenches between the Seagreen Project Area and landfall at Carnoustie, with a maximum length of 530 km. A maximum of 5% (26.2 km) requiring rock armour or concrete mattress protection.</li> </ul>
	2019 Consent – Marine Licence Variation		Variation to amend landfall installation method from horizontal directional drilling to open cut trenching.
Transmission Asset to Cockenzie (SG1A Project)	2021 Consent – Marine Licence	Marine Licence Awarded	Export cable to Cockenzie and associated cable protection.

## 2.2 Proposed Consenting Approach

SWEL intends to request a variation to the Seagreen Alpha S36 Consent and the Seagreen Bravo S36 Consent for the Seagreen Project under section 36C of the Electricity Act 1989. SWEL also intends to request that should the variation of the section 36 consents be granted, the associated Seagreen Alpha Marine Licence and the Seagreen Bravo Marine Licence are also varied by the Scottish Ministers under section 72 of the Marine and Coastal Access Act 2009 and section 30 of the Marine (Scotland) Act 2010. Finally, SWEL intends to request a variation to the existing Marine Licence, varied in 2019, associated with the OTA to Carnoustie. This is consistent with the approach taken by the Scottish Ministers in granting the current consents through section 36C of the Electricity Act 1989 and the Marine and Coastal Access Act 2009 in 2018.

Within this Screening Report, SWEL have considered the effects of the Variation and whether these changes could result in impacts of significance (in EIA terms) which are new or materially different to those of the consented Seagreen Project (which were identified in the 2012 ES and which were considered acceptable and resulted in the 2014 Consents).

### 2.2.1 Appropriateness of a variation application

SWEL will request variations to existing consents based on MS-LOT's latest guidance note: *Application for Variation of section 36 consents* ([MS-LOT, 2019](#)). The guidance note describes a range of possible design changes that may be appropriate to determine under the section 36C procedure, including changes to WTG dimensions. Based on this guidance note, the proposed changes do not result in a

fundamentally or substantially different development in terms of scale and/or nature from that authorised by the 2014 Consents.

#### 2.2.2 Consideration of the need of EIA

SWEL proposes that variation is screened out of the relevant EIA Regulations, in line with the Environmental Impact (EIA) Regulations (the Electricity Works (EIA) (Scotland) Regulations 2017 (**Electricity Works EIA Regulations**) and the Marine Works (EIA) (Scotland) Regulations 2017) (**Marine Works EIA Regulations**).

Under the Electricity Works EIA Regulations in the case of a S36C variation application “EIA development” means a proposed variation which is either—

- (i) Schedule 1 development; or
- (ii) Schedule 2 development likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

Paragraph 2 of Schedule 2 to the Electricity Works EIA Regulations includes: *“Any change to or extension (including a change in the manner or period of operation) of development of a description listed in schedule 1 or in paragraph 1 of [schedule 2 – which includes generating stations] where that development is already authorised, executed, or in the process of being executed, and the change or extension may have significant adverse effects on the environment.”* As a change to an already authorised generating station, the Variation would be Schedule 2 development requiring an EIA if the changes proposed are likely to have significant effects on the environment. As clarified by paragraph 2 of the Policy Note (SSI 2017/451) amending the Electricity Works EIA Regulations *“only variation applications where the changes proposed by the variation may cause significant adverse environmental effects will require an EIA is carried out”*.

In making a determination as to whether or not the Variation will require an EIA to support the S36C variation application, the relevant criteria set out in Schedule 3 must be considered together with the results of any relevant assessment. These criteria cover the characteristics of the works, the location of the works and the characteristics of the potential impact. The position is similar under the Marine Works EIA Regulations. Each of these are addressed in turn within the following sections.

##### 2.2.2.1 Characteristics of the Variation

Schedule 3 of the Electricity Works EIA Regulations specify that the following characteristics must be considered:

- The size and design of the works;
- Cumulation with other existing works and/or approved works;
- The use of natural resources, in particular land, soil, water and biodiversity;

- The production of waste;
- Pollution and nuisances;
- The risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; and
- The risks to human health (for example due to water contamination or air pollution).

In terms of the size and design of the Seagreen Project, the Seagreen Alpha and Seagreen Bravo OWFs are not subject to a generation cap in order to maximise improvements in WTG technology. With the Variation, the OWFs will retain the overall size (maximum of 150 WTGs) and purpose for which they were originally consented. Any potential for impacts arising from the proposed variation to the parameters of the individual WTGs is considered in the technical chapters in Section 4 of this report, and it is concluded for each topic that the proposed variations will not give rise to likely significant effects.

In terms of cumulation with other existing works, the Seagreen Project lies in the vicinity of other projects which have the potential to affect receptors in a cumulative fashion, namely Inch Cape OWF, Neart Na Gaoithe OWF and Berwick Bank OWF. Potential cumulative impacts associated with the Variation have been assessed within relevant technical chapters of this Screening Report.

In terms of the use of natural resources, the installation operation and decommissioning of the larger WTGs would not result in the long-term exploitation of significant volumes of natural resources. Thus, no likely significant effects on the environment through the use of natural resources are anticipated.

Regarding production of waste and pollution and nuisances, all wastes will be managed in line with the Offshore Construction Environmental Management Plan (CEMP)<sup>10</sup> which will be updated as required for the Variation. The EMP includes waste management measures to minimise, reuse, recycle and disposal of waste streams in compliance with relevant waste legislation. Marine pollution prevention and contingency planning measures are also set out in a Marine Pollution Contingency Plan (MPCP)<sup>11</sup> which will be updated as required for the Variation. The MPCP measures adopted will ensure that the potential for release of pollutants is minimised. In this manner, accidental release of contaminants from rigs and supply/service vessels will be strictly controlled. Due to the measures in place to control and/or manage waste and pollution, likely significant effects on the environment are not predicted.

Regarding risk of major accidents and/or disasters, including those caused by climate change, SWEL will require all contractors and subcontractors to complete adequate risk assessments for all aspects of the installation activities and these requirements will be captured within a Construction Method

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<sup>10</sup> [Offshore Construction Environmental Management Plan](#)

<sup>11</sup> [Marine Pollution Contingency Plan](#)



Statement which will be prepared for the Variation. The Seagreen Project will be a notifiable project for the purposes of the Construction (Design and Management) Regulations 2015 (CDM Regulations), and SWEL will require compliance with the CDM Regulations in the design of the Seagreen Project and through the completion of the installation process through conditions of contract. Management standards in line with ISO 9001, 14001 and OHSAS 18001 will be applied for the overall Seagreen Project management system, and the management systems of all contractors will be required to concur with the same principles. Due to these measures in place in respect of the Seagreen Project, likely significant effects on the environment are not predicted.

In relation to risks to human health, SWEL will require compliance with the Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations) through conditions of contract in ensuring that the risk to health from workplace exposure to hazardous substances is appropriately assessed and that exposure is prevented. Where this is not reasonably practicable, adequate controls would be implemented and exposure monitored and managed to within acceptable levels, in line with relevant regulations. Health and Safety regulations will be adhered to at all times and relevant HSE Management tools implemented, to ensure the safety of the workforce and the general public.

When considering these factors, the Variation does not have significant adverse effects and is not likely to have significant effects on the environment. Therefore, it is appropriate to screen the Variation out of the requirement for EIA when considering these factors.

#### 2.2.2.2 Location of the Variation

Schedule 3 of the Electricity Works EIA Regulations specify that the environmental sensitivity of geographical areas likely to be affected by the Variation must be considered having regard to the following:

- The existing and approved land use;
- The relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and underground;
- The absorption capacity of the natural environment, paying particular attention to the following areas:
  - wetlands, riparian areas, river mouths;
  - coastal zones and the marine environment;
  - mountain and forest areas;
  - nature reserves and parks;
  - European sites and other areas classified or protected under national legislation;
  - areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the Project, or in which it is considered that there is such a failure;
  - densely populated areas; and

- landscapes and sites of historical, cultural or archaeological significance.

The Variation is located offshore, within outer Firth of Forth and Firth of Tay region. SWEL is not seeking to change the scale or location of the consented development with the total number of WTGs and OSPs remaining as originally consented and all offshore development associated with the Variation being maintained within the consented offshore Seagreen Project Area 'red line' boundary. Any potential for impacts arising from the proposed variation to the parameters of the individual WTGs is considered in the technical chapters in Section 4 of this report, and it is concluded for each topic that the proposed variations will not give rise to likely significant effects.

The Seagreen Project lies within the vicinity of a number of protected sites, including Special Protected Areas (SPAs), Special Areas of Conservation (SACs) and Marine Protected Areas (MPAs). As such, SWEL have considered the environmental sensitivity of the Seagreen Project Area in relation to protected sites in the vicinity of the Variation (see Section 4.15). This includes consideration of the existing and approved use, the relative abundance, availability, quality and regenerative capacity of natural resources in the area, and the absorption capacity of the natural environment (with reference to coastal zones and European and nationally designated sites).

When considering these factors, the Variation does not have significant adverse effects and is not likely to have significant effects on the environment. Therefore, it is appropriate to screen the Variation out of the requirement for EIA when considering these factors.

#### 2.2.2.3 Characteristics of Potential Impacts

Schedule 3 Electricity Works EIA Regulations specifies that the potential impacts and likely significant effects of the Variation on the environment must be considered taking into account the following:

- The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
- The nature of the impact;
- The transboundary nature of the impact;
- The intensity and complexity of the impact;
- The probability of the impact;
- The expected onset, duration, frequency and reversibility of the impact;
- The cumulation of the impact with the impact of other existing and/or approved works; and
- The possibility of effectively reducing the impact.

Section 4 assesses the environmental effects of the changes proposed by the Variation compared to the effects of the consented Seagreen Project assessed in the 2012 ES. Where relevant, post-consent assessments completed to discharge existing consent conditions are referenced.

Section 4 of this report demonstrates that the Variation does not have significant adverse effects and is not likely to have significant effects on the environment. Therefore, it is appropriate to screen the Variation out of the requirement for EIA when considering these factors.

#### 2.2.2.4 Conclusion

The Variation does not change the fundamental characteristics of the Seagreen Project and will be completed within the consented 'red line' boundary. Based on the technical assessments completed in Section 4, the Variation will not give rise to any likely significant adverse environmental effects, alone or in combination with other projects, compared to the consented Seagreen Project assessed in the 2012 ES. Based on paragraph 31 of [MS-LOT \(2019\)](#) "*where the proposed variation is unlikely to have significant environmental effects, no EIA Report or process would be required in respect of the variation application*".

The Variation is not likely to have significant effects on the environment. As such, SWEL propose the S36C variation application does not require an EIA under the Electricity Works EIA Regulations or the Marine Works EIA Regulations and that the Variation should be screened out of the requirement for EIA.

SWEL propose to accompany the S36C variation application with a supporting Environmental Appraisal Report which will:

- Summarise technical information presented in this Screening Report;
- Provide any additional information reasonably requested by stakeholders during pre-application consultation; and
- Provide any relevant updates between writing this Screening Request and the submission of the S36C variation application.

#### 2.2.3 Stakeholder Engagement

##### 2.2.3.1 Engagement to date

To support the development of this Screening Request, engagement has been undertaken with Marine Scotland, National Air Traffic Services (NATS), Civil Aviation Authority (CAA) and Ministry of Defence (MOD). Seagreen has also requested meetings with MS-LOT Science, Nature Scot and Royal Society for the Protection of Birds (RSPB) to discuss the content of the screening request and additional meetings with other consultees will be held where appropriate. SWEL has held pre-application meetings with MS-LOT and in principle they have agreed that the proposed variation to WTG parameters constitutes a S36C application. Additionally MS-LOT confirmed that they understand our approach to screening out EIA and welcomed that we have undertaken technical assessments to quantify the environmental impacts and to support justification to screen out EIA.

### 2.2.3.2 Future Engagement

Once a screening opinion is received from Marine Scotland, SWEL intends to follow up with any statutory and non-statutory stakeholders based on the feedback received, if required. If consultation is required, SWEL will present a consultation record in the Environmental Appraisal submitted with the S36C application.

### 3. Project Description

#### 3.1 Proposed Variation

Table 3.1 presents a high-level description of the two project components which have proposed parameter changes associated with the Variation. The following subsections provide further details of the proposed changes.

**Table 3.1 Proposed Project Parameter Changes**

Proposed Parameter Change	High Level Description	Refer to Section
WTGs	Increase in size of up to 36 (of the 150 consented) WTGs	3.2
OSP	Increase in OSP steel seabed deposits	3.3

#### 3.2 WTGs

The WTG layout will be designed to best utilise the available wind resource while at the same time seeking to reduce environmental effects and impact on other marine users and considering suitability of ground conditions.

The maximum height of the 36 varied WTGs is expected to be up to 285 m from Lowest Astronomical Tide (LAT) to the blade tip in the vertical position, however new WTGs available on the market at the time of construction will be considered and their detailed dimensions are not yet known. The nacelles and rotor will be mounted upon a cylindrical steel tower; which will, in turn, be supported by a substructure and foundation, the design and type of which is yet to be confirmed. Table 3.2 presents the proposed WTG parameters associated with the Variation and compares these to what is currently consented. The table also presents the parameters for 114 WTGs currently under construction.

Where assessments are based on an identified WTG to be deployed, the dimensions used in the assessments have been rounded to one decimal place (noting this aligns with the level of accuracy for setting parameter dimensions as in the S36 consent).

**Table 3.2 WTG Proposed Parameter Changes**

Parameter	2014 Consented Project Parameters	Seagreen Parameters (applicable to 114 of 150 consented WTGs under construction)	Proposed Change (applicable to 36 of 150 consented WTGs not under construction)	Description
Minimum tip height above LAT (clearance/air gap)	29.8 – 42.7 m	37 m	34m – 45 m	This is the air gap between the lowest point of the WTG blade rotation and the sea surface, referenced to the LAT.
Distance from shore (closest point)	27 km	27 km	27 km	The minimum distance from shore of any WTG remains unchanged.
Indicative capacity of WTGs	7 MW (generating cap removed in 2018)	7 MW (generating cap removed in 2018)	16 MW	WTG capacity is the amount of energy a WTG would produce if it ran 100% of the time at optimal wind speeds.
Maximum number of WTGs	150	114 under construction of Phase 1	150 (Phase 1 + Variation)	The maximum number of WTGs within the consented Seagreen Alpha and Bravo red line boundary remains unchanged.
Split of WTGs between Alpha and Bravo OWF	75/75	75/75	75/75	Split between Alpha and Bravo refers to the maximum number of WTGs to be located between the two OWFs.
Maximum tip height above LAT	209.7 m	205 m	285 m	This is the highest point of the blade rotation measured from the sea surface and referenced to the LAT.
Maximum blade chord width	5.4 m	5.4 m	7.6 m	WTG blade chord width refers to the width of the wing measured in the direction of airflow.
Maximum rotor diameter	122 – 167 m	164 m	242 m	Rotor diameter refers to the diameter the wind WTG hub will sweep.
Minimum separation distance between WTGs	1 km	1 km	1 km	Separation distance refers to the distance between one WTG and the next.

Parameter	2014 Consented Project Parameters	Seagreen Parameters (applicable to 114 of 150 consented WTGs under construction)	Proposed Change (applicable to 36 of 150 consented WTGs not under construction)	Description
Maximum hub height above LAT	87.1 – 126.2 m	119 – 123 m	118 m – 165 m	The hub height of a WTG refers to the height at which the hub sits and is the top of the “tower”. The hub is also the centre of the WTG blades rotation point, the point at which the blades are attached to the WTG tower and where the generator is housed.
RPM	4 – 14 rpm	5 – 14 rpm	3 – 14 rpm	Rotations Per Minute (RPM) refers to the number of complete rotations (full 360 degrees) the WTG blades turn in a minute of rotation.

### 3.3 OSPs

OSPs are critical aspects of OWFs. They collect power produced by WTGs and connect this energy to the grid, an example OSP is presented in Figure 3.1 (jacket foundations). The OSP will consist of a topside, some form of foundation and substructure, with cables connecting from the WTGs and to shore. As presented in Table 3.3, the total seabed deposits of steel/iron necessary for OSP installation are likely to be heavier than consented, and is the only parameter in relation to OSPs that needs consent varying.

**Table 3.3 Proposed OSP Parameter Changes**

Parameter	Current consent (as assessed in 2012 ES or 2018 variation)	Proposed	Description
Number of OSPs	up to 5 OSPs	Unchanged	The Offshore platforms effectively act as a gathering station for the power generated by the WTGs. The export cables carrying the power generated by the WTGs originate at the OSPs.
OSP Rating	C. 220kV	Unchanged	This value (220kV) represents the maximum voltage exported per export cable.
OSP foundation options	Piled jacket, suction piled jacket, Gravity Base	Unchanged	The foundation is the structure upon which the Platform Topsides are mounted and comprises a structure that is set on, or in the seabed.
Worst-case total OSP direct footprint	47,939 m <sup>2</sup>	Unchanged	Relates to the area of ground/seabed taken up by the area of the OSP foundation.
Maximum steel/iron deposit	13,000 tonnes	22,560 tonnes	The total amount of steel to be deposited on/in the seabed as part of the OSP installation. This represents the steel of the jacket structure along with the piles associated with fixing the jackets in place.
Maximum concrete deposit	42,000 m <sup>3</sup> (approx.)	Unchanged	The total amount of concrete to be deposited on/in the seabed as part of the OSP installation.
Maximum silt deposit	130,000 m <sup>3</sup> (max)	Unchanged	The total amount of silt to be deposited on/in the seabed as part of the OSP installation.
Maximum sand deposit	130,000 m <sup>3</sup> (max)	Unchanged	The total amount of sand to be deposited on/in the seabed as part of the OSP installation.
Maximum stone/rock/gravel	435,000 m <sup>3</sup>	Unchanged	Stone/rock/gravel are used to prevent scour from the base of the jackets.



Parameter	Current consent (as assessed in 2012 ES or 2018 variation)	Proposed	Description
(size range 50 – 200 mm) deposit			

**Figure 3.1 Example OSP**



Source: Greater Gabbard OWF

### 3.4 Consented WTG Overview

Under the 2014 Consents, 150 WTGs are consented of which 114 WTGs are currently being constructed within the Seagreen Project Area. Of the three consented foundation options SWEL have selected suction caisson jackets as the foundation type for all 114 WTGs. Jacket foundation installation began in 2021 and will continue into 2022. First power is expected by early 2022 with the OWF expected to enter commercial operation in 2023.

## **4. Technical Assessment**

### **4.1 Introduction**

This chapter identifies environmental and social topics and explains why it is appropriate for the Variation to be screened out of the requirement for an EIA when considering each topic. Further details on each of these technical areas are given below, including a summary, a brief overview of the predicted effects of the 2012 ES, implications of the project parameter changes and a screening outcome.

Within each topic and technical area, the impact of the Variation is considered and assessed against the impacts assessed within the 2012 ES which resulted in the 2014 Consents for the Seagreen Project. Within this screening report, the 2012 ES was therefore used as a baseline for each technical area. The Variation has been assessed using the same methods as used in the 2012 ES to allow for a straightforward comparison of impacts and a robust conclusion made as to whether the Variation results in a significant environmental impact compared to the consented Seagreen Project as per the Electricity Works EIA Regulations.

At the end of each technical section it is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA.

### **4.2 Fish and Shellfish**

#### **4.2.1 Summary**

The 2012 ES concluded significant impacts on herring due to underwater noise. However, the updated assessment undertaken for the 2020 Piling Strategy, which assesses 150 WTGs inclusive of project design refinements since the award of the 2014 Consents, resulted in impacts to all fish species being less than or equal to the assessment undertaken in the 2012 ES for both mortality, auditory injury/impairment and behavioural effects. The Variation will not materially change any impact of the consented Seagreen Project previously assessed in the 2012 ES or 2020 Piling Strategy. The sections below outline potential impacts of the project parameter changes, present a breakdown of the assessment conducted in relation to fish and shellfish in the 2012 ES and screening approach.

#### 4.2.2 Predicted Effects and Mitigation

Table 4.1 presents the fish and shellfish ecology effects summary table as identified and considered in the 2012 ES<sup>12</sup>. In 2020, an updated assessment of potential impacts due to underwater noise from the construction of 150 WTGs was completed as part of the Seagreen OWF Piling Strategy (2020 Piling Strategy<sup>13</sup>). The assessment took account of project design refinements since the award of the 2014 Consents. Assessment results for all fish species were less or the same than presented in the 2012 ES<sup>14</sup> for both mortality, auditory injury/impairment and behavioural effects. Based on the Variation having no material change on impacts on fish and shellfish assessed in the 2012 ES and 2020 Piling Strategy, the Variation leads to no likely significant effects.

