EMEC
THE EUROPEAN MARINE ENERGY CENTRE LTD

Billia Croo S36 Addendum

March 2021




Document History

Revision	Date	Description	Originated by	Reviewed by	Approved by
0.1	23/03/2021	Originate	DL		

Disclaimer

Contents

1 Executive Summary

The purpose of this report is to provide additional information to Marine Scotland regarding the Section 36 application to extend the boundary of EMEC's Billia Croo wave test site. Following a formal consultation exercise carried out by Marine Scotland, several issues were raised by consultees that must be addressed before further progress can be made.

To address the additional information requests, EMEC have conducted further consultations and contracted supplementary work. This report aims to present the additional information in a manner suitable for inspection by Marine Scotland.

2 Hydrodynamic impact of EMEC on aquaculture

During the consultation, Marine Scotland Science (MSS) provided a response to Marine Scotland that showed concerns regarding activity at Billia Croo potentially disturbing hydrodynamic processes which may then impact aquaculture sites nearby. Upon requesting further clarification from MSS, it was highlighted that construction/decommissioning activities were of most concern. The proposed solution was to write a small paragraph explaining the potential issues and why they are considered to be small/negligible.

Firstly, most literature addressing potential impacts of constructing/removing renewable energy developments is focused around large-scale developments such as bottom-fixed turbines and large arrays. As expected, large-scale construction projects within the marine environment is very likely to cause a disturbance to the benthic environment, in particular the resuspension of sediment. The activity occurring at the Billia Croo site is not of a scale that significantly resuspends sediment or alters hydrodynamic processes to the degree of significantly affecting aquaculture sites as far away as the East coast of Hoy, which have been highlighted by MSS as potentially most at risk from this impact pathway. EMEC is assured that any construction, decommissioning, or operational activity at Billia Croo will not significantly affect hydrodynamic processes, sedimentation, or aquaculture.

No literature could be found addressing the issue of sedimentation and altered hydrodynamic processes with regards to single device and small-scale array testing, and instead mostly focuses on large-scale developments that often involve dredging. This shows that scientific studies are not currently focused on this impact pathway for small-scale deployments and therefore should not be considered a significant impact at EMEC sites.

3 Updated SLVIA

During the consultation, OIC provided a response to Marine Scotland that contained a section showing concern regarding worst-case scenarios and the method to which the Seascape, Landscape and Visual Impact Assessment (SLVIA) addressed the issue.

EMEC have consulted with OIC and a new method for producing and presenting the worst-case visualisations was agreed. This involved EMEC contracting extra work to the company that produced the original document. The addendum to the original SLVIA is included within the supporting documentation.

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European Marine Energy Centre

Seascape, Landscape and Visual Impact Assessment
Visualisation Addendum

Draft report
Prepared by LUC
July 2020

European Marine Energy Centre

Seascape, Landscape and Visual Impact Assessment
Visualisation Addendum

Project Number
10497

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1.	Draft	P Macrae	F Grimston	P Macrae	28.07.2020
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Chapter 1
Introduction

Background

1.1 The European Marine Energy Centre Limited (EMEC) is seeking Section 36 consent under the Electricity Act 1989, to cover a range of testing activities that may be carried out at their Billia Croo wave test site off the south-west coast of mainland Orkney. The wave test site is located within the sensitive context of the Hoy and West Mainland National Scenic Area (NSA).

1.2 LUC prepared a seascape, landscape and visual impact assessment (SLVIA) report in support of the Section 36 application in 2019. The SLVIA was based on a realistic worst case development scenario, using the maximum likely parameters of the project envelope in terms of the amount and scale of the development.

1.3 The worst case scenario (WCS) was defined as a range of wave energy devices and other features, of varying size and form, that would be visible within the wave test site at any one time. It was also acknowledged that the WCS was not a static scenario, but would change over time as devices were installed, temporarily moved and decommissioned.

1.4 Because of the uncertainly as to the future appearance of the wave test site, no detailed photomontages were included within the SLVIA. The report was instead supported by visualisations showing the extent of the wave test site overlaid on to baseline photographs from key viewpoints. These visualisations were annotated to indicate the positions of operational devices, where visible. This approach was agreed with consultees (see Table 2.1 of the SLVIA report).