**Table 4.1 Predicted effects and mitigation from the 2012 ES**

Description of Effect	Effect	Potential Mitigation Measures	Residual Effect
<b>Construction Phase</b>			
Effect of noise – death or injury	Minor adverse	<p>Use of non-piled substructures/foundations would significantly reduce noise impacts.</p> <p>Energy needed to drive piles should be minimised to reduce peak noise impacts.</p> <p>Soft start piling (in which the energy used to drive the piles into the sediment is slowly ramped up) creates an increasing level of noise from low levels and will allow noise sensitive species such as herring and sprat to vacate the area and can reduce the risk to injury.</p> <p>This is an industry standard mitigation.</p> <p>Physical mitigation methods may lead to a modest reduction in source level although this is untested in deeper water or tidal conditions. Investigation will continue regarding other technical mitigation solutions to reduce noise impacts.</p>	<p>If non-piled foundations are used then impact would be negligible. The use of the mitigation methods suggested for piling may reduce the impact on high sensitivity species such as herring however at this stage it is not possible to determine what this reduction may be. Therefore, on a precautionary basis, the impact remains minor adverse and not significant.</p>

<sup>12</sup> [2012 ES Chapter 12 Fish and Shellfish Resource](#) Section 12.455

<sup>13</sup> [2020 Piling Strategy](#) Appendix C

<sup>14</sup> [2012 ES Chapter 12 Fish and Shellfish Resource](#) Section 12.455

Description of Effect	Effect	Potential Mitigation Measures	Residual Effect
Effect of noise – behaviour	Moderate adverse (herring).	<p>Use of non-piled substructure/foundations would significantly reduce noise impacts.</p> <p>Energy needed to drive piles should be minimised to reduce peak noise impacts.</p> <p>Soft start piling (in which the energy used to drive the piles into the sediment is slowly ramped up) creates an increasing level of noise from low levels and will allow noise sensitive species such as herring and sprat to vacate the area and can reduce the risk to injury.</p> <p>This is an industry standard mitigation.</p> <p>Physical mitigation methods may lead to a modest reduction in source level although this is untested in deeper water or tidal conditions. Investigation will continue regarding other technical mitigation solutions to reduce noise impacts.</p>	<p>If non-piled substructures/foundations are used then impact would be negligible. The use of the mitigation methods suggested for piling may reduce the impact on high sensitivity species such as herring however at this stage it is not possible to determine what this reduction may be. Therefore, on a precautionary basis, the impact remains moderate adverse and significant.</p>
Seabed habitat disturbance	Negligible.	No mitigation methods advised for this impact.	Not significant.
Permanent loss of habitat	Negligible.	Use of piled jacket structures would reduce the overall footprint and the consequent habitat loss.	Not significant. If prime sandeel habitats are avoided or use of them minimised and jacket substructure/foundations used then the impact could be reduced but given the high sensitivity of the receptor the impact will remain Negligible and not significant.
Increased of suspended sediments and remobilisation of contaminants	Negligible.	No mitigation methods advised for this impact.	Not significant.
<b>Operational Phase</b>			
Disturbance effects of Electromagnetic Fields (EMF)	Minor adverse	The effects of EMF are poorly understood therefore mitigation measures are difficult to recommend.	With appropriate burial depth and intelligent array cable layouts it may be possible to reduce the impacts of EMF, however, given the uncertainties around this impact

Description of Effect	Effect	Potential Mitigation Measures	Residual Effect
		However, burial depths of 0.5m to 2.1m are estimated and the arrangement of the array cable layout will be considered with respect to mitigating the effect of EMF.	from a precautionary standpoint this will remain minor adverse for the most sensitive species and not significant.
Operational noise	Negligible	No mitigation methods advised for this impact.	Not significant.
Disturbance of seabed habitats	Negligible	No mitigation methods advised for this impact.	Not significant.
Creation of new habitats – fish aggregation	Negligible/beneficial	No mitigation methods advised for this impact.	Not significant.
Increased of suspended sediments and remobilisation of contaminants	Minor adverse	Where scour protection is used for conical Gravity Based Structure (GBS) to ensure structural stability, visual dive surveys or bathymetric surveys will be undertaken at selected locations with Project Alpha to assess the effectiveness of scour protection on reducing scour and resultant sediment release.  Site selection or the use of smaller diameter foundations for conical GBS will aim to reduce the requirement for ground preparation and thus reduce the volume of re-suspended sediments and remobilised contaminants.	Not significant.
<b>Decommissioning Phase</b>			
Seabed habitat disturbance and loss	Negligible	No mitigation methods advised for this impact.	Not significant.

#### 4.2.3 Implications of Project Parameters Changes

Table 4.2 notes potential implications of proposed parameter changes associated with the Variation on fish and shellfish. The Variation is considered to have no material change and no likely significant environmental effect on the fish and shellfish compared to the assessment made in the 2012 ES<sup>15</sup>.

<sup>15</sup> [2012 ES Chapter 12: Fish and Shellfish Resource](#) Section 12.455

**Table 4.2 Implications of Proposed Parameter Change on Fish and Shellfish**

Proposed Parameter Change	Potential Effects
Increased size of WTGs	<p>Increasing WTG parameters from parameters that were previously assessed will produce no additional underwater noise during installation and so there will be no increased impact on fish and shellfish species beyond those of the consented Seagreen Project.</p> <p>No material change in impacts previously assessed, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>Increased weight of the steel deposits on the seabed will have no additional impacts compared with the consented Seagreen Project through underwater noise or disturbance.</p> <p>No material change in impacts previously assessed, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

**4.2.4 Screening Outcome**

Potential effects to fish and shellfish will remain as previously assessed (in the 2012 ES and 2020 Piling Strategy<sup>16</sup>) when considering the proposed project parameter changes for the present Variation, with no likely significant effects above and beyond those previous assessed. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering fish and shellfish.

**4.3 Marine Mammals**

**4.3.1 Summary**

The 2012 ES concluded moderate adverse and significant impacts on harbour seals in relation to underwater noise. The 2020 Piling Strategy Underwater Noise Assessment for the refined project design of the 150 WTGs concluded the significance of impacts for all marine mammal species were the same or less than assessed in the 2012 ES for both Permanent Threshold Shift (PTS) and behavioural disturbance. The Variation will not materially change any impact of the consented Seagreen project when compared to the 2012 ES assessments. The sections below outline potential impacts of the Variation and present a breakdown of the assessment conducted in relation to marine mammals in the 2012 ES compared to the Variation.

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<sup>16</sup> [2020 Piling Strategy](#) Section 7

#### 4.3.2 Predicted Effects and Mitigation

Table 4.3 presents the marine mammal effects summary table as identified and considered in the 2012 ES<sup>17</sup>, where all residual impacts ranged from negligible to moderate adverse. Significant impacts (moderate adverse) to harbour seal were predicted from underwater noise (pile driving) during construction.

**Table 4.3 Effects Summary Table from Chapter 13 of the 2012 ES (entire Seagreen Project Area)**

Effect	Description of Effect	Potential Mitigation Measures	Residual Effect
<b>Construction Phase</b>			
Underwater Noise (Pile driving)	Death, injury or behavioural disturbance.	Marine Mammal Observer (MMO) or Acoustic Deterrent Devices (ADDs) (if appropriate). 500 m mitigation zone around noise source.	Moderate adverse and significant in harbour seal. Minor adverse and not significant all species except negligible and not significant in white-beaked dolphin.
Underwater Noise (Vessels)	Death, injury or behavioural disturbance.	Marine Mammal Mitigation Plans (MMMP).	Negligible and not significant (all species).
Collision risk (ship hull impact)	Injury or death.	MMMP	Negligible and not significant (all species).
Changes to water quality (accidental release of contaminants)	Illness, injury or death.	Site Environmental Management Plan (SEMP)	Negligible and not significant (all species).
Changes to water quality (suspended sediment)	Illness, reduced foraging ability.	SEMP	Negligible and not significant in all cetaceans, minor adverse and not significant in seals.
Changes to prey resource	Individual fitness effect from reduced prey availability or increased foraging costs.	Hearing sensitive fish species will be moderately impacted through pile driving noise, mitigation methods applied to the reduction of noise at source are the same as those applied for marine mammals (soft start and ramp up).	Minor adverse and not significant in harbour seal Negligible and not significant (all other species).

<sup>17</sup> [2012 ES Chapter 13: Marine Mammals](#) Table 13.42

Effect	Description of Effect	Potential Mitigation Measures	Residual Effect
<b>Operational Phase</b>			
Underwater noise (WTGs)	Death, injury or behavioural disturbance.	n/a	Negligible and not significant (all species).
Underwater noise (vessel noise)	Death, injury or behavioural disturbance.	n/a	Negligible and not significant (all species).
Barrier effects	Prevent movement or migration.	n/a	Negligible and not significant (all species).
Collision risk (ship hull impact)	Injury or death.	MMMP	Negligible and not significant (all species).
Changes to water quality (accidental release of contaminants)	Illness, injury or death.	SEMP	Negligible and not significant (all species).
Electromagnetic fields	Behavioural changes.	n/a	Negligible and not significant (all species).
<b>Decommissioning Phase</b>			
Underwater noise (cutting)	Death, injury or behavioural disturbance.	n/a	Minor adverse and not significant all species.
Underwater noise (vessels)	Death, injury or behavioural disturbance.	n/a	Negligible and not significant (all species).
Collision risk (ship hull impact)	Injury or death.	MMMP	Negligible and not significant (all species).
Changes to water quality (accidental release of contaminants)	Illness, injury or death.	SEMP	Negligible and not significant (all species).
Changes to water quality (suspended sediment)	Illness, reduced foraging ability.	SEMP	Minor adverse and not significant in seals. Negligible and not significant in all cetacean species.
Changes to prey resource	Individual fitness effect from reduced	n/a	Alpha only - Minor adverse and not



Effect	Description of Effect	Potential Mitigation Measures	Residual Effect
	prey availability or increased foraging costs.		significant in harbour seal Both - Negligible and not significant (all other species).

#### 4.3.3 Implications of Project Parameter Changes

Table 4.4 notes potential implications of proposed parameter changes associated with the Variation on marine mammals. The Variation is considered to have no material change and no likely significant effect on the marine mammals compared to the assessment made in the 2012 ES<sup>18</sup>.

**Table 4.4 Implications of Proposed Parameter Changes on Marine Mammals**

Proposed Parameter Change	Implications on Effect Significance
Increased size of WTGs	<p>Key impacts on marine mammals as previously assessed in 2012 were underwater noise, impacts due to prey displacement and increased turbidity. Increased WTG parameters (height, blade length and width) will have no material change to underwater noise produced during construction, operation or decommissioning as a result of the Variation and so there will be an increased impact on marine mammals. Similarly, no increased disturbance to prey or seabed sediment will occur as a result of the Variation.</p> <p>No material change in impacts previously assessed, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>Increased steel deposit weight will have no effect on underwater noise, impacts due to prey displacement and increased turbidity.</p> <p>No material change in impacts previously assessed, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

<sup>18</sup> [2012 ES Chapter 13: Marine Mammals](#) Section 10.370

#### 4.3.4 Screening Outcome

Potential effects to marine mammals will remain as previously assessed (in the 2012 ES<sup>19</sup> and 2020 Piling Strategy<sup>20</sup>) when considering the proposed project parameter changes for the present Variation, with no likely significant effects. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering marine mammals.

### 4.4 Physical Environment (Metocean, Bathymetry, Seabed Sediments and Sediment Transport)

#### 4.4.1 Summary

Impacts to the Physical environment were assessed in 2012 to have no significant effects. The Variation will not materially change these impacts on the physical environment. The sections below outline potential impacts of the Variation and present a breakdown of the assessment of the consented Seagreen Project conducted in relation to the physical environment in the 2012 ES compared to the Variation.

#### 4.4.2 Predicted Effects and Mitigation

Effects to the physical environment predicted in the 2012 ES<sup>21</sup> are presented in Table 4.5 below, where all residual impacts were assessed to be negligible. It is expected that the effects will remain as previously assessed and no significant effects are predicted with regards to the physical environment.

**Table 4.5 Effects on Physical Environment Summary Table**

Description of Effect	Effect	Proposed Mitigation Measures	Residual Effect
<b>Construction Phase</b>			
Effects on hydrodynamic regime	Negligible.	None.	N/A
Effects on sediments and sedimentary structures	Installation plant: No change (anchored vessels) or negligible effect (jack-up barges).	None.	N/A

<sup>19</sup> [2012 ES](#)

<sup>20</sup> [2020 Piling Strategy](#) Section 10

<sup>21</sup> [2012 ES Chapter 7 Physical Environment](#) Table 7.28

Description of Effect	Effect	Proposed Mitigation Measures	Residual Effect
	Seabed preparation: Negligible effect in areas devoid of mobile bedforms, low effect in areas with mobile bedforms.	Design optimisation to minimise the quantity of worst-case substructures/foundations required and depths of seabed preparation required.	Low effect in areas of mobile bedforms if only industry best practice guidance is used as mitigation, but if alternative foundation types are selected, the effect reduces to negligible (for other GBS) or no change (for jackets with piles or suction piles).
Effects on suspended sediment concentration and transport	Substructures / Foundations: Low effect.	Design optimisation to minimise the quantity of worst-case substructures/foundations required and depths of seabed preparation required.	Negligible (for 52m baseplate diameter conical GBS) or negligible (for jackets with piles or suction piles).
	Array cables: Low effect.	Design optimisation to select preferred cable trenching technique and minimise areas where jetting is used.	Negligible (for ploughing or cutting).
<b>Operational Phase</b>			
Effects on hydrodynamic regime	Waves: Negligible Tides: Low.	Design optimisation to minimise the quantity of worst-case substructures/foundations required.	Waves: N/A Tides: Low (for 52m baseplate diameter conical GBS) or negligible (for jackets with piles or suction piles).
Effects on sediments and sediment structures	Substructures / Foundations: Low effect.	Design optimisation to minimise the quantity of worst-case substructures/foundations required and scour protection likely to be needed to ensure integrity of substructures/foundations.	Low effect (conical GBS) or negligible effect (jackets).
	Array cables: Negligible effect in areas devoid of mobile bedforms, low effect in areas with mobile bedforms.	Design optimisation to minimise the length of cable where protection is required.	No change if all cable is buried to target depth.
Effects on suspended sediment	Substructures / Foundations: Low effect.	Design optimisation to minimise the quantity of worst-case substructures/foundations required and scour protection likely to be	Low effect (conical GBS) or negligible effect

Description of Effect	Effect	Proposed Mitigation Measures	Residual Effect
concentration and transport		needed to ensure engineering integrity of substructures/foundations.	(jackets). No change if scour protection used.
<b>Decommissioning Phase</b>			
Effects as for construction phase.			

#### 4.4.3 Implications of Project Parameter Changes

Table 4.6 notes potential implications of proposed parameter changes associated with the Variation on the physical environment. The Variation is considered to have no material change and no likely significant effect on the physical environment compared to the assessment made in the 2012 ES.

**Table 4.6. Implications of Design Envelope Change on Physical Environment**

Design Envelope Change	Implications on Effect Significance
Increased size of WTGs	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional or changed impact to the physical environment as a result of the Variation compared to the consented Seagreen Project.</p> <p>No material change in impacts previously assessed, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the consented Seagreen Project for impacts to the physical environment.</p> <p>No material change in impacts previously assessed, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.4.4 Screening Outcome

Potential effects to the physical environment will remain as previously assessed (in the 2012 ES) when considering the proposed project parameter changes for the present Variation, with no likely significant effects. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Metocean, Bathymetry, Seabed Sediments and Sediment Transport.

## 4.5 Water and Sediment Quality

### 4.5.1 Summary

Impacts to water and sediment quality were assessed in 2012 to be not significant. The Variation will have no material change on impacts above and beyond those previously consented. The sections below outline potential impacts of the project parameter changes and present a breakdown of the assessment conducted in relation to the physical environment in the 2012 ES compared to the Variation.

### 4.5.2 Predicted Effects and Mitigation

The effects summary table from the 2012 ES<sup>22</sup> is included below (Table 4.7), where all impacts were assessed as Negligible and so in EIA terms, not significant. It is expected that the effects will remain as previously assessed and no significant effects are predicted with regards to the water and sediment quality from the Variation's parameter changes.

**Table 4.7 Water and Sediment Quality Effects Summary**

Description of Effect	Effect	Potential Mitigation Measures	Residual Effect
<b>Construction Phase</b>			
Deterioration in water quality due to re-suspension of sediments	Negligible.	If the need for seabed preparation is determined, a licence will be applied for under the Marine (Scotland) Act 2010 for Dredging and Deposit of Solid Waste in the Territorial Sea and United Kingdom (UK) Controlled Waters Adjacent to Scotland. This will necessarily consider details of the areas and materials to be dredged and a Best Practicable Environmental Option (BPEO) Assessment for deposit of the materials, including consideration of re-use of material as foundation ballast, beneficial use and disposal at sea.	Negligible Not significant.
Deterioration in water quality due to re-suspension of contaminants	Negligible.	No mitigation is proposed.	Negligible Not significant.
Deterioration in water and/or sediment quality due to accidental spillage of construction materials	Minor adverse.	CEMP and Pollution Control and Spillage Response Plans will be agreed with the Regulatory Authorities prior to offshore construction activities commencing.	Negligible Not significant.

<sup>22</sup> [2012 ES Chapter 8 Water and Sediment Quality](#) Section 8.259

Description of Effect	Effect	Potential Mitigation Measures	Residual Effect
Introduction of marine non-native/alien species	Minor adverse.	Once the vessels for construction are confirmed, a risk assessment will be conducted. The assessment and measures indicated by the assessment will be agreed with Marine Scotland.  Further consultation with Scottish Natural Heritage (SNH) (now called NatureScot) and Scottish Environmental Protection Agency (SEPA) may be required.	Negligible Not significant.
<b>Operational Phase</b>			
Deterioration of water and sediment quality as a result of scour impacts at WTG structures	Negligible.	As a matter of good practice, the detailed design of the Variation will consider scour protection.  Visual or bathymetric surveys will be undertaken at selected locations within the OWF site.  Further monitoring requirements will be determined through consultation with Marine Scotland and other key stakeholders.	Negligible Not significant.
Deterioration in water quality due to accidental spillages	Minor adverse.	Best practice for pollution prevention will be considered during the operational phases to mitigate the risk from accidental spillages.	Negligible Not significant.
Introduction of marine non-native/alien species	Minor adverse.	Once the vessels for operation are confirmed, a risk assessment will be conducted. The assessment and measures indicated by the assessment will be agreed with Marine Scotland.  Further consultation with SNH (now called NatureScot) and SEPA may be required.	Negligible Not significant.
<b>Decommissioning Phase</b>			
Impacts due to re-suspension of sediments and contaminants	Negligible.	As detailed in the 2012 ES Chapter 5: Project Description, a decommissioning plan will be established and agreed with the regulators.	Negligible Not significant.
Introduction of marine non-native/alien species	Minor adverse.	Once the vessels for construction are confirmed, a risk assessment will be conducted. The assessment and measures indicated by the assessment will be agreed with Marine Scotland.  Further consultation with SNH (now called NatureScot) and SEPA may be required.	Negligible Not significant.

#### 4.5.3 Implications of Project Parameter Changes

Table 4.8 notes potential implications of proposed parameter changes associated with the Variation on the water and sediment quality. The Variation is considered to have no material change and no likely significant effect on water and sediment quality compared to the assessment made in the 2012 ES.

**Table 4.8 Implications of Design Envelope Change on Water and Sediment Quality**

Design Envelope Change	Implications on Effect Significance
Increased size and capacity of WTGs	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact to water and sediment quality as a result of the Variation above and beyond the consented Seagreen Project.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to water and sediment quality.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.5.4 Screening Outcome

It is expected that potential effects to water and sediment will remain as previously assessed in the 2012 ES when considering the proposed project parameter changes for the Variation. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Water and Sediment Quality.

## 4.6 Benthic & Intertidal Ecology

### 4.6.1 Summary

Impacts to benthic and intertidal ecology were assessed in 2012 to have no significant effects. The Variation will not materially change these impacts on Benthic and Intertidal Ecology. The sections below outline potential impacts of the Variation and present a breakdown of the assessment conducted in relation to benthic and intertidal ecology in the 2012 ES compared to the Variation.

### 4.6.2 Predicted Effects and Mitigation

The impact of Seagreen Alpha and Seagreen Bravo on Benthic and Intertidal Ecology was assessed in the 2012 ES<sup>23</sup>, the results from this assessment, both pre and post-mitigation is presented in Table 4.9.

<sup>23</sup> [2012 ES Chapter 11 Benthic and Intertidal Ecology](#) Section 11.335

The effects were assessed to be negligible and not significant, with some minor impacts during decommissioning.

**Table 4.9 Predicted Effects and Mitigation from the 2012 ES.**

Effect	Description of Effect	Potential Mitigation Measures	Residual Effect
<b>Construction Phase</b>			
Direct impact on benthos due to physical disturbance	Negligible and not significant.	Siting of WTG, array cables and ancillary structures to avoid the areas of sensitive habitat wherever practicable.  As part of the pre-construction survey (which will be agreed with Marine Scotland), data will be analysed to ascertain the presence of any rare or important habitats, such as <i>Sabellaria</i> or <i>Modiolus</i> reefs and microsite infrastructure if necessary.	Negligible and not significant.
Direct impact on benthos due to the loss of habitat	Minor adverse and not significant (Alpha)  Negligible and not significant (Bravo).	Siting of WTG, array cables and ancillary structures to avoid the areas of sensitive habitat where ever practicable.  As part of the pre-construction survey (which will be agreed with Marine Scotland), data will be analysed to ascertain the presence of any rare or important habitats, such as <i>Sabellaria</i> or <i>Modiolus</i> reefs and microsite infrastructure if necessary.	Negligible and not significant.
Indirect impact on benthos due to increased suspended sediments	Negligible and not significant.	No mitigation measures are advised for this impact.	Negligible and not significant.
Indirect impacts on benthos due to increased suspended sediments	Negligible and not significant.	No mitigation measures are advised for this impact.	Negligible and not significant.
<b>Operational Phase</b>			
Direct impact on benthos due to physical disturbances caused by maintenance activities	Negligible and not significant.	No mitigation measures are advised for this impact.	Negligible and not significant.
Direct impact on subtidal benthos due to creation of new habitat	Negligible and not significant.	No mitigation measures are advised for this impact.	Negligible and not significant.
Indirect impacts on subtidal benthos due to changes in	Negligible and not significant.	No mitigation measures are advised for this impact.	Negligible and not significant.



Effect	Description of Effect	Potential Mitigation Measures	Residual Effect
current regime and coastal processes			
Indirect impacts on subtidal benthos due to alteration to existing human activity	Negligible and not significant.	No mitigation measures are advised for this impact.	Negligible and not significant.
<b>Decommissioning Phase</b>			
Impacts on benthos	Minor adverse and not significant.	It is anticipated that surveying for Annex I habitat will be undertaken prior to decommissioning in line with surveys anticipated as part of the pre-construction activities. Should these surveys indicate the presence of any sensitive habitats, Seagreen will discuss how to decommission the OWF with the regulators to avoid, where possible, impacts upon such habitats.	Minor adverse and not significant all species.

#### 4.6.3 Implications of Project Parameter Changes

The potential implications of the proposed changes in project design parameters on commercial fisheries are summarised in Table 4.10.

**Table 4.10 Implications of Proposed Parameter Change on Benthic and Intertidal Ecology**

Proposed Parameter Change	Implications on Effect Significance
Increased size of WTGs	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact on benthic and intertidal ecology as a result of the Variation above and beyond the consented Seagreen Project, throughout either construction, operation or decommissioning.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to benthic and intertidal ecology throughout either construction, operation or decommissioning.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.6.4 Screening Outcome

Having reviewed the impact summary table that was presented in the 2012 ES<sup>24</sup>, as well as the potential implications from the Variation, potential effects will remain as previously assessed when considering the project parameter changes. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Benthic and Intertidal Ecology.

Impacts to qualifying features of the Firth of Forth Banks Complex Nature Conservation MPA was fully assessed in the 2012 ES<sup>69</sup>, the proposed project parameter changes under the Variation will have no increased impact compared to the consented Seagreen Project.

Given there will be no near-shore activities associated with the Variation, there are no effects to intertidal ecology as a result of the Variation.

### 4.7 Commercial Fisheries

#### 4.7.1 Summary

Impacts to commercial fisheries were assessed in 2012 to have no significant effects. The Variation will not lead to any material changes to impacts on commercial fisheries. The sections below outline potential impacts of the Variation and present a breakdown of the assessment conducted in relation to commercial fisheries in the 2012 ES compared to potential impacts from the Variation.

#### 4.7.2 Predicted Effects and Mitigation

The impact of Seagreen Alpha and Seagreen Bravo on Benthic and Intertidal Ecology was assessed in the 2012 ES. The outcomes of the assessment took account of the application of environmental measures incorporated into Seagreen Alpha / Seagreen Bravo and the implementation of additional mitigation where appropriate to reduce significant impacts, guided by Seagreen Alpha / Seagreen Bravo's Fisheries Management and Mitigation Strategy (FMMS) and existing consent conditions. The results from this assessment (2012 ES), both pre and post-mitigation is presented in Table 4.11. The effects were assessed to be not significant.

**Table 4.11 Commercial Fisheries Summary Table from 2012 ES**

Description of Impact	Impact	Potential Mitigation Measures	Residual Impact
<b>Construction Phase</b>			

<sup>24</sup> [2012 ES Chapter 11 Benthic and Intertidal Ecology](#) Section 11.335

Description of Impact	Impact	Potential Mitigation Measures	Residual Impact
Temporary Loss or Restricted Access to Fishing Grounds	Minor Adverse.	Ongoing engagement through the forum of the Working Group to enable construction and installation procedures which allow normal fishing activities to safely resume.	Not significant.
Safety Issues for Fishing Vessels (all fishing vessels)	Within acceptable limits for aspects with applied safety zones. Outside of acceptable limits for array cable installation.	Protocol for the removal of seabed obstacles. Completion of post-installation survey of array cables to ensure fishing activities can be safely resumed. Consultation with fishing interests to ensure that all safety risks are brought within acceptable limits.	Residual impacts will be reduced to within acceptable limits and therefore not significant.
Increased Steaming Times for Fishing Vessels	Minor Adverse.	N/A	Not significant.
Displacement of Fishing Vessels into other Areas	Minor Adverse.	Ongoing engagement through the forum of the Working Group to enable construction and installation procedures which allow normal fishing activities to safely resume.	Not significant.
Interference to Fishing Activities (navigational conflict)	Minor Adverse – all fisheries exception crab and lobster. Moderate Adverse – crab and lobster fishery.	Development of protocols, including vessel transit lanes, in consultation with fishing interests to ensure that possible reductions in interference are achieved.	Not significant.
<b>Operational Phase</b>			
Loss or Restricted Access to Fishing Grounds	Minor Adverse.	Ongoing engagement through the forum of the Working Group to enable operational procedures which allow normal fishing activities to safely be undertaken. Investigations are ongoing within the offshore renewables industry to explore potential modifications to bottom towed gear, which may better enable fishing activities within and around operational OWFs. These investigations may result in mitigating the impact identified.	Not significant.
Safety Issues for Fishing Vessels (all fishing vessels)	Within acceptable limits for infrastructure and array cables.	All infrastructures will be marked and lit. Application of 50m safety zones around infrastructure.	N/A

Description of Impact	Impact	Potential Mitigation Measures	Residual Impact
Increased Steaming Times for Fishing Vessels	Minor Adverse.	N/ A	Not significant.
Displacement of Fishing Vessels into other Areas	Minor Adverse.	N/ A	Not significant.
Interference to Fishing Activities (navigational conflict)	Minor Adverse.	N/ A	Not significant.

#### 4.7.3 Implications of Project Parameter Changes

The potential implications of the proposed changes in project design parameters on commercial fisheries are summarised in Table 4.12.

**Table 4.12 Implications of Proposed Parameter Change on Commercial Fishing**

Proposed Parameter Change	Implications on Effect Significance
WTGs increase in size and capacity	<p>The proposed changes to WTGs have no significant implications for commercial fishing (i.e. increase in minimum tip height, maximum capacity, hub height and blade chord width). The proposed changes will have no change on the impact of the consented Seagreen Project.</p> <p>The total number of WTG proposed across Project Alpha and Project Bravo combined (150) and the minimum spacing between WTGs (1 km) would remain as previously consented.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>Increased weight of the submerged steel as part of the OSP will have no change on the impact of the consented Seagreen Project.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.7.4 Screening Outcome

As discussed in Section 4.7.3 the proposed changes in the Variation’s design parameters have no significant implications over commercial fishing and therefore have no potential to materially change the conclusions of the previous assessments. The effects remain as previously assessed in the 2012 ES. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Commercial Fishing.

## 4.8 Archaeology and Cultural Heritage

### 4.8.1 Summary

The 2012 ES<sup>25</sup> concluded no significant impacts were anticipated as a result of the Seagreen project on archaeology and cultural heritage. Implications of design changes outlined in column two of Table 4.13, suggest there will be no material change in these previously assessed impacts. The sections below outline potential impacts of the Variation and present a breakdown of the assessment conducted in relation to the physical environment in the 2012 ES compared to the Variation.

### 4.8.2 Predicted Effects and Mitigation

The impact of the Seagreen Project on archaeology and cultural heritage was assessed in the 2012 ES, the results from this assessment, both pre and post-mitigation is presented in the table below. The effects were assessed to be negligible to archaeology and cultural heritage, as a result of the Seagreen Project committing to a strategy of avoidance for any potential anomalies or known wrecks, to be detailed in a project Written Scheme of Investigation (WSI)/ Protocol for Archaeological Discoveries (PAD), any update to a WSI/PAD will be discussed with MS-LOT.

**Table 4.13 Archaeology and Cultural Heritage Summary Table from 2012 ES**

Description of Effect	Impact	Potential Mitigation Measures	Residual Impact
<b>Construction phase</b>			
Direct impact on archaeology and cultural heritage due to installation of infrastructure	Moderate to major adverse.	All sites of cultural heritage interest included in this assessment will be avoided where possible. WSI and PAD will be prepared for the approval of Historic Scotland and Aberdeenshire Council Heritage Advisor to mitigate construction effects in the event of any unexpected archaeological discoveries during installation. Infrastructure will be micro-sited and temporary exclusion zones will be implemented to prevent invasive activities. These measures will form part of the CEMP.	Negligible (Not Significant).

<sup>25</sup> [2012 ES Chapter 17 Archaeology and Cultural Heritage](#) Section 17.140

Description of Effect	Impact	Potential Mitigation Measures	Residual Impact
Indirect impact on archaeology and cultural heritage due to physical processes	Minor adverse.	WSI and PAD will be prepared for the approval of Historic Scotland and Aberdeenshire Council Heritage Advisor to mitigate construction effects by outlining archaeological exclusion zones around known features, and in the event of any unexpected archaeological discoveries during installation.	Negligible (Not Significant).
<b>Operational Phase</b>			
Indirect impact on archaeology and cultural heritage	Negligible.	Same as Construction.	Negligible (Not Significant).
<b>Decommissioning</b>			
Impacts on archaeology and cultural heritage	Moderate to major adverse.	Same as Construction.	Negligible (Not Significant).
<b>Construction phase</b>			
Direct impact on archaeology and cultural heritage due to installation of infrastructure	Moderate to major adverse.	All sites of cultural heritage interest included in this assessment will be avoided where possible. WSI and PAD will be prepared for the approval of Historic Scotland and Aberdeenshire Council Heritage Advisor to mitigate construction effects in the event of any unexpected archaeological discoveries during installation. Infrastructure will be micro-sited and temporary exclusion zones will be implemented to prevent invasive activities. These measures will form part of the CEMP.	Negligible (Not Significant).
Indirect impact on archaeology and cultural heritage due to physical processes	Minor adverse.	WSI and PAD will be prepared for the approval of Historic Scotland and Aberdeenshire Council Heritage Advisor to mitigate construction effects in the event of any unexpected archaeological discoveries during installation.	Negligible (Not Significant).
<b>Operational Phase</b>			
Indirect impact on archaeology and cultural heritage	Negligible.	Same as Construction.	Negligible (Not Significant).
<b>Decommissioning</b>			
Impacts on archaeology and cultural heritage	Moderate to major adverse.	Same as Construction.	Negligible (Not Significant).

#### 4.8.3 Implications of Project Parameter Changes

Following review of the marine archaeological and cultural heritage baseline, as of September 2021, the established baseline developed for the project as presented in the 2012 ES<sup>26</sup> remains valid. There is anticipated to be no changes to the assessment of effects of the Variation on archaeology and cultural heritage from proposed parameter changes.

**Table 4.14 Implications of Proposed Parameter Change on Archaeology and Cultural Heritage**

Proposed Parameter Change	Implications on Effect Significance
Increased size and capacity of WTGs	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact to archaeology and cultural features throughout construction, operation or decommissioning as a result of the Variation above and beyond the consented Seagreen Project.</p> <p>No material change, no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSP	<p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to archaeology and cultural heritage features throughout either construction, operation or decommissioning.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.8.4 Screening Outcome

Following a review of the impact summary table (Table 4.13) that was presented in the 2012 ES and the potential project implications, as set out in Table 4.14, have no significant impacts on archaeology and cultural heritage above and beyond those assessed in the 2012 ES. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Archaeology and Cultural Heritage.

<sup>26</sup> [2012 ES Chapter 17 Archaeology and Cultural Heritage](#) Section 17.23

An appropriate WSI & PAD<sup>27</sup> has been prepared and approved for the Seagreen project to mitigate construction effects by outlining archaeological exclusion zones around known features, and in the event of any unexpected archaeological discoveries during installation. No changes are required to the WSI & PAD as a result of the Variation.

#### 4.9 Socioeconomic, Tourism and Recreation

##### 4.9.1 Summary

Socioeconomics, tourism and recreation were assessed in 2012 to have beneficial effects. Given the implications of the Variation is anticipated to have no material change on the 2012 assessment Socioeconomics, tourism and recreation will be screened out of further assessment. The sections below outline potential impacts of the project parameter changes and present a breakdown of the assessment conducted in relation to the physical environment in the 2012 ES compared to the Variation.

##### 4.9.2 Predicted Effects and Mitigation

There is anticipated to be beneficial impacts on the local economy due to job creation especially during construction, and to a lesser extent during subsequent operation of the Seagreen Project. These benefits are likely to arise from local employment directly for the Seagreen Project as well as manufacturing chains and pre-assembly facilities and transport of goods to and from construction facilities.

There are also expected to be some impact on tourism and recreation. Tourism and recreation include such things as coastal golf, beach goers, sightseers, beach users, inshore water users and small watercraft users and more. Visibility of the OWF is anticipated to be the biggest impact on tourism and recreation. Table 4.15 presents the 2012 ES<sup>28</sup> effects summary table.

**Table 4.15 Socioeconomic, Tourism and Recreation Impact Summary Table from 2012 ES**

Effect	Nature of Effect	Significance*	Significant in terms of EIA Regulations*	Mitigation	Residual Effect
Capital Expenses (CAPEX): Construction Phase Effects in Scotland	Beneficial, short term, direct.	Low – Minor High – Moderate	Low – No High – Yes	None proposed.	Low – Minor High – Moderate (Significant beneficial)

<sup>27</sup> [2019 Seagreen Written Scheme of Investigation & Protocol for Archaeological](#)

<sup>28</sup> [2012 ES Chapter 19 Socioeconomics, Tourism and Recreation](#) Table 19.21



Effect	Nature of Effect	Significance*	Significant in terms of EIA Regulations*	Mitigation	Residual Effect
CAPEX: Construction Phase Effects in Rest of Great Britain	Beneficial, short term, direct.	Low – No Change High – Minor	Low – No High – No	None proposed.	Low – No Change High – Minor
Operating Expenses (OPEX): Operational Phase Effects in Scotland	Beneficial, long term, direct.	Low – Moderate High – Moderate	Low – Yes High – Yes	None proposed.	Low – Moderate High – Moderate (Significant beneficial)
OPEX: Operational Phase Effects in Rest of Great Britain	Beneficial, long term, direct.	Low – No change High – Negligible	Low – No High – No	None proposed.	Low – No change High – Negligible
Employment: Construction Effects in Scotland	Beneficial, short term, direct.	Low – Moderate/ Major High – Major	Low – Yes High – Yes	None proposed.	Low – Moderate/ Major High – Major (Significant beneficial)
Employment: Construction Effects in Rest of Great Britain	Beneficial, short term, direct.	Low – No change High - Minor	Low – No High – No	None proposed.	Low – No change High – Minor
Employment: Direct Operational	Beneficial, long term, direct.	Moderate	Yes	None proposed.	Moderate (Significant beneficial).
Tourism and Recreation: Direct Effects	Adverse, short term, direct, temporary.	Negligible	No	None proposed.	Negligible.
Tourism and Recreation: Indirect Effects	Adverse, long term, indirect, permanent.	Negligible to Minor	No	None proposed.	Negligible to Minor.

\*High – Expenditure relating to Scotland only, Low – Expenditure relating to Great Britain.

#### 4.9.3 Implications of Project Parameter Changes

There is anticipated to be no significant changes in the significance of assessment due to project parameter changes, these are presented in Table 4.16.

**Table 4.16 Implications of Proposed Parameter Change on Socioeconomic, Tourism and Recreation**

Proposed Parameter Change	Implications on Effect Significance
Increased size and capacity of WTGs	<p>Increase WTG parameters come with potential increased spending and so there is will likely be a positive impact on socioeconomics compared with the consented Seagreen Project, for both construction and operation.</p> <p>As the project area is not changing and given the distance from shore, the increase to WTG dimensions will not be likely to change the impacts on tourism or recreation.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation to Recreation and Tourism.</p>
Increased weight of OSPs	<p>Increased weight of steel deposits for the OSPs as part of the Variation will have no material change to impacts to socioeconomics, tourism and recreation.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.9.4 Screening Outcome

Having reviewed the impact summary table above, (Table 4.15) originally presented in the 2012 ES<sup>29</sup> and the potential project implications, potential effects will remain as previously assessed when considering the Variation, or in the case of Socioeconomics, there is the potential for an increased positive impact due to increased spending. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Socioeconomic, Tourism and Recreation.

#### 4.10 Other Marine Users

##### 4.10.1 Summary

Based on the 2012 assessment<sup>30</sup> that no significant impacts would result from the Seagreen Project on other marine users. It is expected that there will be no material change as a result of the Variation, and so it is proposed that Other Marine Users be screened out of the further assessment. The sections below outline potential impacts of the project parameter changes, present a breakdown of the assessment conducted in relation to other marine users in the 2012 ES and screening approach.

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<sup>30</sup> [2012 ES Chapter 19 Socioeconomics, Tourism and Recreation](#) Table 19.21

#### 4.10.2 Predicted Effects and Mitigation

Table 4.17 presents the effects from the 2012 ES<sup>31</sup> on Other Marine Users and Activities, it is expected that the effects will remain as previously assessed.

**Table 4.17 Effects on Other Marine Users and Activities Summary Table**

Description of Impact	Impact	Potential Mitigation Measures	Residual Impact
<b>Construction Phase</b>			
Impacts on other OWF projects	Negligible to minor adverse.	Consultation	Not significant.
Impacts on Military Practice and Exercise Areas (PEXAs)	Alpha – No impact Bravo – Minor adverse.	Consultation	Not significant.
Impacts on marine disposal sites	No impact.	N/A	Not significant.
Impact on other non-wind farm marine activities	No impact.	N/A	Not significant.
<b>Operational Phase</b>			
Impacts on other OWF projects	Negligible.	Consultation	Not significant.
Impacts on PEXAs	Alpha – No impact Bravo – Minor adverse	Consultation	Not significant.
Impacts on marine disposal sites	No impact.	Consultation	Not significant.
Impact on other non-wind farm marine activities	No impact.	N/A	Not significant.
<b>Decommissioning Phase</b>			
As per construction	Minor Adverse (dependent on activity levels at the time of decommissioning).	Consultation	Not significant.

#### 4.10.3 Implications of Project Parameter Changes

Table 4.18 notes potential implications of proposed parameter changes associated with the Variation on Other Marine Users. The Variation is considered to have no material change and no likely significant effect on other marine users compared to the assessment made in the 2012 ES.

<sup>31</sup> [2012 ES Chapter 20 Other Marine Users](#) Section 20.81

**Table 4.18 Implications of Design Envelope Change on Other Marine Users**

Design Envelope Change	Implications on Effect Significance
Increased size and capacity of WTGs	<p>Increased WTG parameters such as height, blade length and width as part of the Variation will have no additional impact to other marine users throughout construction, operation or decommission above the consented Seagreen Project.</p> <p>No material change, no likely significant effect.</p>
Increased weight of OSPs	<p>Increased weight of steel deposits as part of the Variation to OSP consent parameters will have no additional impact on Other Marine Users.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.10.4 Screening Outcome

Potential effects to Other Marine Users will remain as previously assessed in the 2012 ES when considering the proposed project parameter changes for the present Variation, with no likely significant effects expected above and beyond those previous assessed. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Other Marine Users.

### 4.11 Ornithology

#### 4.11.1 Summary

The Variation will have no material increase, and in most cases significantly lower impacts, on seabirds when compared to the consented Seagreen Project as it is being constructed. Collision Risk Modelling (CRM) was undertaken to compare the 150 WTGs as consented to the 114 WTGs being constructed plus the 36 proposed WTGs. Two CRM methods were used, the first replicated the original CRM undertaken to support the 2014 consents and the second used the most up to date stochastic CRM (sCRM) as per the latest Marine Scotland guidance<sup>32</sup>. As both CRMs show the predicted collisions for key seabird species to be have no material increase, and in most cases, significantly lower for the Variation combined with the 114 WTGs being constructed when compared to the project as currently consented, no further ornithological assessment is considered necessary as the Variation is unlikely to cause significant effects on ornithological receptors.

<sup>32</sup> [Stochastic collision risk model for seabirds in flight - gov.scot \(www.gov.scot\)](http://www.gov.scot)

#### 4.11.2 Introduction

The 2012 ES<sup>33</sup> assessed the following impacts as part of the ornithology assessment:

- collision risk during operation;
- direct habitat loss during construction;
- disturbance from construction activities such as the movement of construction/ decommissioning vessels and piling;
- displacement during the operational phase, resulting in loss of foraging / roosting area; and
- impacts on bird flight lines (i.e. barrier effect) and associated increased energy use by birds for commuting flights between roosting and foraging areas.

Disturbance during construction and operation, as well as displacement and barrier effects, are not considered to be impacted by the proposed changes as the seabed deposits will not cause a material increase in construction activity or vessel movements, that would result in an increased impact to bird disturbance or displacement, given construction will require the same number of vessels and over the same construction time period. Similarly, the impact from barrier effects and barrier displacements will not exceed those previously assessed in 2012.

Installation of 36 larger WTG combined with the 114 WTGs under construction will increase the total combined rotor swept area<sup>34</sup> of the Seagreen Project, as well as increase the maximum tip height for 36 WTGs, compared to the consented Seagreen Project. The 114 WTGs being installed have a larger air gap than the WTGs previously assessed in the consented Seagreen Project, and the proposed parameter changes for the 36 proposed WTGs will have a larger air gap<sup>35</sup> compared to the WTGs assessed in the consented Seagreen Project (as per Table 3.2 above).

#### 4.11.3 Implications of Project Parameter Changes

Changes in potential impacts from project parameter changes are presented in Table 4.19.

**Table 4.19 Implications of Proposed Parameter Change on Ornithology**

Proposed Parameter Change	Implications on Effect Significance
Increased size of 36 WTGs	Compared to the consented Seagreen Project, 36 WTGs combined with the 114 WTGs under construction would have a higher tip height, larger swept area and larger air gap. This would decrease the potential collision risk of the Seagreen Project.

<sup>33</sup> [2012 ES Chapter 10: Ornithology](#) Section 10.518

<sup>34</sup> Rotor Swept Area is defined as the area of the circle delineated by the tips of the blades of the wind turbine for a horizontal axis wind turbine.

<sup>35</sup> The air gap is defined as the gap between the surface of the water and the lowest point of the turbine blades through a rotation.

	No material change, and no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.
Increased weight of OSPs	No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.

#### 4.11.4 Updated Collision Risk Modelling

New CRM was undertaken in order to determine if the Variation (taking into account the 114 WTGs in construction) will have likely significant effects or significant adverse effects over the originally consented project. Two CRMs were run in order to fully consider the impacts of the Variation. The first used the 2012 Band Model, which was used in support of the 2014 Consents to allow a direct comparison with the original CRM modelling used to inform the 2012 ES assessment. The second uses the most up to date stochastic CRM as per Marine Scotland’s latest guidance<sup>36</sup> in order to determine if the latest modelling techniques produce the same outcomes as the original modelling.

##### **Receptor Scope**

During the EIA consultation for the ODA, Marine Scotland and SNH (now NatureScot) recommended that any updates to the Seagreen CRM should focus on the three main receptor species which have the largest potential impacts from Seagreen. These species are:

- northern gannet;
- black-legged kittiwake; and
- herring gull.

Given this previous advice from Marine Scotland and SNH (now called NatureScot) the CRM undertaken for this report followed the same approach and assessed the species above.

##### 4.11.4.2 2012 Band Model

Chapter 10 of the 2012 ES<sup>37</sup> presented the results of CRM which used a 2011 Band model and different WTG parameters to those consented by Scottish Ministers in 2014 (namely a smaller minimum air gap of 26.1m). An update to this CRM was produced in 2013 and submitted to Marine Scotland as an update to the ornithology Habitat Regulation Appraisal (HRA)<sup>38</sup> which used the 2012 Band model with the same smaller minimum blade height. Finally, the modelling results used in the Marine Scotland

<sup>36</sup> [Stochastic collision risk model for seabirds in flight - gov.scot \(www.gov.scot\)](http://www.gov.scot/Resource/0045/0045_0001.pdf)

<sup>37</sup> [chapter\\_10\\_-\\_ornithology.pdf \(marine.gov.scot\)](http://www.marine.gov.scot/Document/0000/0000_0001.pdf)

<sup>38</sup> [Microsoft Word - 01-A4MR-SEAG-Z-DEV275-SRP-233\\_Seagreen\\_Phase\\_1\\_HRA\\_Introduction\\_vB3\\_FINAL.docx \(marine.gov.scot\)](http://www.marine.gov.scot/Document/01-A4MR-SEAG-Z-DEV275-SRP-233_Seagreen_Phase_1_HRA_Introduction_vB3_FINAL.docx)

2014 AA<sup>39</sup> were from Marine Scotland's own CRM results using the 2012 Band model and the revised 29.8 m minimum air gap.