1.5 In October 2019, Orkney Islands Council (OIC) responded to the Section 36 application, highlighting "*significant concerns regarding the proposed scale and colour of the devices and ancillary equipment*". OIC requested visualisations to illustrate the effects on the special qualities of the NSA and the seascape of the west coast of Orkney, as well as further information on cumulative effects.

1.6 In May 2020, EMEC, LUC and OIC met to discuss the SLVIA, and it was agreed that photomontage visualisations of the WCS would be prepared and submitted. This Addendum report presents these visualisations and sets out a brief reappraisal of effects on seascape, landscape and visual receptors.

Worst Case Scenario

1.7 The WCS was based on parameters of the Project Envelope, and was defined in the SLVIA report as follows:

- The development will comprise up to 20 separate wave energy converters (WECs) (single devices, components or assemblages), all of which are assumed to be floating or surface piercing;
- The devices/components will be grouped around five berths, which are assumed to be spaced across the entire test site;
- A variety of forms, types and sizes of devices/components will be present, though it is assumed that all devices/components will be at or approaching the maximum dimensions;
- In addition to the 20 devices/components, the scenario assumes the presence of two floating platforms and ten electrical hubs, and a number of smaller scientific instruments;
- All devices/components and other equipment will be painted yellow, and will be fitted with flashing yellow lights with a nominal range of three nautical miles (5.6 km) – flashing patterns are assumed to vary between devices;
- The arrangement of WECs will change on a regular basis over the consent period, with WECs being installed or decommissioned on average every six months;
- During each installation or decommissioning procedure, large vessels will be on site for up to one month at a time; and
- Operations using smaller vessels (up to 30 m) will take place on a weekly basis.

1.8 In order to produce visualisations of this scenario, further refinement was undertaken to define a potential layout and arrangement of WECs. The layout is shown in **Figure 1** and was prepared based on the following further parameters:

- Installations are focused around 10 berths, which are located across the whole test site (locations are indicative only);
- Five berths host arrays of three identical WECs and five berths host single WECs (total of 20 WECs);
- The project envelope allows three maximum device sizes:
  - 30x50x8m
  - 30x20x12m
  - 200x12x8m
- Sizes are randomly assigned to WECs, but with at least one array and at least one single device of each dimension;
- WECs and arrays are all aligned to west-north-west;
- Two floating platforms are shown in random locations – one has dimensions 30x50x8m and the other 30x20x12m;
- Electrical hubs are assigned to all berths, and are assumed to be conical structures 12m in diameter and 12m high; and
- All elements are painted bright yellow.

1.9 For the purposes of night-time visualisation, it was assumed that all WECs are fitted with a single navigation marker light with a nominal range of three nautical miles. This is the same specification as the lights on the existing cardinal buoys.

1.10 Dynamic elements of the WCS, such as ship movements and changes in the WECs over time, are not illustrated. As WECs will be installed and decommissioned regularly, the WCS will be a temporary state that will be present for around 6-12 months.

1.11 The layout and additional parameters were agreed with EMEC as being a realistic interpretation of the WCS, although it is considered highly unlikely that this precise arrangement of shapes and forms would occur.

Visualisations

1.12 The WCS described above and shown in **Figure 1** has been illustrated in views from five key viewpoints that were assessed in the SLVIA. These are listed below:

- Viewpoint 1 Yesnaby;
- Viewpoint 2 Black Craig;
- Viewpoint 3 Outertown;
- Viewpoint 4 Warbeth Beach; and
- Viewpoint 5 Cuilags, Hoy.

1.13 An additional visualisation showing the night-time appearance of the WCS has been prepared using dusk photography taken at Viewpoint 3 Outertown.

1.14 Visualisations are shown in **Figures 2 to 7**.

Methodology for producing visualisations

1.15 Visualisations were produced for the purposes of this Addendum, and were created using site photography, a digital terrain model (DTM) and a 3D block model of the WCS. The visualisations in this Addendum were produced using

photography captured for the 2019 SLVIA Report, which was carried out in accordance with the Landscape Institute Advice Note 01/11 *Photography and photomontage in landscape and visual impact assessment*.

Photography

1.16 A series of partly overlapping photographs was taken using a Digital SLR camera with a fixed 50mm lens. All viewpoint photography was executed using a fully levelled tripod with panoramic head. During field photography, various parameters were recorded including the British National Grid coordinates of the viewpoint locations, date and time, and camera settings, and these are presented on the viewpoint images in Figures 2 to 7. Other information was recorded for alignment purposes, such as bearings to distinct features in the view. The individual photos were stitched together in Adobe Photoshop software using cylindrical projection to form wide angle panoramic images with a 90 degree horizontal field of view.

1.17 The images are presented on an A1 length and A3 landscape format height page (841 x 297mm) with a horizontal view of 90 degrees.

Digital Terrain Model

1.18 A 3D landform model of the study area was created using gridded Ordnance Survey (OS) Terrain 5 data within 43D Topos software. This data is in British National Grid coordinates and consists of height values (metres above Ordnance Datum) at each intersection of a 5m horizontal grid.

Modelling

1.19 The extent of the scheme, and the infrastructure shown in **Figure 1** representing the WCS, was modelled within AutoCAD software and imported into the DTM. The selected viewpoints were added to the model (using onsite GPS readings and aerial mapping) and views were created within Topos using identical camera parameters. These camera views were then rendered and exported to replicate the size (in pixels), horizontal field of view and central view bearing of the stitched baseline photographs.

1.20 The rendered exports were aligned with the photography to create the photomontage visualisations. The photomontages provide an accurate visual representation of the area of sea in which the test site is located, and the potential scale and distribution of infrastructure within the test site from these viewpoint locations.

1.21 The visualisations aim to inform the visual assessment and show the maximum (worst case) extent of infrastructure in terms of number and size of devices, though this will vary over the life of the project.

Lighting

1.22 The dusk photomontage in Figure 7 provides an indicative representation of the appearance of the infrastructure in the hours of darkness. This visualisation uses baseline photography taken at dusk which shows shore based light sources and offshore navigational lighting installed on an existing buoy. While any lighting would have a nominal range of three nautical miles, the precise strength of the proposed lighting specification is unconfirmed at this stage. The visualisation seeks to replicate the appearance of the existing offshore buoy lighting, applying this to each component at their most easterly point. In addition, light strength and visual degradation have been estimated using the relative position of the components to the existing buoy light.

Chapter 2
Appraisal

2.1 The landscape and visual effects of the Project were assessed in detail as part of the SLVIA. The following sections revisit the assessments made with reference to the visualisations.

Effects on coastal character

2.2 Moderate effects were predicted to occur along the west Mainland coast, between Breckness in the south and Yesnaby in the north, representing around 7 km of coastline. This was due to the proximity of the coastline to the test site, and the likely effect that the presence of the test site would have on key views that contribute to its character.

2.3 Figures 2, 3 and 4 illustrate views from this section of coastline. The visualisations show that WECs and other features could be clearly visible from the coast, occupying the inshore area to the west. As noted in the SLVIA, the presence of offshore infrastructure and equipment will affect key characteristics including the openness of the sea and the remoteness of the coast.

2.4 The assessment identified minor effects across other coasts, including the high-sensitivity coastlines of north Hoy, due primarily to the distance from the test site, and the limited influence that devices and activities within the test site would have on key characteristics. Figure 5 for example illustrates that the WCS would form a small group of features within the overall view.

2.5 At night, the SLVIA concluded that marker lights on the WECs and other equipment would be visible as uncharacteristic features, affecting the qualities of remoteness associated with the coast between Black Craig and Yesnaby. Lighting would be visible from the more settled coast south of Black Craig (see Figure 7) though lighting onshore and offshore is more characteristic in this area.

Effects on landscape character

2.6 The effects on the Cliff Landscapes landscape character type (LCT) were judged to be moderate, with minor effects on the other LCTs examined. These effects reflect the findings of effects on coastal character, and moderate effects are due to the presence of the WECs and other equipment, as illustrated in Figures 2, 3 and 4. Effects on inland coastal character will be minor or negligible.