The data from the 2014 Marine Scotland AA were never published, therefore, for this Screening Report the 2012 Band Model was replicated as closely as possible to the methodology used in the 2013 Seagreen ornithological update (the full 2012 CRM parameters used are set out in Annex 1).

The flight height categories recorded during the boat-based surveys which informed the 2012 ES and subsequent assessments were of insufficient detail to classify the proportion of birds at risk at the minimum WTG blade height above LAT (air gap). As a consequence, a generic modelling study by Cook *et al* (2011) was used to define the proportion of each species at risk height. Using the bird flight height densities from the literature rather than from site based surveys is known as 'Option 2' in the 2012 Band model and these results will be presented. Full CRM results are set out in Annex 1.

#### ***Stochastic CRM (sCRM)***

The latest version of the Band Model (as recommended by Marine Scotland) was also run to compare the Variation taking into account the 114 WTGs under construction with the consented Seagreen Project. This latest band model takes a stochastic rather than deterministic approach to modelling and is able to estimate collision mortalities with confidence intervals. The sCRM also uses the latest published studies to estimate bird flight heights.

#### ***Parameter Differences***

The proposed Variation taking into account the 114 WTGs under construction will result in a larger swept area (and higher minimum tip height (air gap) for 36 WTGs) than the currently consented Seagreen Project. However, the 114 WTGs being installed and the 36 WTGs being proposed in the Variation have a significantly higher minimum air gap compared to the consented project which decreases the risk of collision of seabirds and WTGs.

Table 4.20 presents a summary of the WTG parameters relevant to CRM that were assessed as part of the 2012 ES<sup>40</sup> and used in the updated CRM in this Screening Report. Where assessments are based on an identified WTG to be deployed, the dimensions used in the assessments have been rounded to one decimal place (noting this aligns with the level of accuracy for setting parameter dimensions as in the S36 consent).

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<sup>39</sup> [appropriate assessment redacted 0.pdf \(marine.gov.scot\)](#)

<sup>40</sup> [2012 ES Chapter 10: Ornithology](#) Section 10.163

**Table 4.20 WTG Number, Size, Swept Area and Air Gap of Seagreen Project Scenarios**

Seagreen Project Scenario	Number of WTGs	Blade Length	Swept Area Combined (Individual)	Air gap
2014 Consent	150 WTGs as consented	83.5 m	3,285,600 m <sup>2</sup> (150 x 21,904 m <sup>2</sup> )	29.8 m
Variation + Project under construction	114 WTGs under construction + 36 WTGs varied (150 WTGs total)	114 WTGs with 82 m blade length 36 WTGs with 118 m blade length	4,153,056 m <sup>2</sup> (114 x 21,124 m <sup>2</sup> and 36 x 44,000 m <sup>2</sup> )	114 WTGs x 37 m and 36 WTGs x 34 m

#### 4.11.5 CRM Results

The full CRM results and methodology including parameters and assumptions are set out in Annex 1. Table 4.21 presents a summary of the CRM results for both the 2012 Band model (replicating the original CRM undertaken for the 2012 ES) and the sCRM. The 2012 Band model results for both gannet and kittiwake show a significant reduction in predicted collision mortalities between the consented project and the project as being constructed plus the Variation with herring gull mortalities marginally increasing. The sCRM shows a significant reduction in predicted collision mortalities for gannet and kittiwake and a small reduction in mortalities for herring gull. Absolute herring gull collision mortalities predicted by the 2012 Band model between the two modelled scenarios should be treated with caution due to no flight height proportional data being available. The increased air gap of the 36 WTGs associated with the Variation is therefore unable to be taken account for within the 2012 Band model herring gull outputs. The sCRM model outputs are considered more representative of herring gull collision mortalities, which take account of the increased air gap associated with the Variation and show a decrease in mortality.



**Table 4.21 Predicted Annual Collision Mortality results Comparing 150 WTGs as Consented with 114 WTGs as Constructed + 36 WTGs as Proposed in the Variation using both the 2012 CRM (Band Model) and the sCRM**

Model	Species	Predicted Annual Collision Mortalities	
		150 WTGs as Consented <sup>1</sup>	114 WTGs as Constructed <sup>2</sup> + 36 WTGs as Proposed in the Variation <sup>3</sup>
2012 CRM	Gannet (98.9% avoidance)	431	166
	Kittiwake (98.9% avoidance)	424	222
	Herring Gull <sup>4</sup> (99% avoidance)	39	40
sCRM	Gannet (99.7% avoidance (±0.002))	173	101
	Kittiwake (99.2% avoidance (±0.007))	587	350
	Herring Gull (99.7% avoidance (±0.002))	26	19

**Notes:**

<sup>1</sup> 88% on-time, 14 rpm, 29.8 m air gap, 83.5 m rotor radius, 5.4 m blade width

<sup>2</sup> 90% on-time, 8.8 rpm, 37 m air gap, 82 m rotor radius, 5.4 m blade width

<sup>3</sup> 90% on-time, 14 rpm, 34 m air gap, 121 m rotor radius, 7.6 m blade width

<sup>4</sup> Flight height data was not available for herring gull and as such 28.4% proportion at collision risk height was used for all WTG options.

**4.11.5.1 Cumulative Baseline: Summary of Changes**

The CRM results using the 2012 Band model (in order to replicate the modelling undertaken in support of the 2014 consents decision), taking account of the lack of flight height proportional data for herring gull, show that the Seagreen Project as it is being constructed plus the Variation will have materially the same or significantly lower collision mortalities when compared to the consented worst-case parameters.

No update to the assessment of cumulative ornithology impacts is considered necessary due to the equal or significantly lower predicted collision mortalities. Any developments consented after the 2014 Consents were issued will have considered Seagreen in their cumulative impact assessments. As the Variation will cause no increase to ornithological impacts from Seagreen as consented, an update to the cumulative assessment is not necessary.

#### 4.11.6 Seagreen Ornithology Monitoring Commitments

The Ornithology Monitoring Strategy for the Seagreen Project reflects the Forth and Tay Regional Advisory Group Ornithology sub-group's determination of seabird monitoring priorities for the Forth and Tay OWFs and the conclusions of the Seagreen 2012 ES and 2013 Addendum. The monitoring strategy seeks to;

- Determine the extent of displacement or barrier effects around the WTGs for kittiwake, puffin and razorbill;
- Determine flight heights, avoidance behaviour and collision risk to gannet and kittiwake;
- Monitor seabird colonies (number of birds, and productivity), to assess if there are detectable changes in productivity or population that can be attributed to displacement, barrier effects or collisions from the Seagreen Project; and
- Compile an up-to-date pre-construction baseline against which post construction monitoring can be compared, to test the predictions within the ES, and to identify any detectable changes.

The agreed monitoring approach comprises a 5 year programme of studies overlapping the pre-construction, construction and operation phases for the Seagreen Project. A collaborative approach has been adopted with the neighbouring projects in the wider Forth and Tay area which has been very well received and is widely regarded as a model approach delivering common methodologies and consistent data across the region. The Seagreen ornithology monitoring commitments for the whole Seagreen Project (150 WTGs including the 36 WTGs as varied) are as follows;

1. Aerial surveys of the site plus 8 km buffer preconstruction (2 breeding seasons) and post construction (2 breeding seasons).
2. Tagging and colony monitoring (kittiwake, guillemot, razorbill, puffin) at the Isle of May, during breeding seasons from 2020 to 2024.
3. Tagging and colony monitoring (kittiwake) at Fowlsheugh and St. Abbs Head colonies, during breeding seasons 2021 – 2025.
4. Colour ringing and colony monitoring (gannet) at Bass Rock and Grassholm during breeding season 2021 – 2025.
5. Participation in the seabird interactions study at the Neart na Gaoithe OWF. The study will use bird tracking and recording systems to monitor flight activity and interaction of gannet and kittiwake in proximity to operational WTGs during 2023 - 2024.

The studies listed at 2, 3, 4 and 5 are a collaboration with Neart na Gaoithe and Berwick Bank projects. The aerial surveys listed at 1, while not collaborative, are delivered using a consistent methodology with surveys of the Neart na Gaoithe, Inch Cape Offshore Limited and Berwick Bank projects;

In addition to the above Seagreen has supported the comprehensive compilation of historical colony data from Fowlsheugh (RSPB) and St. Abb's (NTS) Reserves, improving the availability of long-term productivity and population data, to inform assessment of any construction and post construction effects and enabling detailed understanding of colony distribution changes over time.

This monitoring programme represents a significant financial commitment by SWEL, with the total committed cost of approximately £4million over the 5 year programme

#### 4.11.7 Conclusion

Taking account of model limitations associated with herring gull flight heights, updated CRM using both the 2012 Band model and the latest sCRM show that the project as it is being constructed combined with the Variation will have equal to or significantly lower collision risks than the project as currently consented. As the Variation will not materially increase predicted seabird collisions, an update to cumulative impacts will not be necessary as it will not change cumulative impact assessments undertaken by more recent developments.

In addition to collision impacts, the Variation combined with the project as being constructed will not change any of the other potential ornithological impacts identified in the 2012 ES (direct habitat loss, disturbance and displacement).

The Variation will not cause any material increase to impacts from the Seagreen Project as currently consented and being constructed. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Ornithology.

### 4.12 Shipping and Navigation

#### 4.12.1 Summary

The impact of the Seagreen Project on shipping and navigation was assessed in the 2012 ES, with all impacts assessed to be not significant once mitigation was applied. The proposed parameter changes are considered to have no material change and no likely significant effect on shipping and navigation compared to the 2012 ES assessment. Shipping and navigation are therefore proposed to be screened out of further assessment.

#### 4.12.2 Predicted Effects and Mitigation

The impact of the Seagreen Project on shipping and navigation was assessed in Chapter 15 of the 2012 ES<sup>41</sup>, which included an assessment of the following impacts:

- Route deviations and vessel displacement;
- Increased vessel to vessel encounters and collision risk;
- Vessel to structure collision risk;
- Interaction with subsea cables;

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<sup>41</sup> [2012 ES Chapter 15: Shipping and Navigation](#) Section 15.287

- Increased requirement for Search and Rescue (SAR) operations and restricted access to casualties; and
- Impacts to position fixing equipment (including Radar and electromagnetic interference).

All impacts were assessed to be not significant once mitigation was applied. These mitigations included:

- Promulgation of information;
- Use of guard vessels where appropriate;
- Application for safety zones, and appropriate means to monitor and police safety zones;
- Compliance with Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) (IMO, 1972) and broadcast via Automated Information System (AIS) by project vessels;
- Lighting and marking in line with relevant guidance and Maritime Coastguard Agency (MCA) and Northern Lighthouse Board (NLB) requirements;
- Creation of Emergency Response Cooperation Plan in line with MCA requirements;
- Site monitoring via agreed means with MCA;
- Appropriate cable protection via burial and external protection means; and
- Display of infrastructure in nautical charts.

#### 4.12.3 Implications of Project Parameter Changes

Table 4.22 notes potential implications of proposed parameter changes associated with the Variation on shipping and navigation. The Variation is considered to have no material change and no likely significant effect on shipping and navigation compared to the assessment made in the 2012 ES on the basis that:

- The maximum number of structures that could be built is not exceeding what was assessed within the original Navigational Risk Assessment<sup>42</sup>; and
- The dimensions at sea level of the structures are not increasing over those that were originally assessed.

**Table 4.22 Implications of Proposed Parameter Change on Shipping and Navigation**

Proposed Parameter Change	Implications on Effect Significance
Increased size and capacity of WTGs	Increased WTG parameters, including WTG height, blade length and width will have no material change to the previous assessment for impacts to shipping and navigation throughout either construction, operation or decommissioning.

<sup>42</sup> [2012 Navigational Risk Assessment \(NRA\)](#) Section 3

Proposed Parameter Change	Implications on Effect Significance
	No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.
Increased weight of OSP	<p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to shipping and navigation throughout either construction, operation or decommissioning.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.12.4 Screening Outcome

The proposed parameter changes are considered to have no material change on shipping and navigation and therefore have no potential to affect the outcomes of the previous assessments and effects will remain as previously assessed in the 2012 ES. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Shipping and Navigation.

It is noted that the relevant MCA guidance (MCA, 2021) has evolved since the time of the original NRA, most notably in relation to SAR. Based on the Variation not giving rise to shipping and navigation effects compared to the consented Seagreen Project, consideration of Marine Guidance Note (MGN) 654<sup>43</sup> requirements is deemed not necessary for the S36C variation application.

If required, future amendments to the layout of WTGs will follow a process which will be described within the Design Specification and Layout Plan and agreed with the MCA and NLB. Implications of any requirements to macro-site WTGs (i.e. deviating from proposed locations by up to 299 m), including consideration of MGN 654 requirements will be discussed and agreed with MCA and NLB as the relevant and key statutory bodies in relation to the layout design process. Agreement of MCA and NLB will be confirmed to MS-LOT prior to installation at the macro-sited location. No such macro-siting is necessitated as a result of the Variation.

### 4.13 Seascape, Landscape and Visual

#### 4.13.1 Summary

The Variation will cause no further significant seascape, landscape and visual impacts compared to the as consented Seagreen Project. Using the same methods as presented in the 2012 ES, wireline

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<sup>43</sup> [Marine Guidance Note 654](#)

visualisations were completed to compare the 150 WTGs as consented to the 114 WTGs being constructed plus the 36 proposed larger WTGs. The wireline visualisations also took account of other projects that had the potential to cause cumulative impacts. Wireline visualisations were completed from the same eight viewpoints as presented in the 2012 ES and reconsidered within both the ODA and 2021 Design Statement submitted to Marine Scotland in response to the S36 Consent Condition 13 and Marine Licence Condition 3.2.2.7. As the wireline visualisations show no further significant seascape, landscape and visual impacts compared to the as consented project, no further assessment is considered necessary, as the Variation is unlikely to cause significant effects on seascape, landscape and visual receptors.

#### 4.13.2 Predicted Effects and Mitigation

The 2012 ES assessed the following impacts during construction, operation and decommissioning of the Seagreen Project as part of the seascape, landscape and visual amenity assessment:

- Impacts on landscape elements;
- Impacts on seascape character;
- Impacts on landscape character;
- Impacts on landscape designations; and
- Impacts on visual amenity.

No significant impacts were identified during the construction and decommissioning phases of either Seagreen Alpha or Seagreen Bravo. During operation, two significant impacts on seascape character and two significant impacts on visual amenity were assessed for Seagreen Alpha. No significant impacts were assessed for Seagreen Bravo. Cumulative significant offshore impacts on four seascape character units and two viewpoints were assessed with neighbouring OWF sites.

#### 4.13.3 Implications of Project Parameter Changes

Table 4.23 notes potential implications of proposed parameter changes associated with the Variation on seascape, landscape and visual amenity.

**Table 4.23 Implications of Proposed Parameter Change on Landscape, Seascape and Visual**

Proposed Parameter Change	Implications on Effect Significance
Increased size of WTGs	<p>Potential temporary or long term indirect effects on seascape character and views from sensitive receptors, such as residential properties, recreational receptors on core paths or at promoted hilltop locations. Updated wireline visualisations show that the Seagreen Project as it is being constructed combined with the Variation will cause no further significant effects compared to the as consented project.</p> <p>No material change, and no likely significant effect and no significant adverse effects on the environment as a result of</p>

Proposed Parameter Change	Implications on Effect Significance
	the change proposed by the Variation taking into account the 114 WTGs in construction.
Increased weight of OSPs	<p>Increased weight of the steel deposits on the seabed will have no additional impacts compared with what was assessed in the 2012 ES.</p> <p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation taking into account the 114 WTGs in construction.</p>

#### 4.13.4 Updated Wireline Visualisations

New wireline visualisations were modelled using the same methodology as presented in the 2012 ES in order to determine if the Variation taking into account the 114 WTGs in construction is likely to have significant effects over the originally consented project (see Annex 2). Wireline visualisations were completed from the same eight viewpoints as presented in the 2012 ES<sup>44</sup> and reconsidered within both the ODA<sup>45</sup> and 2021 Design Statement<sup>46</sup> submitted to Marine Scotland in response to the S36 Consent Condition 13 and Marine Licence Condition 3.2.2.7. The offshore components of the Seagreen Project will have no direct impact on any landscape features and therefore these were not included in the assessment. The visualisations take account of the proposed parameter changes in combination with the worst case scenarios from other projects which have reached a level of detail to allow accurate model representation. These include Inch Cape OWF, Neart na Gaoithe OWF and Kincardine OWF. At the time of writing, Forthwind OWF and Berwick Bank OWF are both at the scoping stage and have been assessed qualitatively in Annex 2. Details of the viewpoints visualised are given in Table 4.24 below.

**Table 4.24 Seascape, Landscape and Visual Features Identified**

VP No.	Viewpoint	Primary Visual Receptors	Other Visual Receptors within the vicinity	Distance (approx.)
VP1	Garron Point	Golfers	Walkers, railway travellers, motorists	38 km
VP2	Beach Road Kirkton St. Cyrus	Residents, Walkers	motorists	31 km

<sup>44</sup> [2012 ES Chapter 16: Seascape, Landscape and Visual Amenity](#) Section 16.137

<sup>45</sup> [Optimised Design Application Chapter 13: Seascape, Landscape and Visual Amenity](#) Section 13.194

<sup>46</sup> [2021 Design Statement](#) Section 5.4

VP No.	Viewpoint	Primary Visual Receptors	Other Visual Receptors within the vicinity	Distance (approx.)
VP3	White Caterhun Hill Fort	Residents, Visitors	Local road users	51 km
VP4	Montrose	Residents, Visitors	Motorists, cyclists	32 km
VP5	Braehead of Lunan	Cyclists, residents, road Users	visitors	35 km
VP6	Arbroath Signal Tower	Visitors, Walkers	Residents	40 km
VP7	Carnoustie	Residents, visitors, including to the beach	Motorists, cyclists	48 km
VP8	Fife Ness	Walkers, visitors	Residents, motorists	49 km

#### 4.13.5 Wireline Visualisation Results

Annex 2 presents wireline visualisations for the consented and proposed schemes side by side, both on their own and with other offshore wind farms shown. The difference in turbine height within the proposed variation scheme are often barely discernible, and are unlikely to be clearly noticeable in any view. Based on professional judgement, the changes to the appearance of the Seagreen OWF arising from the Variation would not be sufficient to increase the level of effect experienced by any seascape, landscape or visual receptor. The distribution of significant effects would be the same for the Variation as was set out in the 2012 ES.

#### 4.13.6 Cumulative Baseline: Summary of Changes

The wireline visualisations show that the Seagreen Project as it is being constructed with the Variation will cause no likely significant effect compared to the assessment completed as part of the 2014 Consents. Any developments consented after the 2014 Consents were issued will have considered Seagreen in their cumulative impact assessments. As the Variation will cause no increase to seascape, landscape and visual impacts from Seagreen, an update to the cumulative assessment is not necessary.

#### 4.13.7 Screening Outcome

Updated wireline visualisations from the same eight viewpoints as presented in the 2012 ES and reconsidered within both the ODA and 2021 Design Statement show that the Seagreen Project as it is being constructed combined with the Variation will cause no further significant effects compared to the as consented project. As the Variation will not cause any further significant effects, an update to cumulative impacts will not be necessary as it will not change cumulative impact assessments undertaken by more recent developments.



The Variation will not cause any material increase to impacts from the Seagreen Project as currently consented and being constructed in respect of seascape, landscape and visual impacts. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Landscape, Seascape and Visual.

## 4.14 Military and Civil Aviation Activities

### 4.14.1 Summary

The 2012 ES assessment for the Seagreen Project identified the MOD's Air Defence Remote Radar Heads (AD RRHs) at Buchan and Brizlee Wood, the NATS Primary Surveillance Radars at Perwinnes and Allanshill and the MOD's Primary Surveillance Radar at Leuchars Station as potential constraints that would require mitigation. Mitigation Agreements are currently in place between SWEL and the aforementioned Aviation Stakeholders. These are summarised in the respective MOD and NATS Primary Radar Mitigation Schemes, which were approved by Scottish Ministers in June 2021. Similar to the outcome of the Military and Civil Aviation Assessment in the 2012 ES, the proposed parameter changes would cause effects on military and civil aviation activities prior to mitigation measures being applied. SWEL has undertaken engagement with NATS and the CAA and reached agreement in principle that existing mitigation measures are acceptable to mitigate impacts from the Variation on relevant aviation activities. SWEL are continuing to engage with MOD, and anticipate to have confirmation that mitigation for the Variation does not need to be agreed through the EIA process. SWEL expects to submit evidence of MOD's confirmation with the S36C variation application. Residual impacts of the Variation are therefore considered not significant. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Military and Civil Aviation Receptors.

### 4.14.2 Predicted Effects and Mitigation

The 2012 ES assessed the following impacts during operation of the Seagreen Project as part of the Military and Civil Aviation Assessment:

- Civil radar;
- Military radar;
- En-route radar;
- MOD Air Defence (AD) radar;
- MOD low-flying System and Danger Area operations;
- Helicopter Main Routes; and
- CAA regulatory requirements.

The Assessment identified the AD RRHs at Buchan and Brizlee Wood, the NATS Primary Surveillance Radars at Perwinnes and Allanshill and the MOD's Primary Surveillance Radar at Leuchars Station as potential constraints that would require mitigation (as secured by Condition 20 – 22 of the 2014 Consents). Condition 23 of the 2014 Consents required SWEL to submit a Primary Radar Mitigation Scheme ("PRMS") for approval by the Scottish Ministers prior to the erection of any WTGs in respect of the Seagreen Project. SWEL submitted a PRMS in April 2021, which was accepted by Scottish Ministers in June 2021.

#### 4.14.3 Implications of Project Parameter Changes

Table 4.25 notes potential implications of proposed parameter changes associated with the Variation on military and civil aviation. The technical considerations are very similar for the larger WTGs than for the smaller ones, the level of impact is potentially slightly higher with increased size.

**Table 4.25 Implications of Proposed Parameter Change on Military and Civil Aviation**

Proposed Parameter Change	Implications on Effect Significance
Increased size of WTGs	<p>Current mitigation measures are sufficient to effectively mitigate impacts on military and civil aviation activities.</p> <p>No material change, and no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>
Increased weight of OSPs	<p>No material change, no likely significant effect and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>

#### 4.14.4 Screening Outcome

Radar Line-of-Sight Assessments have been undertaken by both primary aviation stakeholders and 3<sup>rd</sup>-Party Technical Specialists for sample WTG locations within the Red Line Boundary of the Variation. The results of this exercise demonstrated potential visibility for at least some of the WTG positions to all of the radar listed below with the exception of NATS Allanshill Radar, which is not predicted to detect any WTGs under the assessed configuration:

- MOD AD RRH Buchan;
- MOD AD RRH Brizlee Wood;
- NATS Perwinnes Primary Surveillance Radar; and
- MOD Primary Surveillance Radar Leuchars Station.

The proposed parameter changes would cause effects on military and civil aviation activities prior to mitigation measures being applied. SWEL has undertaken engagement with NATS and CAA and reached agreement in principle that existing mitigation measures are acceptable to mitigate impacts from the Variation on relevant aviation activities.

SWEL are continuing to engage with MOD, and anticipate to have confirmation that mitigation for the Variation does not need to be agreed through the EIA process. SWEL initially undertook a technical assessment to support the interim AD mitigation proposal in December 2019. As a result of this Variation, SWEL tasked Serco to update this model with the revised parameters in order to assure all stakeholders that there would be no additional impact caused to either RRH Buchan or RRH Brizlee Wood. This report was delivered to both SWEL and the MOD in January 2022 stating no additional impact is caused and that no additional mitigation is required to that already agreed in the existing AD Radar Mitigation Scheme. SWEL expects to submit evidence of MOD’s confirmation that existing mitigation is acceptable with the S36C variation application.

Residual impacts of the Variation are therefore considered not significant. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Military and Civil Aviation.

#### **4.15 HRA Methodology**

##### **4.15.1 Summary**

There have been two previous AAs undertaken by MS-LOT for the Seagreen Project. The first was undertaken in 2014 in support of the consent decision, the second was as part of the 2018 ODA (the AA was published but the application has not been determined).

The Variation will not cause any significant impacts as the proposed parameter changes only have the potential to change impacts on ornithological receptors and the updated ornithological assessment (above) has shown that the Variation will not result in significant impacts compared to the consented Seagreen project as it is being constructed.

##### **4.15.2 Legislative Context**

The Council Directive 92/43/EEC (the Habitats Directive) was adopted in 1992, providing a means for the European Union to meet its obligations under the Bern Convention. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status. This protection is granted through the designation of European Sites and European Protected Species (EPS). The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) provides a framework for the conservation and management of wild birds within Europe. The Directive affords rare and vulnerable species listed under Annex I of the Directive, and regularly occurring migratory species, protection through the identification and designation of Special Protection Areas (SPAs).

The Directives have been transposed into Scottish Law by various regulations, those of relevance to the Variation include:

- The Conservation (Natural Habitats &) Regulations 1994 (as amended);
- The Conservation of Habitats and Species Regulations 2017; and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to marine licences and Section 36 applications within the Scottish Offshore region).

In accordance with these Regulations, and as part of the HRA process, where it is identified that there is potential for the change to have a likely significant effect on a designated site, the applicant is required to provide information on the effects of the change to the Seagreen project on the integrity of a European site to the competent authority, to enable them to undertake an AA of the project. Despite the recent changes to the Habitats Regulations, following the UK's exit from the European Union, the HRA process remains unchanged (Scottish Government, 2020).

#### 4.15.3 Project background

An AA was published by Marine Scotland in support of the 2014 decision to award consent to the Seagreen Alpha, Seagreen Bravo, Inch Cape and Neart na Gaoithe OWFs. The 2014 Marine Scotland AA concluded no adverse effects on the integrity of the protected sites given in Table 4.25 below. The conclusions of the Marine Scotland AA in respect of the Fowlsheugh SPA and the Forth Islands SPA, and the methods used to determine them were the subject of a Judicial Review challenge by RSPB against the OWF consents issued by the Scottish Government. The legality of the decision to award consents for Seagreen Alpha OWF and Seagreen Bravo OWF was confirmed by the UK Supreme Court in November 2017, following legal challenge by the RSPB.

The HRA assessment for the ODA<sup>47</sup> was based on the same development boundary as the originally consented projects but with fewer (maximum 120 WTGs across both sites), larger, higher capacity WTGs resulting in slower rotation speeds and a higher minimum blade tip clearance of 32.5 m (consent boundary presented in Figure 1.1 and project parameters presented in Table 3.2). The methodologies applied were agreed with Marine Scotland and reflected developments in assessment methods since the original consents application in 2012. The assessment incorporated updated baseline information as appropriate. The subsequent AA published by Marine Scotland in 2019 concluded there would be no adverse effects on the site integrity of the assessed protected sites either in isolation or in combination with other plans and projects.

In 2014 MS-LOT undertook an MPA assessment (Marine Scotland, 2014) of the potential impacts of the Seagreen Project on the Firth of Forth Banks Complex MPA and concluded there would be no significant risk of the MPAs conservation objects being hindered.

**Table 4.25 Protected sites assessed in the original 2014 AA<sup>48</sup> and the 2019 AA<sup>49</sup> undertaken for the Optimised Seagreen Application by Marine Scotland. Marine Scotland concluded no adverse effect on the integrity of all protected sites assessed (sites assessed are highlighted green).**

Designated Site	2014 AA of the Seagreen Alpha, Seagreen Bravo, Inch Cape and Neart na Gaoithe OWFs	2019 AA for Optimised Seagreen Application
Buchan Ness to Collieston Coast SPA		

<sup>47</sup> [Optimised Design Application Chapter 16: Habitats Regulations Appraisal](#) Section 16.137

<sup>48</sup> [2014 Appropriate Assessment](#) Page 4

<sup>49</sup> [2019 Appropriate Assessment](#) Page 21

Designated Site	2014 AA of the Seagreen Alpha, Seagreen Bravo, Inch Cape and Neart na Gaoithe OWFs	2019 AA for Optimised Seagreen Application
Fowlsheugh SPA		
Forth Islands SPA		
St Abb's Head to Fast Castle SPA		
Moray Firth SAC		
Firth of Tay and Eden Estuary SAC		
Isle of May SAC		
Berwickshire & Northumberland Coast SAC		
River South Esk SAC		
River Tay SAC		
River Dee SAC		
River Teith SAC		
River Tweed SAC		
Outer Firth of Forth and St Andrews Bay Complex (p)SPA		

#### 4.15.1 Requirement to Undertake HRA

No elements of the design envelope for the Variation have the potential for likely significant effects when compared to the consented Seagreen Project as it is being constructed.

Impacts to seabirds are shown in the updated collision risk modelling (Table 4.21) in the ornithology section above, as having the equal or significantly lower impacts than those previously assessed in the 2014 AA.

As there is no potential for increased impacts from the Variation when compared to the previous AA (or the ODA AA), an update to the HRA is not required as the Variation does not have likely significant effects.

#### 4.15.2 Updated Conservation Objectives

At the meeting between MS-LOT and SSE on 16 December 2021, MS-LOT advised that NatureScot had recently published draft conservation objectives for the Outer Firth of Forth and St Andrews Bay Complex SPA<sup>50</sup>. The draft conservation objectives state that:

*‘European shag, black-legged kittiwake, common tern and herring gull are considered to be in an unfavourable condition at the Outer Firth of Forth and St Andrews Bay Complex SPA and therefore an overarching ‘restore’ objective is set for the site.’*

This ‘restore’ objective is a change to the current objective which is ‘maintain’. However, as stated above, the Variation does not have any likely significant effects on seabird receptors compared to the Seagreen Project as it is being constructed.

#### 4.15.3 Screening Outcome

The Variation will not cause any likely significant effects, and the updated ornithological assessment (above) has shown that the Variation will not result in likely significant effects on ornithological receptors. Therefore, there is no requirement for a further AA.

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<sup>50</sup> <https://apps.snh.gov.uk/sitelink-api/v1/sites/10478/documents/67>

## 5. Screening Summary Table

Table 5.1 summarises key aspects of this screening report, including previous assessments (2012 ES and 2018 ODA), likely implications of the project parameter changes and the proposed screening outcome for each technical topic.



**Table 5.1 Screening Summary Table**

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
Archaeology and Cultural Heritage	No significant effects following application of mitigation.	Not assessed.	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact to archaeology and cultural features throughout construction, operation or decommissioning as a result of the Variation above and beyond those assessed in 2012.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to archaeology and cultural heritage features throughout either construction, operation or decommissioning.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>Following a review of the impact summary table (Table 4.13) that was presented in the 2012 ES and the potential project implications, as set out in Table 4.14, the Variation's parameter changes will have no likely significant effects on archaeology and cultural heritage above and beyond those assessed in the 2012 ES.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
Benthic & Intertidal Ecology	No significant effects.	Not assessed.	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact on benthic and intertidal ecology as a result of the Variation above and beyond those assessed in 2012, throughout either construction, operation or decommissioning.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to benthic and intertidal ecology throughout either construction, operation or decommissioning.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>Having reviewed the impact summary table that was presented in the 2012 ES, as well as the potential project implications, effects will remain as previously assessed when considering the project parameter changes.</p> <p>Impacts to qualifying features of the Firth of Forth Banks Complex Nature Conservation MPA was fully assessed in the 2012 ES, the proposed project parameter changes under the Variation will have no increased impact.</p> <p>Given there will be no near-shore activities associated with the Variation, there are no effects to intertidal ecology. There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>
Commercial Fisheries	Pre-mitigation significant effects on crab and lobster fishery	No significant residual impact.	The proposed changes to WTGs for the most part relate to aspects that have no implications for commercial fishing (i.e.	As discussed in Section 4.7.3, the proposed changes in the Variation’s design parameters have no significant implications over commercial fishing

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
	activities during construction only.	Several impacts assessed as negligible to moderate, including; catch mortality, temporary or complete loss of fishing grounds, increased steaming times to fishing grounds, navigational interference.	<p>increase in minimum tip height, maximum capacity, hub height and blade chord width).            The total number of WTG proposed across Project Alpha and Project Bravo combined (150) and the minimum spacing between WTGs (1 km) would remain as previously consented.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of the submerged steel as part of the OSP will have no change on the impact as assessed in 2012. No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>and therefore have no potential to affect the outcomes of the previous assessments and effects will remain as previously assessed in the 2012 ES.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>
Fish and Shellfish	Pre-mitigation significant effects from noise on the behaviour of herring.	<p>No significant residual impact.</p> <p>Several impacts assessed as negligible to moderate focused</p>	Increasing WTG parameters from parameters that were previously assessed will produce no additional underwater noise during installation and so there will be no increased impact on fish and shellfish species beyond those previously assessed.	Potential effects to fish and shellfish will remain as previously assessed (in the 2012 ES and 2020 Piling Strategy) when considering the proposed project parameter changes for the present Variation, with no likely significant effects above and beyond those previous assessed.

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
		<p>exclusively on noise during construction.</p>	<p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of the steel deposits on the seabed will have no additional impacts compared with what was assessed in the 2012 ES and Piling Strategy through underwater noise or disturbance.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>
<p>Landscape, Seascape &amp; Visual</p>	<p>Potentially significant effects on: Regional Character Areas (SA3, SA4) Visual Amenity (VP2, VP5) Settlements within 35 km Sustrans National Cycle Network (NCN) 1</p>	<p>Significant impacts (Major – Moderate) anticipated on receptors along the coastline with the potential impact upon the visual amenity of visual receptors.</p> <p>VP2 – Beach Road, Kirkton, St Cyrus –</p>	<p>Potential temporary or long term indirect effects on seascape character and views from sensitive receptors, such as residential properties, recreational receptors on core paths or at promoted hilltop locations.</p> <p>Updated wireline visualisations show that the Seagreen Project as it is being constructed combined with the Variation will cause no further significant effects compared to the as consented project.</p> <p>No material change in impacts previously assessed, and no likely significant effects and</p>	<p>Updated wireline visualisations from the same eight viewpoints as presented in the 2012 ES and reconsidered within both the ODA and 2021 Design Statement show that the Seagreen Project as it is being constructed combined with the Variation will cause no further significant effects compared to the as consented project. Any developments consented after the 2014 Consents were issued will have considered Seagreen in their cumulative impact assessments. As the Variation will cause no increase to seascape, landscape and</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
	<p>Local vantage points and car parks within 35 km</p> <p>Recreational boats and yachts</p> <p>Bell Rock Lighthouse</p> <p>Cumulative on:</p> <p>National Seascape Area 4</p> <p>Regional Character Area (SA3, SA4, SA5, SA6)</p> <p>Visual amenity (VP2, VP5)</p> <p>Settlements within 35 km, especially St Cyrus</p> <p>Sustrans NCN1</p> <p>Local vantage points and car parks</p> <p>Recreational boats and yachts</p> <p>Bell Rock Lighthouse</p>	<p>Impact upon visual amenity of visual receptor.</p> <p>VP5 – Braehead of Lunan – Impact upon visual amenity of receptor.</p> <p>Several more impacts assessed as negligible to moderate in relation to visual amenity of visual receptor and characteristic of seascape.</p>	<p>no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of the steel deposits on the seabed will have no additional impacts compared with what was assessed in the 2012 ES.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>visual impacts from Seagreen, an update to the cumulative assessment is not necessary.</p> <p>The Variation will not cause any material increase to impacts from the Seagreen Project as currently consented in respect of seascape, landscape and visual impacts, therefore it is proposed that the Variation is screened out of the requirement for EIA.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
Marine Mammals	Moderate adverse and significant in harbour seal from underwater noise (piling).	<p>No significant residual impact.</p> <p>Several impacts assessed as Negligible to Minor in relation to; Injury (PTS) during pile driving in construction and disturbance during pile driving during construction.</p>	<p>Key impacts on marine mammals as previously assessed in 2012 were underwater noise, impacts due to prey displacement and increased turbidity. Increased WTG parameters (height, blade length and width) will have no material change to underwater noise produced during construction, operation or decommissioning as a result of the variation and so there will be no increased impact to marine mammals. Similarly, no increased disturbance to prey or seabed sediment will occur as a result of the Variation.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased steel deposit weight will have no effect on underwater noise, impacts due to prey displacement and increased turbidity.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>Potential effects to marine mammals will remain as previously assessed (in the 2012 ES and 2020 Piling Strategy) when considering the proposed project parameter changes for the present Variation, with no likely significant effects.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
Military & Civil Aviation Activities	None following technical mitigation proposed.	No significant residual impacts.	<p>Potential to increase detection by radar installations with potential implications on radar performance. Post mitigation impacts (residual impact) considered not significant.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>The previous EIA assessments for the Seagreen Project identified the air defence radar at Buchan and Brizlee Wood, the NATS radar at Perwinnes and Allanshill and the MOD radar at Leuchars' station as potential constraints that would require mitigation. Mitigation agreements are currently in place between Seagreen and the relevant radar operators. The Variation will not change the assumptions of the 2012 ES nor will the proposed parameter changes change the mitigation requirements. SWEL has undertaken engagement with NATS and CAA and reached agreement in principle that existing mitigation measures are acceptable to mitigate impacts from the Variation on relevant aviation activities. SWEL are continuing to engage with MoD, and anticipate to have confirmation that mitigation for the Variation does not need to be agreed through the EIA process. SWEL expects to submit evidence of MoD's confirmation with the S36C variation application. Residual impacts of the Variation are therefore considered not significant</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
Ornithology	<p>Effects were assessed as not significant for all species during construction, operation and decommissioning. The potential for moderate and significant impacts on auk species: guillemot, razorbill and puffin, as a result of indirect effects on their sandeel prey due to piling during construction were identified. During operation, collision risk had the potential to cause significant effects on regional gannet, kittiwake, herring gull and greater black-backed gull populations at one or both projects.</p>	<p>No significant residual Impacts.</p> <p>Several impacts assessed as Minor to Moderate in relation to Disturbance of prey during construction, Collision risk during operation, barrier effects during operation and disturbance and displacement during construction and decommissioning.</p>	<p>Increased WTG parameters will increase swept area, and increase the air gap between lowest blade height and LAT. This in turn will affect previous assessments done in relation to the potential collision risk impacts on ornithology. However, given the design envelope previously assessed in the 2020 piling strategy and 2012 ES, collision risk estimates are within the worst case scenario previously approved and consented.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased steel deposit weight as part of the OSPs will have no effect on collision risk, prey displacement or impacts due to disturbance.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>Updated CRM using both the 2012 Band model and the latest sCRM show that the project as it is being constructed combined with the Variation will have equal to or significantly lower collision risks than the project as currently consented. This conclusion takes into account the limitations associated with herring gull outputs from the 2012 Band model due to a lack of flight height proportional data. As the Variation will not increase predicted seabird collisions, an update to cumulative impacts will not be necessary as it will not change cumulative impact assessments undertaken by more recent developments.</p> <p>In addition to collision impacts, the Variation will not change any of the other potential ornithological impacts identified in the 2012 ES (direct habitat loss, disturbance and displacement).</p> <p>The Variation will not cause any material increase to impacts from the Seagreen Project as currently consented and being constructed. It is concluded that the Variation does not lead to any likely significant effects and that it is appropriate for the Variation to be screened out of the requirement for an EIA when considering Ornithology.</p>



Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
				There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.
Other Marine Users	No significant effects.	Not assessed.	<p>Increased WTG parameters such as height, blade length and width as part of the Variation will have no additional impact to other marine users throughout construction, operation or decommission above those previously assessed in 2012.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of steel deposits as part of the Variation to OSP consent parameters will have no additional impact to Other Marine Users.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>Potential effects to Other Marine Users will remain as previously assessed in the 2012 ES when considering the proposed project parameter changes for the present Variation, with no likely significant effects expected above and beyond those previous assessed.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
Physical Environment	No significant effects.	Not assessed.	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact to the physical environment as a result of the Variation above and beyond those assessed in 2012.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to the physical environment.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>Potential effects to the physical environment will remain as previously assessed (in the 2012 ES) when considering the proposed project parameter changes for the present Variation, with no likely significant effects.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>
Shipping & Navigation	No significant effects following mitigation.	<p>No significant residual impacts.</p> <p>Several impacts assessed as Tolerable with mitigation and</p>	<p>Increasing WTG parameters will have impact on the position of the WTGs and so no increased impact will result from the Variation on shipping and navigation.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the</p>	<p>Potential effects to shipping and navigation will remain as previously assessed (in the 2012 ES) when considering the proposed project parameter changes for the present Variation, with no likely significant effects above and beyond those previously assessed.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
		<p>Broadly Acceptable in relation to Displacement, Encounters and collision risk.</p>	<p>environment as a result of the change proposed by the Variation.</p> <p>Increase steel deposits as part of the project parameter Variations associated with the OSPs will have no change to the location of the WTGs and so will have no impact on shipping navigation above what has been previously assessed.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	<p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>
Socioeconomic, Tourism and Recreation	<p>Significant beneficial effects on:</p> <ul style="list-style-type: none"> <li>expenditure in Scotland during construction and operation</li> <li>Employment in Scotland during construction and operation</li> </ul>	<p>No significant residual impacts.</p> <p>Impacts ranging from Minor beneficial to Moderate beneficial in relation to local, regional and wider CAPEX, OPEX and employment.</p>	<p>Increase WTG parameters comes with potential increased spending and so there is will likely be a positive impact on socioeconomics compared with what was assessed in 2012, for both construction and operation. Increased WTG parameters will not change the location of the project area, and given the distance from shore, there will likely be no change to the impact on tourism or recreation.</p> <p>Positive change to Socioeconomics.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the</p>	<p>The impact summary table in Section Table 4.15, originally presented in the 2012 ES concluded Negligible to Minor negative impacts on tourism and recreation and minor to moderate positive impacts on socioeconomics. Coupled with the project implications as set out in Table 4.16, effects will remain as previously assessed when considering the Variation, or in the case of Socioeconomics, there is the potential for an increased positive impact due to increased spending.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>

Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
			<p>environment as a result of the change proposed by the Variation. Increased weight of steel deposits for the OSPs as part of the Variation will have no material change to impacts to socioeconomics, tourism and recreation.</p> <p>No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p>	
Water and Sediment Quality	No significant effects.	Not assessed.	<p>Increased WTG parameters, including WTG height, blade length and width will have no additional impact to water and sediment quality as a result of the Variation above and beyond those assessed in 2012. No material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.</p> <p>Increased weight of steel deposits as part of changed project parameters for the OSP under the Variation, will have no material change to the previous assessment for impacts to water and sediment quality. No</p>	<p>Potential effects to water and sediment will remain as previously assessed in the 2012 ES when considering the proposed project parameter changes for the present Variation, with no likely significant effects.</p> <p>There will be no likely significant effects or significant adverse effects in respect of this topic. The Variation can be screened out.</p>



Topic	2012 ES Significant Effects	2018 ODA EIA Assessed Impacts	Impact of Proposed Parameter Changes	2021 Screening Outcome
			material change in impacts previously assessed, and no likely significant effects and no significant adverse effects on the environment as a result of the change proposed by the Variation.	

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## Seagreen S36C Application

### Screening Report

January 2022

# Annex 1 - Collision Risk Model for Seagreen Wind Energy Wind farm



# Collision Risk Model for Seagreen Wind Energy Wind farm

Comparison of different turbine parameters  
on estimated seabird mortality

10th January 2022

Project No.: 0611521

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## Signature Page

10th January 2022

# Collision Risk Model for Seagreen Wind Energy Wind farm

Comparison of different turbine parameters on estimated seabird mortality

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Comparison of different turbine parameters on estimated seabird mortality

## CONTENTS

1.	INTRODUCTION .....	1
2.	METHOD.....	1
3.	RESULTS.....	5
4.	REFERENCES .....	7

### List of Tables

Table 1: WTG Parameters and data.....	3
Table 2: Monthly Predicted RPM of Consented Turbines from Seagreen Vortex Hindcast modelling (Used in Band CRM)* .....	4
Table 3: Mean Monthly Densities (km <sup>-2</sup> ) of flying birds, with standard deviations. Breeding season in grey, precautionary breeding season in blue. ....	4
Table 4: Seabird morphological and behaviour parameters.....	4
Table 5: Band 2012 CRM Estimated Annual Mortality - Option 2.....	5
Table 6: McGregor 2018 sCRM Estimated Annual Mortality - Option 2.....	6
Table 7: McGregor 2018 sCRM Estimated Annual Mortality - Option 3.....	6

### Acronyms and Abbreviations

BTO	British Trust for Ornithology
CRM	Collision Risk Model
Gannet	Northern gannet ( <i>Morus bassanus</i> )
Herring gull	European herring gull ( <i>Larus argentatus</i> )
Kittiwake	Black-legged kittiwake ( <i>Rissa tridactyla</i> )
MS-LOT	Marine Scotland - Licensing Operations Team
NatureScot	Scotland's Nature Agency
RPM	Revolutions Per Minute
sCRM	Stochastic Collision Risk Model
WTG	Wind Turbine Generator

## 1. INTRODUCTION

A Collision Risk Model (CRM) was used to estimate and compare the annual mortality of three species of seabird between different designs of Wind Turbine Generator (WTG) within a proposed Seagreen Wind Farm Array.