Effects on views

2.7 The SLVIA found that a moderate level of effect is likely to be experienced from elevated positions along the west Mainland coast, in close proximity to the test site, as represented by Viewpoints 1 and 2. Minor effects are expected from lower elevations on the Mainland coast or from Hoy due to partial or distant views, respectively.

2.8 Figures 2 and 3 show the potential view of the WCS from Viewpoints 1 and 2, and show how the WECs and other equipment will be clearly visible in the immediate views towards the sea. In particular, the wide extent of the test site will be visible from Viewpoint 2, and the SLVIA accordingly finds that major effects would be experienced by walkers using coastal paths between Yesnaby and Black Craig, as a result of sequential and sustained views of devices and activities within the test site.

2.9 The SLVIA also notes that moderate effects would be experienced by visitors to these locations at night time, including dusk and sunset, as a result of marker lights on the WECs and other equipment.

2.10 Effects on community receptors (i.e. residents) at Outertown and other locations are likely to be minor as only the southern portion of the test site will be visible. Figure 4 illustrates the potential appearance of the WCS from Outertown, and Figure 7 shows the same view at dusk. Moderate effects may be experienced during the hours of darkness as a result of the lighting across the test site.

2.11 The level of effect on other receptors, including people travelling through the area by car or ferry, and recreational receptors in other locations such as Hoy, will be minor as set out in the SLVIA, as the WECs and other equipment within the test site will be small or distant features within views from these locations, as represented by Figures 5 and 6.

Effects on the special qualities of the NSA

2.12 An assessment of effects on the special qualities of the Hoy and West Mainland NSA was undertaken as part of the SLVIA. This found that the special quality relating to *'spectacular coastal scenery'* was the only one likely to experience a moderate effect, although this will be localised to the elevated west Mainland coast (Figures 2 and 3). The WCS will not have any unduly adverse effect on the integrity of the NSA, nor the qualities for which it has been designated.

Cumulative effects

2.13 Cumulative effects were scoped out of the SLVIA, since no other consented or planned developments have been identified that would interact with the test site to give rise to potentially significant cumulative effects. This remains the case, though OIC suggested in their response that "*existing coastal and marine developments, and developments currently within the planning system, should have been considered for potential cumulative effects on the NSA*." Existing developments are part of the landscape and visual baseline, so are already considered in the SLVIA. A further check of the OIC planning portal has not identified any coastal or marine developments within the study area that would interact with the test site to give rise to potentially significant cumulative effects.

2.14 Cumulative effects may arise within the test site as a result of different types of WEC or other equipment being deployed simultaneously. The WCS shown in Figure 1 represents this by incorporating the widest possible range of WEC dimensions and numbers, and this has been illustrated in the accompanying visualisations. The dynamic nature of the test site, with WECs and other equipment being regularly installed and decommissioned, is also considered in the SLVIA. No cumulative effects that are additional to the effects set out in the SLVIA are therefore anticipated.

Conclusions

2.15 The SLVIA was undertaken in 2019 based on a realistic WCS, which has been further developed as a layout for illustration within this Addendum. It is considered highly unlikely that this actual combination of sizes and forms of WECs and other equipment would be deployed at the test site, but the layout forms a reasonable interpretation of the WCS.