The three species of seabird compared were northern gannet (*Morus bassanus*), black-legged kittiwake (*Rissa tridactyla*), and European herring gull (*Larus argentatus*). These species were chosen to keep in line with previously conducted CRMs and were identified through a Marine Scotland Scoping Opinion in 2017.

The estimates have been calculated using the Band (2012) Collision Risk Model (Excel file accessed through the British Trust for Ornithology Strategic Ornithological Support Services website) and also using the McGregor (2018) Stochastic Collision Risk Model (sCRM) (rShiny App accessed through the Scottish Government website).

Three sets of WTGs were compared for this assessment they are categorised as:

- Originally consented WTGs
- Currently constructed WTGs
- Newly proposed WTGs

Two layouts of these WTGs were compared:

- 150 WTGs originally consented
- 114 WTGs currently constructed + 36 WTGs newly proposed

Only turbine parameters were changed within the CRMs to allow for comparison, all other input parameters to the model were kept consistent within each model. Seabird density and biometric data were kept consistent between both CRMs. Site specific flight height distribution was not available from survey data and as such was taken from the Cook *et al* (2011) found within the Band CRM excel and from Johnston *et al* (2014) as is available within the sCRM web app.

## 2. METHOD

Estimated mortality rates through collision with turbine blades are calculated using Option 2 of the Band CRM and Option 2 and Option 3 of the McGregor sCRM. Whilst Option 1 would be preferable there was not enough site specific survey data that could be used. It is also in keeping as close as possible to the methods and parameters of the original consent application CRM in which Option 2 was chosen.

- Option 2 assumes uniform distribution, based on the proportion of sea birds at collision risk height (between lowest and highest height of the turbine blades) taken from species specific pooled and modelled flight data.
  - Within the Band CRM, this proportion at collision risk height data comes from the Cook *et al* (2011) aggregate dataset. Gannet and kittiwake flight height proportions are present from 0–150m within the Excel CRM. Flight height proportions between 0–150m herring gull were not available. As neither site survey data nor aggregate data of flight heights were available, and the known proportion of birds between 20–150m was 28.4% (Cook *et al* 2011) this proportion was used for herring gull for all WTGs in the Band CRM.
  - Within the McGregor sCRM, the proportion at collision risk height comes from the Johnston *et al* (2014) modelled flight data. For all three species of sea bird, flight height proportions were available within the sCRM rShiny app from 0–300m.

- Option 3 is an extension of Option 2, with the full range of flight distributions between minimum and maximum heights of the turbine blades is incorporated with a calculation of varying risk of collision across the swept area.
  - Within the Band CRM Option 3 was not considered as there was not a full enough range of flight height data from the Cook *et al* (2011) dataset as all turbines had a maximum height above 150m for gannet and kittiwake.
  - Within the McGregor sCRM, this extended modelling is presented as per Nature Scot guidance for only the kittiwake and herring gull.

The parameters used within each model to obtain the collision estimates are presented below (see Table 1 to Table 4).

In both the Band CRM and McGregor sCRM sets of results were obtained for estimated mortality for each of the 3 seabird species, the number of WTGs in each set were:

- 150 WTGs with originally consented parameters;
- 36 WTGs newly proposed parameters; and
- 114 WTGs currently constructed parameters.

Parameters used whilst running the Band CRM were the same as or as close as possible to the parameters and methods used in the original Seagreen consent.

The Seagreen site has a latitude of 56.37 degrees and this was kept consistent in all models to inform the number of daylight hours.

The maximum width of the windfarm was assessed to be 30km.

Tidal offset within the Band CRM was 0 m and within the McGregor sCRM was 2.3 m, to provide correction for flight heights measured from mean sea level and turbine parameters measured from highest astronomical tide (tidal data from the National Tidal and Sea Level Facility at Aberdeen port shows mean sea level 2.55 m and highest astronomical tide 4.85 m).

Each WTG design has 3 blades. Monthly proportion of time operational was set at 88% for the WTGs originally consented and 90% for WTGs currently constructed and WTGs newly proposed. Rotation speed of 14 rpm was used as a worst case scenario for the WTGs originally consented, and WTGs newly proposed. Rotation speed of 8.8 rpm was used for the WTGs currently constructed. In the Band CRM to keep in line with a previously conducted CRM in 2012, a second model run was undertaken for WTGs originally consented with a likely monthly average rpm, giving an annual average of 10.6 rpm (see Table 2). Rotor pitch was 10 degrees consistently in each model. Maximum rotor width was set at 5.4 m for the WTGs originally consented, and WTGs currently constructed, and at 7.6 m for the WTGs newly proposed. Rotor radius was 83.5 m for the WTGs originally consented, 82 m for the WTGs currently constructed, and 121 m for the WTGs newly proposed.

Maximum height above the mean sea level was 194.3 m for the WTGs originally consented, 198.5 m for the WTGs currently constructed, and 273.5 m for the WTGs newly proposed. Hub height above the mean sea level was 110.8 m for the WTGs originally consented, 116.5 m for the WTGs currently constructed, and 152.5 m for the WTGs newly proposed. The air gap between the lowest sweep of the rotor and mean sea level was 27.3 m for the WTGs originally consented, 34.5 m for the WTGs currently constructed, and 31.5 m for the WTGs newly proposed.

Seabird morphological and behavioural parameters were kept the same in all models (see Table 4). Bird length and wingspan from BWPI 2004 data, flight speed from Alerstam *et al* 2007, flight type set to flapping for all species, and nocturnal activity proportions were taken from data previously agreed within a scoping opinion from MS-LOT and found within Seagreen (2018) EIAR Appendix 8B. Seabird monthly flight density is derived from site survey data as used in the Seagreen (2018) EIAR Appendix 8B (see Table 3).

Comparison of different turbine parameters on estimated seabird mortality

Avoidance rates used within the Band CRM for Option 2 are the same as in Seagreen (2018) EIAR Appendix 8B and these are:

- Gannet – 98.9% ( $\pm 0.2\%$ )
- Kittiwake – 98.9% ( $\pm 0.2\%$ )
- Herring gull – 99.5% ( $\pm 0.1\%$ )

Avoidance rates used within the McGregor sCRM are taken from Bowgen & Cook (2018) as recommended in Nature Scot guidance. The avoidance rates are:

- Gannet:
  - Option 2 – 99.7% ( $\pm 0.2\%$ )
  - Option 3 – N/A (Option 3 not considered for gannet)
- Kittiwake:
  - Option 2 – 99.2% ( $\pm 0.2\%$ )
  - Option 3 – 96.7% ( $\pm 2.7\%$ )
- Herring gull:
  - Option 2 – 99.7% ( $\pm 0.2\%$ )
  - Option 3 – 99.2% ( $\pm 0.2\%$ )

**Table 1: WTG Parameters and data**

Parameter	Consented WTG	Constructed WTG	Newly Proposed WTG
Array latitude (degrees)	56.37	56.37	56.37
Number of WTGs in Array	150 (36*)	114	36
Width of Array (km)	30	30	10
Number of blades	3	3	3
Rotation speed (rpm)	14 (10.6*)	8.8	14
Rotor radius (m)	83.5	82	121
Maximum blade width (m)	5.4	5.4	7.6
Rotor blade pitch (degrees)	10	10	10
Airgap above mean sea level (m)	27.3	34.5	31.5
Total height of WTG above mean sea level (m)	194.3	198.5	273.5
Hub height above mean sea level (m)	110.8	116.5	152.5
Monthly proportion of time operational (%)	88	90	90

\*Consented worst case 14 rpm but expected 10.6 rpm annually (see Table 2)



Comparison of different turbine parameters on estimated seabird mortality

**Table 2: Monthly Predicted RPM of Consented Turbines from Seagreen Vortex Hindcast modelling (Used in Band CRM)\***

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg
11.2	10.9	10.8	10.5	10.2	10.3	10.1	10.0	10.7	11.0	11.1	10.9	10.6

\*As used in Addendum to the Seagreen (2018) EIAR – Appendix 8B

**Table 3: Mean Monthly Densities (km<sup>-2</sup>) of flying birds, with standard deviations. Breeding season in grey, precautionary breeding season in blue.**

Species	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gannet	Mean	0.309	0.613	1.900	1.154	4.986	7.612	2.116	3.403	2.197	1.333	0.532	0.083
	SD	0.126	-	0.752	0.704	0.932	2.809	1.454	2.653	1.078	1.372	0.485	0.118
Kittiwake	Mean	1.911	1.355	2.629	1.804	2.947	2.409	3.414	1.167	2.017	1.999	8.610	0.666
	SD	0.072	-	2.618	0.121	1.604	1.563	3.053	1.225	2.737	1.201	11.33 2	0.748
Herring gull	Mean	0.120	0.108	0.190	0.028	0.078	0.128	0.019	0.000	0.028	0.072	0.027	0.235
	SD	0.130	-	0.229	0.001	0.053	0.171	0.033	0.000	0.040	0.022	0.038	0.255

**Table 4: Seabird morphological and behaviour parameters**

Bird	Length (m)	Wingspan (m)	Flight speed (m sec <sup>-1</sup> )	Nocturnal Activity	Flight Type
Gannet	0.94	1.72	14.9	1 (0%)*	Flapping
Kittiwake	0.39	1.08	13.1	2 (50%)*	Flapping
Herring gull	0.61	1.44	12.8	2 (50%)*	Flapping

\*Integer for use in Band CRM, percentage for use in McGregor sCRM

### 3. RESULTS

The results are presented as annual collision estimates for each species and each Seagreen WTG option, with relevant avoidance rates detailed in the methods applied. The results are based on all flying seabirds regardless of age or breeding status. Due to the model expressing estimated mortality as decimal numbers and excel rounding to the nearest whole number some additions may not sum as displayed.

Table 5 shows estimated annual mortality using the Band CRM Option 2. For the 150 WTGs comparison, there is a decrease in estimated mortality for gannet and kittiwake from the consented WTGs to the combination of newly proposed and constructed WTGs. This is possibly due to the slightly smaller swept area of the 114 constructed WTGs and the larger air gap in both the constructed and newly proposed WTGs. Herring gull sees a slight increase in estimated mortality in the 150 WTGs comparison, likely because the minimum blade tip height is not factored into the herring gull modelling due to data limitations, the higher predicted collisions for herring gull reflects the larger swept area of the newly proposed WTGs.

McGregor sCRM annual estimated mortality as seen in Table 6 and Table 7 shows a large decrease in mortality for all species from the 150 consented to the combination of constructed and newly proposed. Using Option 3 for kittiwake and herring gull there is a decrease in both comparisons from consented to newly proposed (and constructed) WTGs.

**Table 5: Band 2012 CRM Estimated Annual Mortality - Option 2**

Species	150 WTGs Consented 10.6rpm	150 WTGs Consented 14rpm	114 WTGs Constructed + 36 WTGs Newly proposed
Northern gannet	372	431	166
Black-legged kittiwake	381	424	222
European herring gull*	34*	39*	40*

*\*Flight height data were not available for herring gull and as such 28.4% proportion at collision risk height was used for all WTG options.*

**Table 6: McGregor 2018 sCRM Estimated Annual Mortality - Option 2**

<b>Species</b>	<b>150 WTGs Consented</b>	<b>114 WTGs Constructed + 36 WTGs Newly proposed</b>
Northern gannet	173	101
Black-legged kittiwake	587	350
European herring gull	26	19

**Table 7: McGregor 2018 sCRM Estimated Annual Mortality - Option 3**

<b>Species</b>	<b>150 WTGs Consented</b>	<b>114 WTGs Constructed + 36 WTGs Newly proposed</b>
Black-legged kittiwake	636	301
European herring gull	32	19

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## Seagreen S36C Application

### Screening Report

January 2022

# Annex 2 – Seagreen Offshore Wind Farm Seascape, Landscape and Visual Review to inform the Screening Report

**ERM**

# Seagreen Offshore Wind Farm

## Seascape, Landscape and Visual Review to inform the Screening Report

Prepared by LUC  
January 2022



**ERM**

**Seagreen Offshore Wind Farm**  
 Seascape, Landscape and Visual Review to inform  
 the Screening Report

**Project Number**  
 11840

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OHS627041

# Contents

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<b>Chapter 1</b>	
<b>Introduction</b>	<b>1</b>

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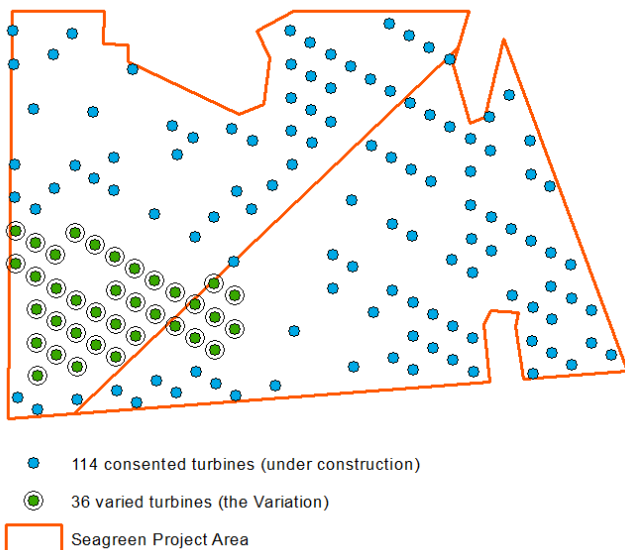
<b>Chapter 2</b>	
<b>Potential effects</b>	<b>2</b>

Changes in relation to the 2012 ES	2
Visualisations	3
Potential for changes in effects	5



# Chapter 1

## Introduction



**Figure 1:** Consented Seagreen turbine layout, identifying the 36 turbines that form the proposed Variation, clustered in the south-east

**1.1** LUC was appointed in December 2021 to undertake a review of the potential seascape, landscape and visual effects associated with a proposed variation ('the Variation') to the consented Seagreen Offshore Wind Farm ('the Seagreen Project').

**1.2** The Seagreen Project received consent in 2014. 114 of the 150 consented turbines are currently under construction (beginning in September 2021) and have a grid connection into Tealing, Angus. The Variation seeks to allow for changes principally in the parameters of the 36 turbines that are consented but not under construction. This report considers the effect of these changes on seascape, landscape and visual receptors, and forms an Appendix to the Screening Report being submitted to Marine Scotland.

**1.3** The 2014 Consents allow for the construction of 150 offshore wind turbines, with maximum height to blade tip of 209.7m above lowest astronomical tide (LAT), and a maximum rotor diameter of 167m.

**1.4** The Variation seeks consent to increase the size of 36 turbines to a maximum blade tip height of 285m above LAT, with maximum rotor diameter of 242m ('the varied turbines'). The remaining 114 turbines will be built within the consented dimensions, at 205m blade tip height above LAT and 164m rotor diameter. No changes to the turbine locations are proposed, and these remain as set out in the Development Specification and Layout Plan (DSLPL).

**1.5** This report considers the potential for the Variation to have effects on seascape, landscape and visual receptors that are different to the effects set out in Chapter 16 of the 2012 Seagreen Environmental Statement ('the 2012 ES'). Wireline views have been generated to show the consented wind farm alongside the proposed Variation, from each of the eight 2012 ES viewpoints.

**1.6** The review has been undertaken by Chartered Members of the Landscape Institute (CMLI) at LUC. No site visits have been undertaken as part of this review.

## Chapter 2

### Potential effects

#### Changes in relation to the 2012 ES

**2.1** Chapter 16 of the 2012 ES presents an assessment of the effects of the Seagreen Project on seascape, landscape and visual receptors, and was undertaken in accordance with best practice guidance that was current at the time. While some of this guidance has been updated, notably the third edition of *Guidelines for Landscape and Visual Impact Assessment (GLVIA3)* in 2013, this would not materially affect the findings of the seascape, landscape and visual impact assessment (SLVIA).

**2.2** For the purposes of the 2012 ES, the Seagreen Project was considered as two developments of 75 turbines: Seagreen Alpha and Seagreen Bravo; and the combined effects of both schemes were considered separately. This review considers the combined effects as the scheme is now being developed as a single project: the varied turbines are within the Seagreen Project Area and are mainly, but not entirely, within the former Seagreen Alpha (see Figure 1).

#### Baseline

**2.3** Seascape baseline is set out in the Regional Seascape Character Assessment: Aberdeen to Holy Island, prepared for the Forth and Tay Offshore Wind Developer Group (Appendix K2 to the 2012 ES). This divides the coast into 21 seascape character areas, and provides a description for each along with an assessment of sensitivity to offshore wind farm development. While some development and other localised changes have taken place, this does not affect the regional scale assessment, which still provides a reliable baseline for assessment.

**2.4** Onshore landscape character is drawn from a series of regional character assessments. These have been replaced by Nature Scot's national landscape character assessment,<sup>1</sup> although the content of the published material remains largely the same.

**2.5** Since the publication of the 2012 ES, landscape designations have been introduced in Aberdeenshire.<sup>2</sup> The South East Aberdeenshire Coast Special Landscape Area (SLA) covers the coast from Portlethen in the north to St Cyrus in the south, within seascape character area SA3: Cove

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<sup>1</sup> Nature Scot: [Scottish Landscape Character Types Map and Descriptions](#)

<sup>2</sup> Aberdeenshire Council (2016) [Aberdeenshire Special Landscape Areas: Supplementary Guidance](#)

Bay to Milton Ness. The presence of this designation indicates value placed on the coastal landscape, which influences its sensitivity. If the sensitivity of SA3 were to be reconsidered with the designation in place, the sensitivity to offshore development would likely be medium-high rather than medium.

**2.6** Effects on visual amenity were considered in relation to eight representative viewpoints, as well as the main receptor groups (residents, tourists, marine users, etc). The coastal outlook has not greatly changed from any of the key viewpoints, and there are no reasons to reconsider the main receptor groups.

**2.7** Other than the introduction of the South East Aberdeenshire Coast SLA, no substantive changes in baseline have taken place that would affect the outcome of the SLVIA.

### Cumulative baseline

**2.8** The 2012 ES considered the cumulative impacts of the Project alongside the Inch Cape and Neart na Gaoithe offshore wind farms, as well as a number of onshore wind farms. Neart na Gaoithe is now under construction. Subsequent applications to increase the turbine size of Inch Cape have received consent. In addition, the Kincardine floating offshore wind farm has been constructed. These schemes have been modelled into the cumulative wirelines on the basis of the following data.

**Table 2.1: Cumulative wind farms**

Wind farm	Number of Turbines	Tip height (m)	Rotor diameter (m)
Inch Cape <sup>3</sup>	72	291	250
Kincardine	6	191	164
	1	106	80
Neart na Gaoithe	54	208	167

**2.9** A variation to the Forthwind offshore wind farm in the Firth of Forth remains in planning, though due to its location it would not be visible from any of the 2012 ES viewpoints. A Scoping Report for Berwick Bank Offshore Wind Farm has been published, but limited project information is available. These schemes have not been modelled in to the cumulative wirelines.

### Findings of the 2012 ES

**2.10** The findings of the SLVIA are presented in Tables 16.29a and 16.29b of the 2012 ES, and significant effects are summarised below.

**2.11** Potentially significant (moderate adverse) effects during operation were identified for two seascape character areas: SA3 Cove Bay to Milton Ness; and SA4 Montrose Bay. No significant effects were found on landscape character or designations.

**2.12** Potentially significant (moderate adverse) effects on visual amenity were identified at two representative viewpoints: VP2 Kirkton, St Cyrus; and VP5: Braehead of Lunan. More generally, potentially significant effects were identified for high sensitivity receptors, including residents, recreational users and marine users, within 35km of the offshore turbines.

**2.13** No significant effects were identified during construction. Effects during construction have not been considered further in this report. No significant night time effects were identified as a result of turbine lighting. No changes to lighting are proposed, and night time effects are not considered further in this report.

**2.14** When considering the presence of offshore wind farms (Neart na Gaoithe and Inch Cape), potentially significant cumulative effects were identified on SA3 (moderate adverse) and SA4 (major/moderate adverse), and also SA5 Long Craig and SA6 Lunan Bay (moderate adverse).

**2.15** Significant (major/moderate) cumulative visual effects were noted for VP2 Kirkton, St Cyrus, and VP5 Braehead of Lunan. This was mainly due to the interaction of Seagreen with Inch Cape in the seaward view.

### Visualisations

**2.16** Wireline visualisations have been generated to show the appearance of the proposed Variation. Wirelines show the consented and Variation schemes side-by-side for each of the eight assessment viewpoints used in the 2012 ES (see Table 2.2). A second page for each viewpoint shows the same pair of views with the cumulative wind farms listed in Table 2.1 included.

**2.17** Observations on the wirelines, focusing on the difference in visual appearance between the consented and Variation schemes, are set out in Table 2.2. The potential for changes in seascape, landscape and visual effects is discussed in the concluding sections.

<sup>3</sup> No up to date layout information was available for Inch Cape, so an indicative 72 turbine layout was developed by LUC using previous published layouts for this scheme as a general guide.

Table 2.2: Observations on wireline visualisations

VP No.	Viewpoint	Distance (approx.)	Seagreen only (including the Variation)	Cumulative
VP1	Garron Point	38 km	The difference in height between the consented and proposed turbines is likely to be imperceptible, as the varied turbines are among the most distant.	The cumulative schemes are distant and do not alter perception of the difference in turbine height.
VP2	Beach Road Kirkton St. Cyrus	31 km	The closest viewpoint. The difference in height between the consented and proposed turbines is likely to be discernible in the view, particularly as the varied turbines are seen in rows.	The larger Inch Cape turbines are seen alongside Seagreen, diminishing the apparent difference between the consented and varied turbines.
VP3	White Caterthun Hill Fort	51 km	Although the difference in turbine height is discernible when comparing the wirelines on the page, at over 50km distance it is likely that atmospheric visibility will make the size difference between the turbines imperceptible in the view.	All four wind farms are theoretically visible, though details of turbine dimensions are unlikely to be discernible at this distance.
VP4	Montrose	32 km	From sea level, the hubs of the consented turbines are at the horizon. The larger varied turbines appear with hubs just above the horizon, so the difference is just discernible.	The larger Inch Cape turbines are seen closer than Seagreen, diminishing the apparent difference between the consented and varied turbines of the more distant scheme.
VP5	Braehead of Lunan	35 km	The larger size of the varied turbines is discernible in this elevated view, though the difference is unlikely to be clearly noticeable.	The larger Inch Cape turbines are seen alongside Seagreen, diminishing the apparent difference between the consented and varied turbines.
VP6	Arbroath Signal Tower	40 km	In this more distant sea-level view, the varied turbines are more visible than the consented, though they will still appear as just hubs and upper blades on the horizon.	The larger varied turbines are seen behind Inch Cape, and the difference in size is unlikely to be discernible.
VP7	Carnoustie	48 km	The consented scheme is barely visible from this viewpoint, and the varied turbines will be just visible as turbine blades.	Seagreen is entirely behind Inch Cape, and would not be discernible in the view.
VP8	Fife Ness	49 km	Similar to VP7, the upper blades of the varied turbines will be barely visible above the horizon.	Seagreen is entirely behind Inch Cape, and would not be discernible in the view.

## Potential for changes in effects

**2.18** The focus of this section is the difference between the turbines of the proposed Variation when compared to the consented Seagreen Project. Although minor changes to the baseline have been noted, and changes to the cumulative offshore situation, this section primarily considers the additional effects of the increased dimensions of the 36 varied turbines.

**2.19** As noted above, significant effects on coastal seascape were identified for two seascape character areas, with cumulative effects on two more. With reference to the viewpoints located within those seascape character areas (VPs 1, 2, 4 and 5), the changes in the coastal outlook as a result of the Variation would be very small. It is judged that no additional effects on seascape character would occur. Even considering the slight increase in sensitivity that may be attributed to SA3 as a result of the SLA designation, no additional level of effect would be anticipated as a result of the Variation.

**2.20** With reference to the other visualisations, it is judged that the Variation would not alter the outlook from other seascape character areas, such that the predicted level of effect would be increased.

**2.21** In terms of visual effects, the observations in Table 2.2 suggest that the difference in turbine dimensions between the consented and Variation schemes is likely to be discernible but not especially noticeable for a number of views.

**2.22** The views where significant effects were previously noted (VP2 and VP5) are those where the difference appears most clear. However, factors such as atmospheric visibility will reduce the clarity of the view. It is judged that at these viewpoints the Variation would not lead to any increase in the level of effect on the view.

**2.23** In relation to other viewpoints, it is judged that the change in view will be minimal, and would not be sufficient to raise any effect above the level of significance.

**2.24** By extension, no changes in the outlook experienced by the receptor groups assessed would be so great as to increase the level of effect on the receptor.

**2.25** When considering cumulative effects, the additional effect of the Seagreen Project in combination with other offshore wind farms is to increase the horizontal spread of turbines across the seaward horizon. In terms of apparent turbine size, the presence of the larger Inch Cape turbines at generally closer distances tends to diminish the apparent size difference between the consented and varied turbines. In other cases, Inch Cape would appear in front of the Seagreen Project, which would render the more distant scheme barely perceptible in the view. It is judged that no additional

cumulative effects would occur as a result of the proposed Variation. No clear conclusion can be drawn in relation to Berwick Bank offshore wind farm, as the details of this scheme remain unknown.

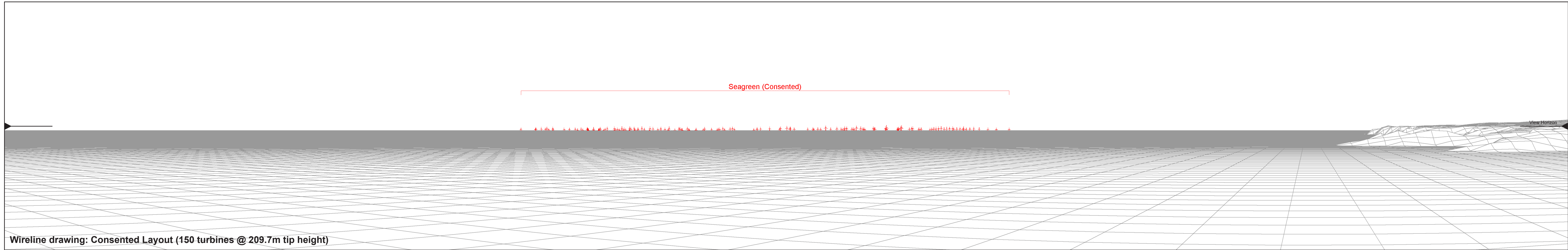
## Conclusion

**2.26** This report has examined the proposed Variation of turbine dimensions for 36 of the 150 consented Seagreen turbines. The SLVIA within the 2012 ES assessed the effects of the consented scheme, and no substantive changes to the assessment baseline have been identified. The SLVIA therefore remains an accurate assessment of the effects of the consented scheme.

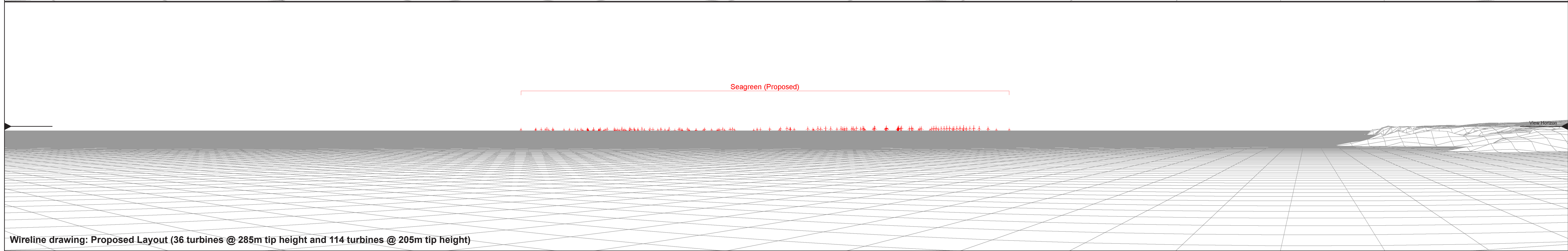
**2.27** Wireline visualisations have been generated to show the consented and Variation schemes side by side, both on their own and with other offshore wind farms shown. The difference in turbine height between the consented and varied turbines are often barely discernible, and are unlikely to be clearly noticeable in any view.

**2.28** It is judged that the changes to the appearance of the wind farm arising from the proposed Variation would not be sufficient to increase the level of effect experienced by any seascape, landscape or visual receptor. The distribution of significant effects would be the same for the proposed Variation as was set out in the 2012 ES.

**2.29** On this basis, it is judged that there is no requirement to undertake SLVIA for the proposed Variation, as the findings would not be materially different to the findings of the 2012 ES.



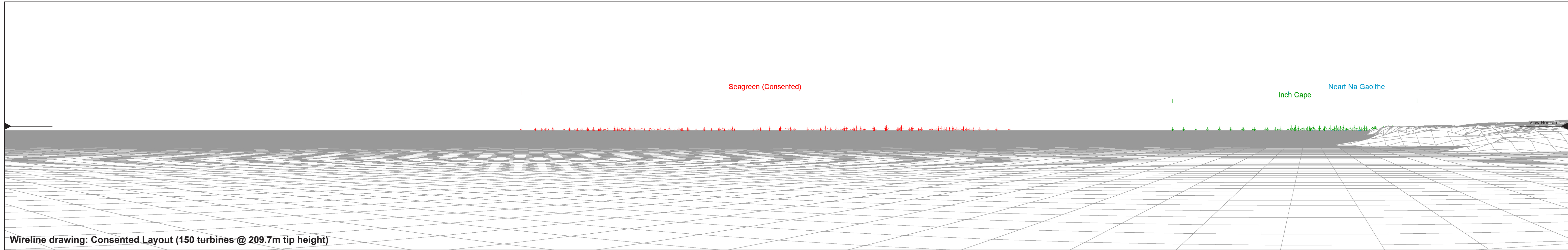
**Wireline drawing: Consented Layout (150 turbines @ 209.7m tip height)**



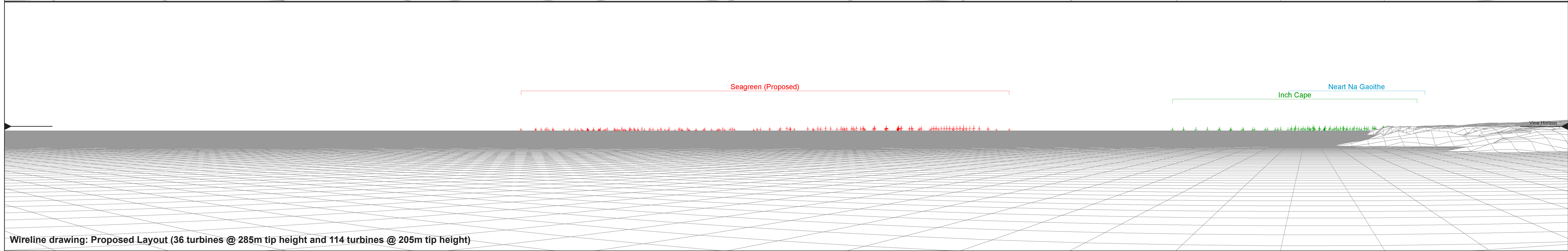
**Wireline drawing: Proposed Layout (36 turbines @ 285m tip height and 114 turbines @ 205m tip height)**



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Direction of view:	150°	Paper size:	841 x 297 mm (half A1)
Nearest turbine:	37.9 km	Correct printed image size:	820 x 260 mm



Wireline drawing: Consented Layout (150 turbines @ 209.7m tip height)



Wireline drawing: Proposed Layout (36 turbines @ 285m tip height and 114 turbines @ 205m tip height)

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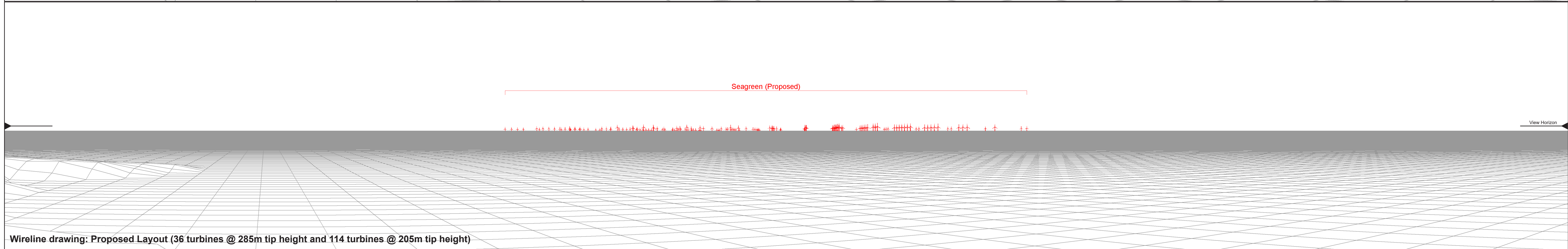
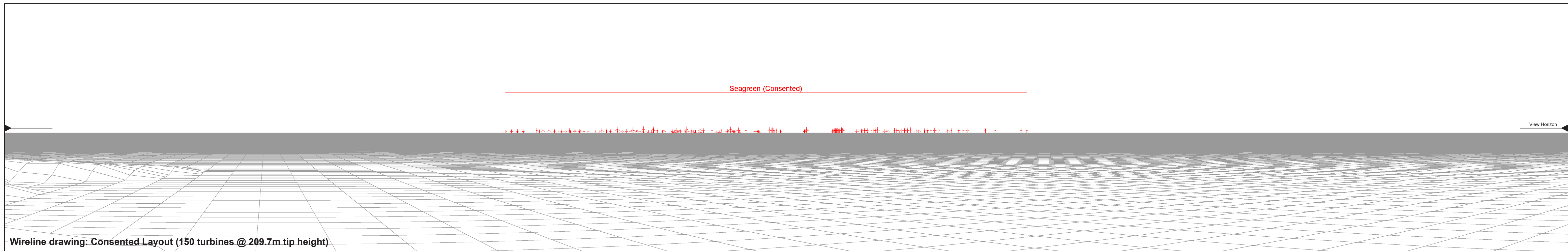
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Nearest turbine:	37.9 km	Correct printed image size:	820 x 260 mm

Wind Farm Developments key  
(by status):

Seagreen  
Operational  
Under construction  
Consented

Seagreen Wind Farm

Viewpoint 1: Garron Point

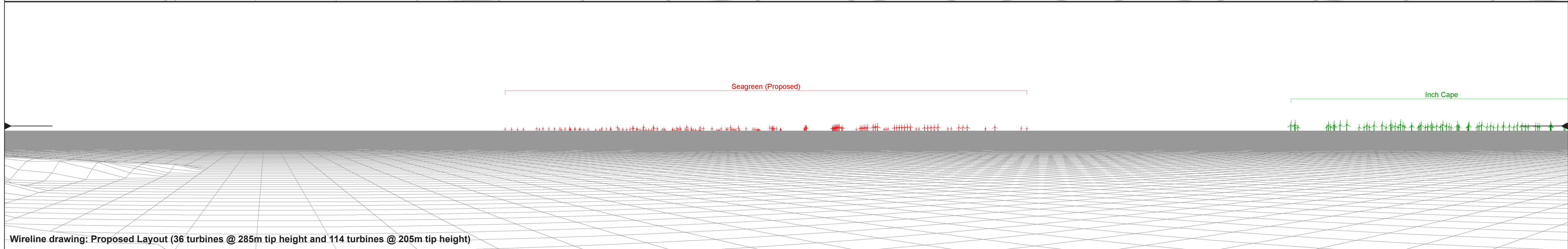
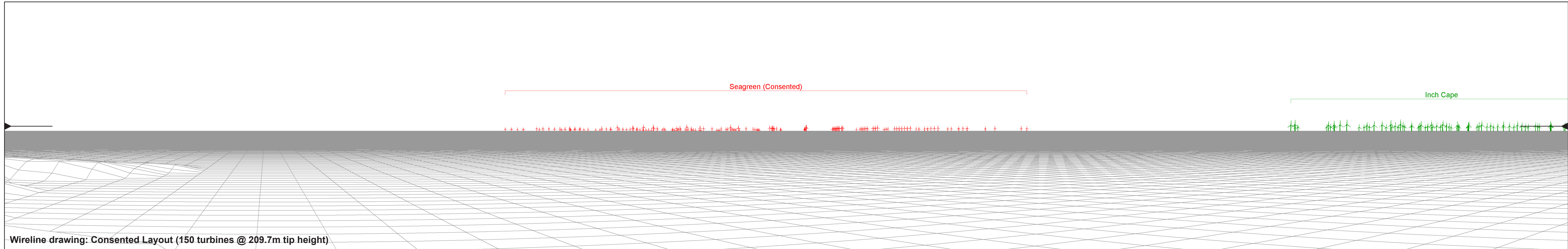


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Direction of view:	120°	Paper size:	841 x 297 mm (half A1)
Nearest turbine:	31.2 km	Correct printed image size:	820 x 260 mm





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 Nearest turbine: 31.2 km

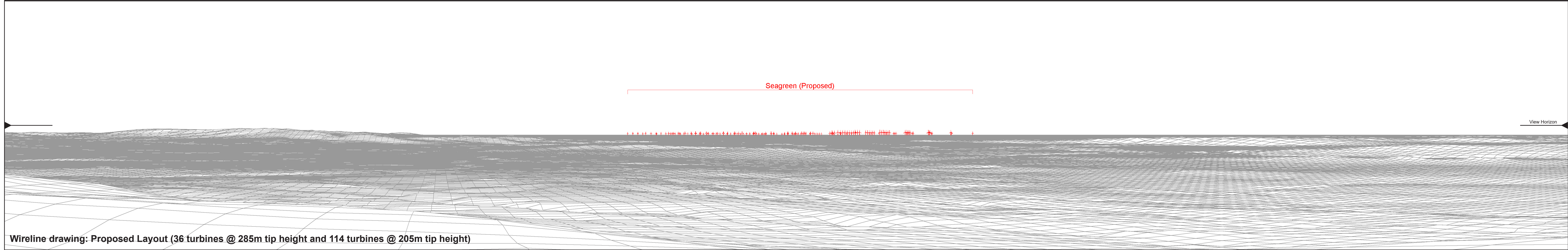
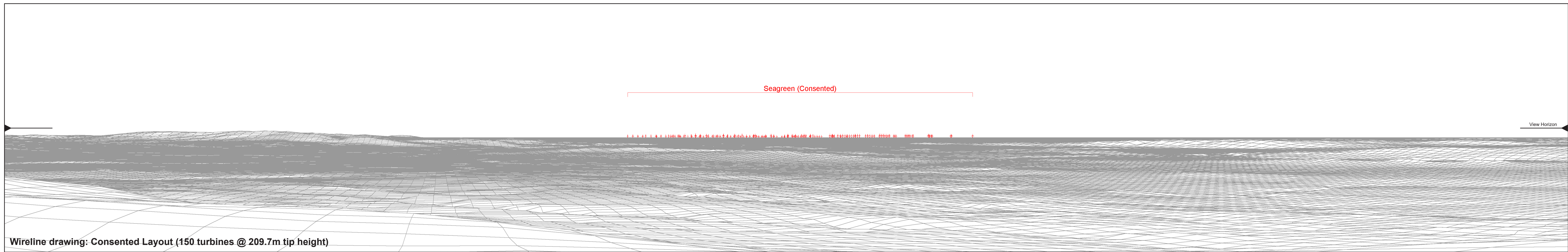
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 Correct printed image size: 820 x 260 mm

Wind Farm Developments key  
 (by status):

- Seagreen
- Operational
- Under construction
- Consented

Seagreen Wind Farm

Viewpoint 2: Beach Road Kirkton St. Cyrus



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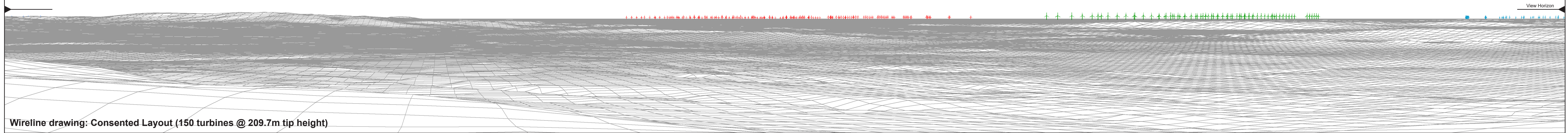


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Seagreen Wind Farm

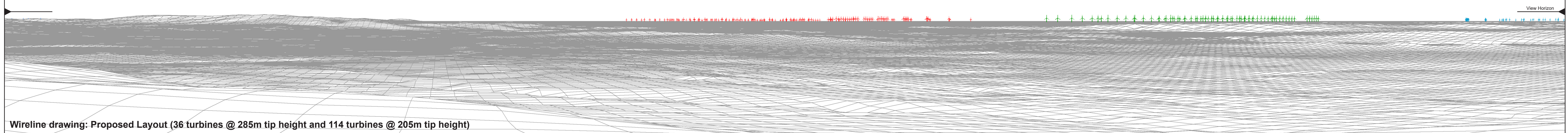
**Viewpoint 3: White Caterthun Hill Fort**

Kincardine



Wireline drawing: Consented Layout (150 turbines @ 209.7m tip height)

Kincardine



Wireline drawing: Proposed Layout (36 turbines @ 285m tip height and 114 turbines @ 205m tip height)

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 Nearest turbine: 51.0 km

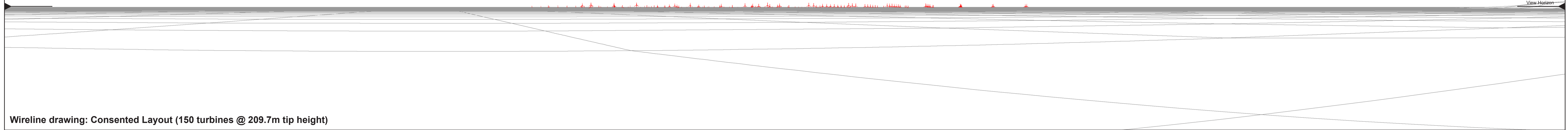
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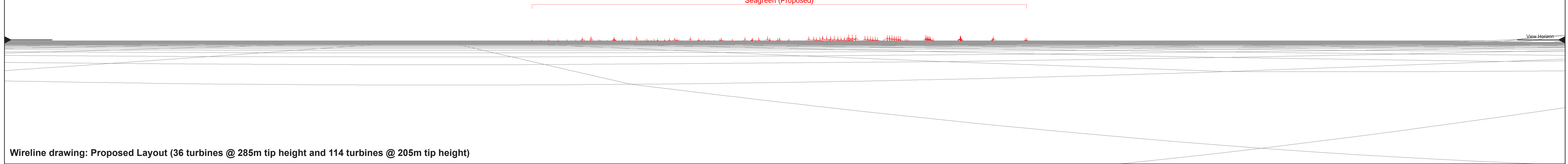
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- Consented

Seagreen Wind Farm

Viewpoint 3: White Caterthun Hill Fort



Wireline drawing: Consented Layout (150 turbines @ 209.7m tip height)

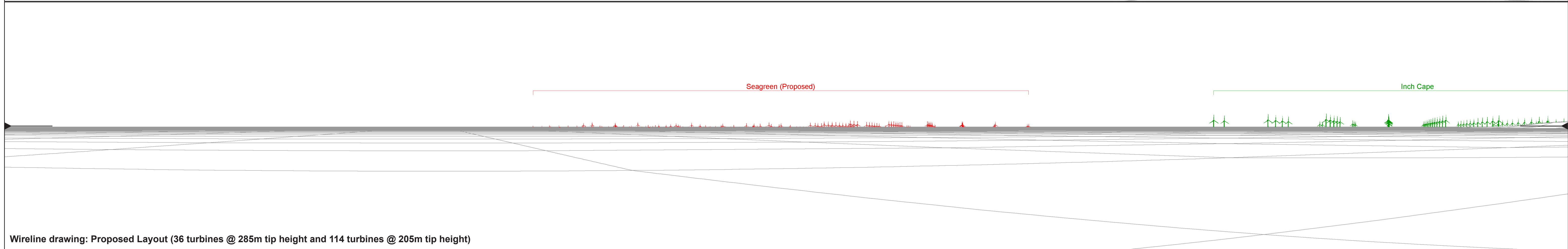
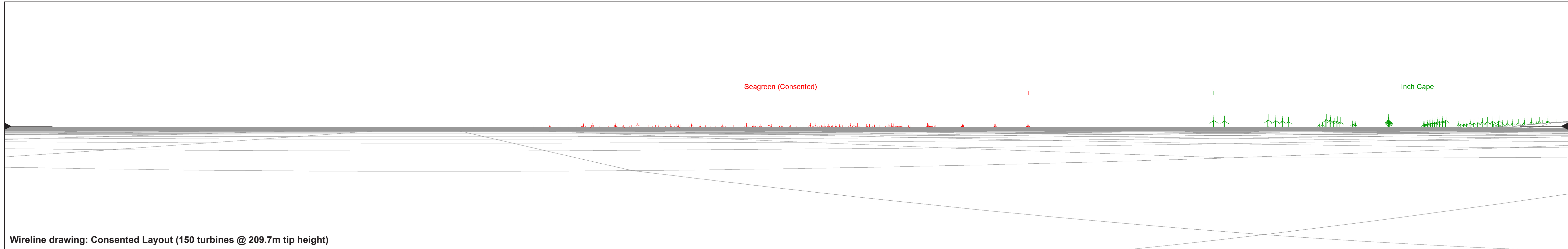


Wireline drawing: Proposed Layout (36 turbines @ 285m tip height and 114 turbines @ 205m tip height)

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Nearest turbine:	31.8 km	Correct printed image size:	820 x 260 mm



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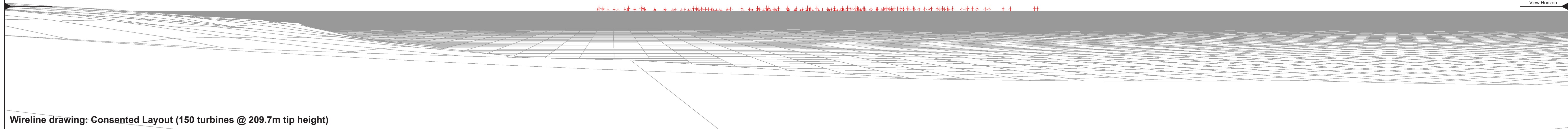
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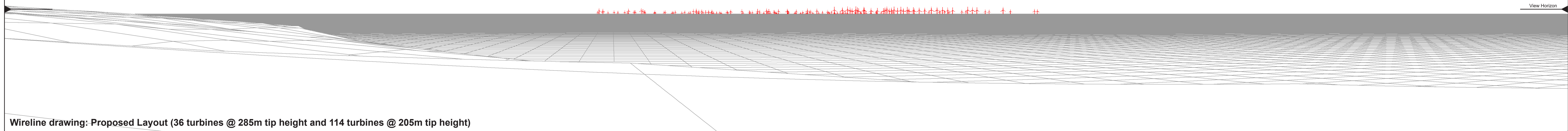
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- Operational
- Under construction
- Consented

Seagreen Wind Farm

Viewpoint 4: Montrose



Wireline drawing: Consented Layout (150 turbines @ 209.7m tip height)

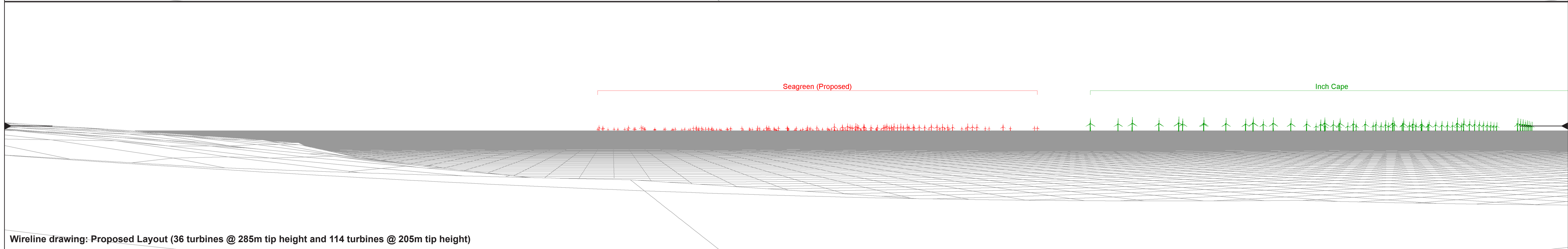
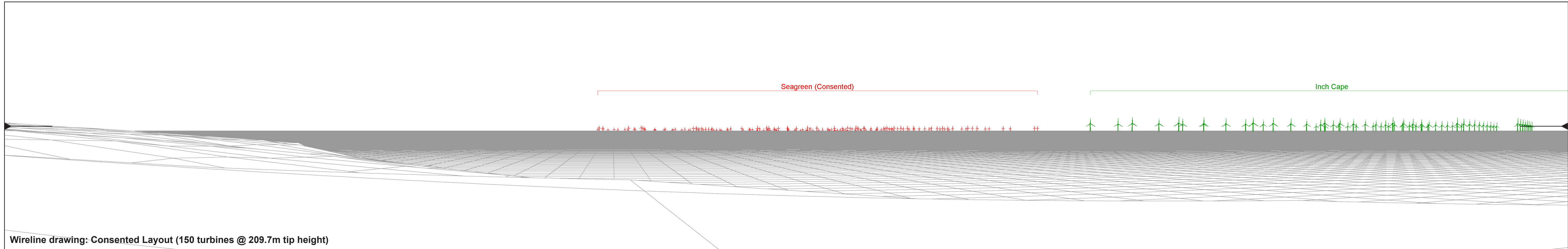


Wireline drawing: Proposed Layout (36 turbines @ 285m tip height and 114 turbines @ 205m tip height)



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 AOD: 73 m  
 Direction of view: 100°  
 Nearest turbine: 35.1 km

Horizontal field of view: 90° (cylindrical projection)  
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 Paper size: 841 x 297 mm (half A1)  
 Correct printed image size: 820 x 260 mm



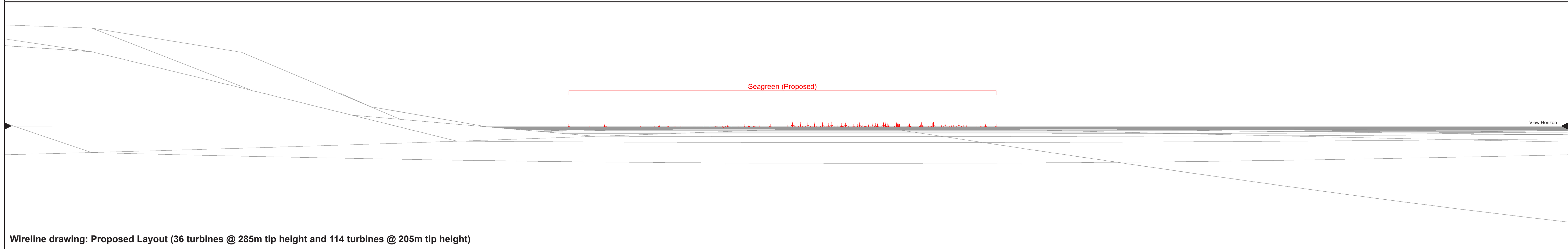
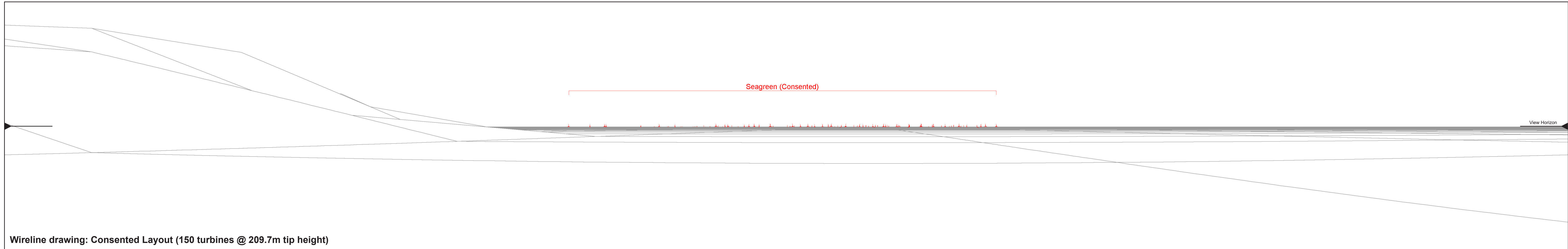
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Horizontal field of view: 90° (cylindrical projection)  
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Wind Farm Developments key  
 (by status):

Seagreen  
 Operational  
 Under construction  
 Consented

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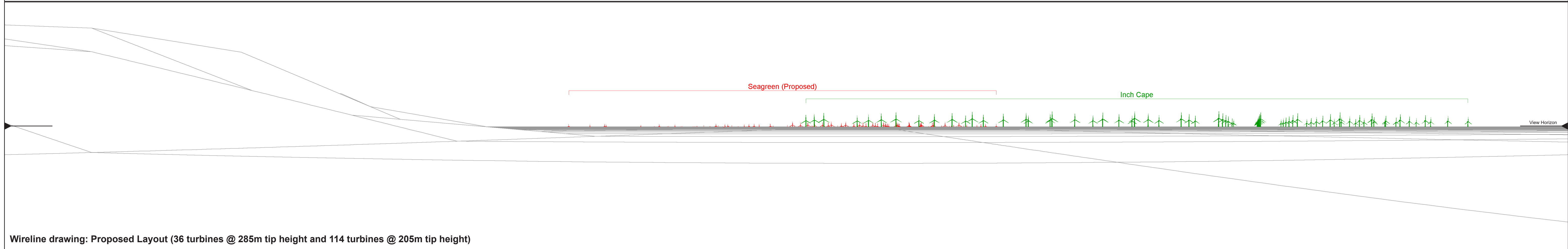
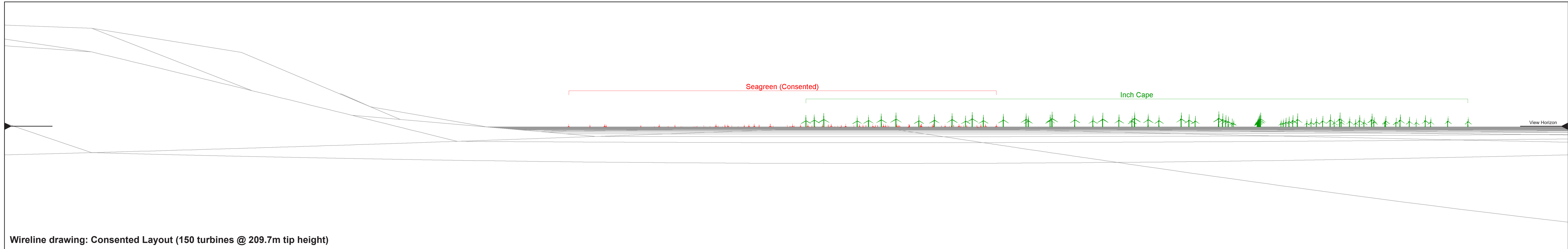


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 Direction of view: 85°  
 Nearest turbine: 38.4 km

Horizontal field of view: 90° (cylindrical projection)  
 Principal distance: 522 mm  
 Paper size: 841 x 297 mm (half A1)  
 Correct printed image size: 820 x 260 mm

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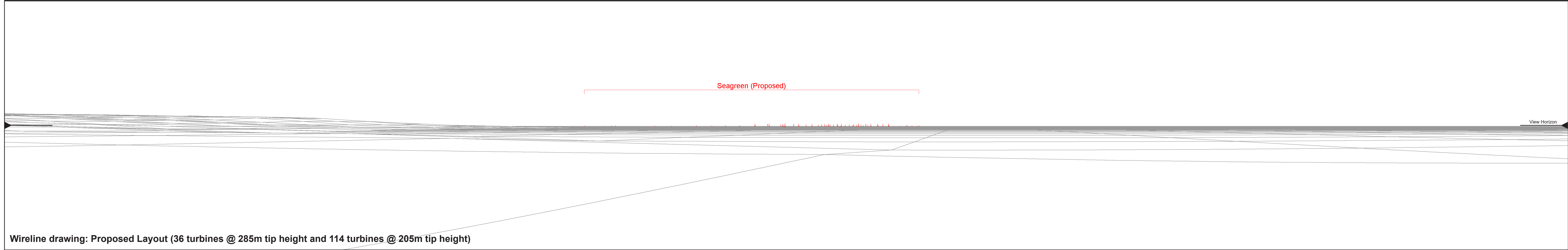
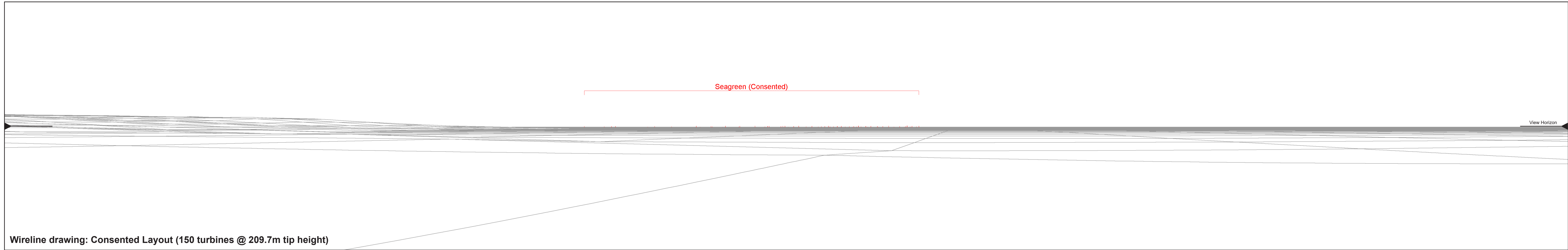
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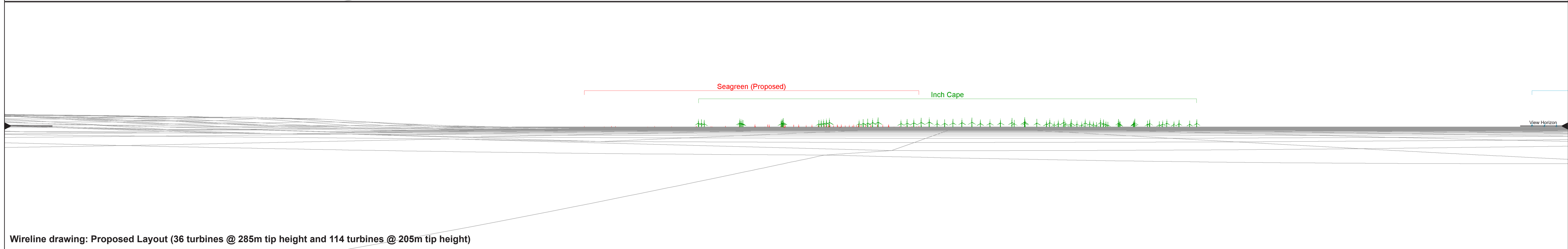
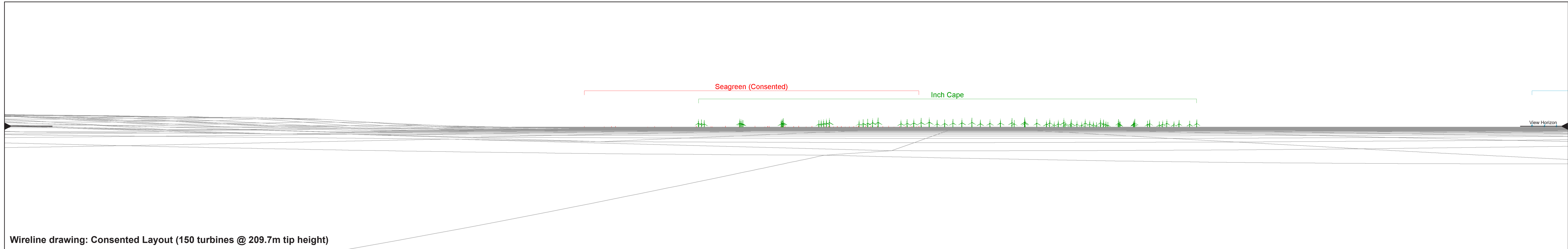
Wind Farm Developments key  
 (by status):

- Seagreen
- Operational
- Under construction
- Consented

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OS reference:	356249E 734093N	Horizontal field of view:	90° (cylindrical projection)
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Direction of view:	80°	Paper size:	841 x 297 mm (half A1)
Nearest turbine:	48.2 km	Correct printed image size:	820 x 260 mm



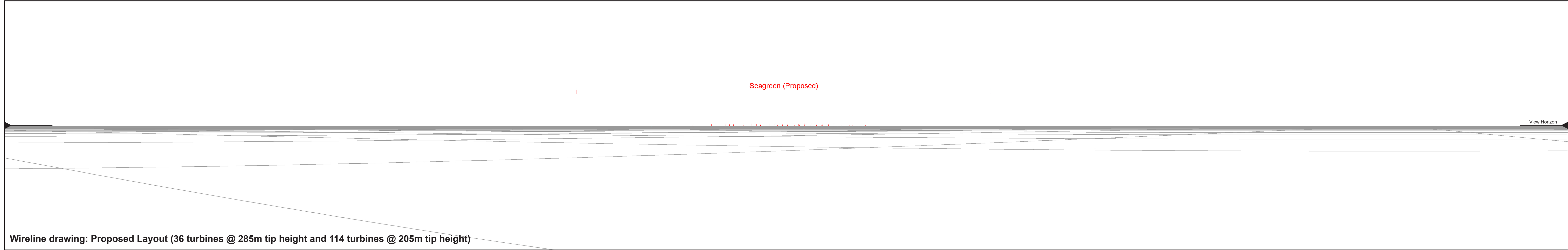
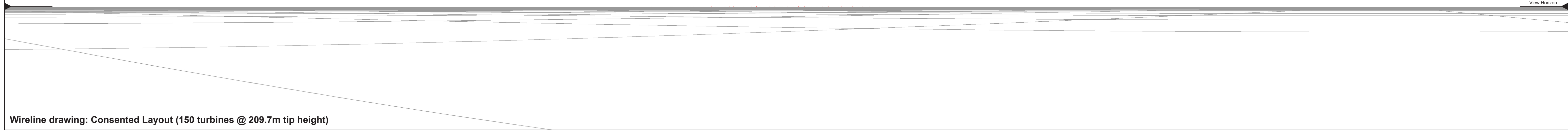
OS reference: 356249E 734093N  
 AOD: 1 m  
 Direction of view: 80°  
 Nearest turbine: 48.2 km

Horizontal field of view: 90° (cylindrical projection)  
 Principal distance: 522 mm  
 Paper size: 841 x 297 mm (half A1)  
 Correct printed image size: 820 x 260 mm

Wind Farm Developments key  
 (by status):

- Seagreen
- Operational
- Under construction
- Consented

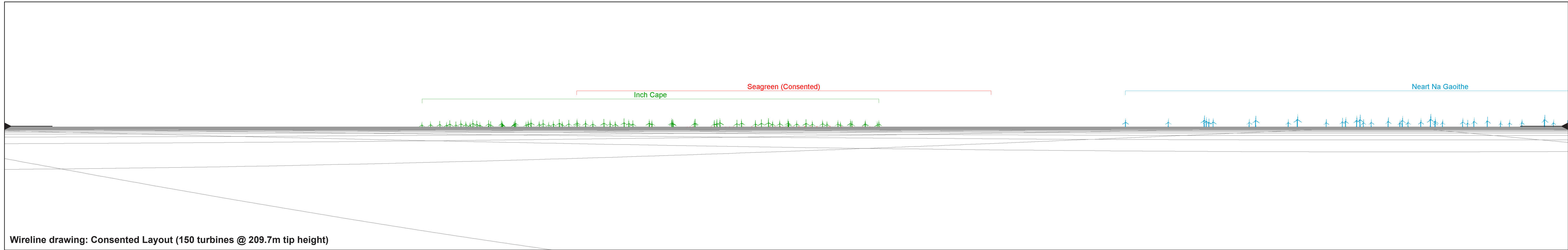
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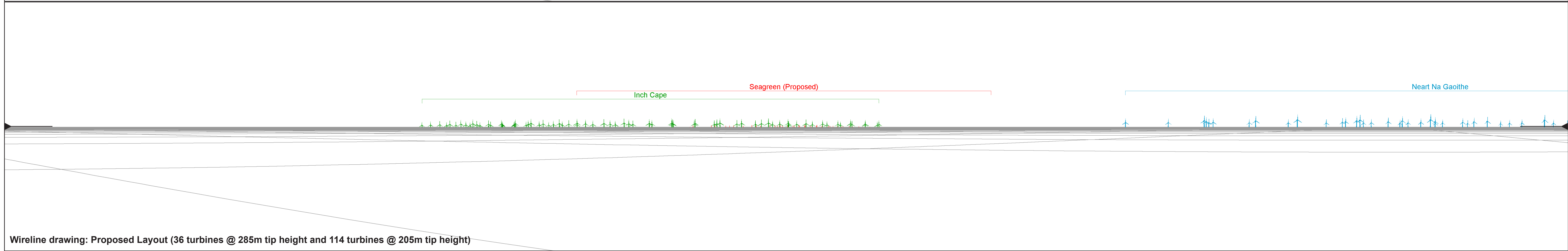
OS reference: 363842E 709766N  
 AOD: 0 m  
 Direction of view: 55°  
 Nearest turbine: 48.6 km

Horizontal field of view: 90° (cylindrical projection)  
 Principal distance: 522 mm  
 Paper size: 841 x 297 mm (half A1)  
 Correct printed image size: 820 x 260 mm

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Wireline drawing: Consented Layout (150 turbines @ 209.7m tip height)



Wireline drawing: Proposed Layout (36 turbines @ 285m tip height and 114 turbines @ 205m tip height)

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OS reference: 363842E 709766N  
 AOD: 0 m  
 Direction of view: 55°  
 Nearest turbine: 48.6 km

Horizontal field of view: 90° (cylindrical projection)  
 Principal distance: 522 mm  
 Paper size: 841 x 297 mm (half A1)  
 Correct printed image size: 820 x 260 mm

Wind Farm Developments key  
 (by status):

- Seagreen
- Operational
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