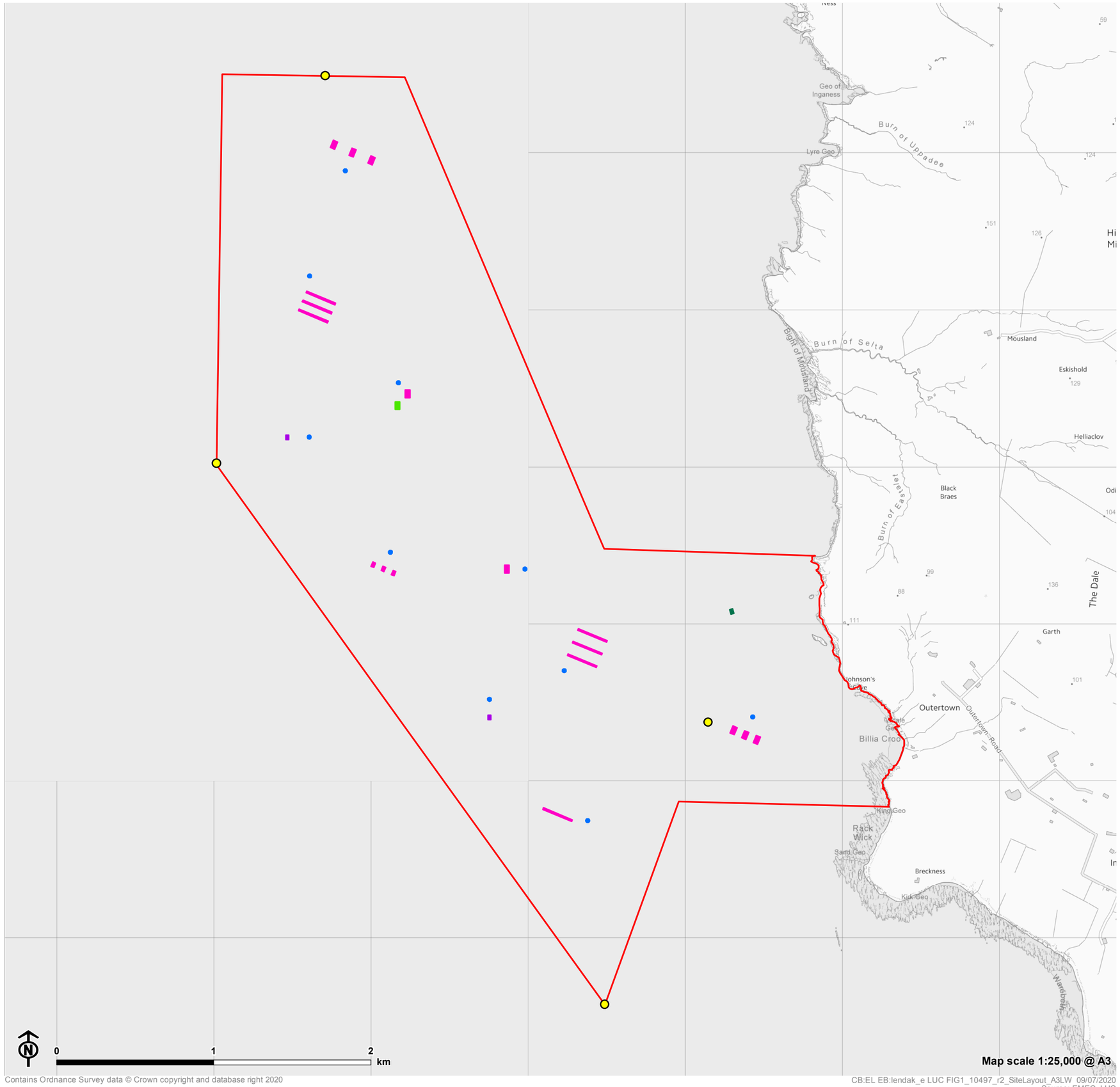
2.16 The visualisations support the findings of the SLVIA, in terms of the likely scale of effect on landscape and visual amenity. The WCS is predicted to give rise to a number of moderate effects, and a smaller number of major effects, on landscape and visual receptors in a localised area of the West Mainland coast, with reduced effects across the wider study area. Effects on the integrity of the NSA are not anticipated. No additional cumulative effects are predicted.

2.17 The dynamic nature of the test site is not shown in the visualisations. While there may be short periods within the 20-year duration of the Section 36 consent when something approaching the WCS is present, there may also be periods when less development is visible. All effects of the proposal will be temporary and fully reversible at the end of the 20-year period.

Billia Croo Seascape, Landscape and Visual Impact Assessment
for European Marine Energy Centre Ltd

LUC

Figure 1: Proposed Site Layout



Project area
Cardinal buoy

Proposed infrastructure

Wave energy converter (12m tall)
Wave energy converter (8m tall)
Electrical hub (12m tall cone)
Floating platform (12m tall)
Floating platform (8m tall)

CB:EL EB:lendak_e LUC FIG1_10497_r2_SiteLayout_A3LW 09/07/2020
Source: EMEC, LUC

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Billia Croo Test Site: SLVIA Addendum

Figure 2a

Viewpoint 1: Yesnaby

OS reference:	321823 E 1015675 N
AOD:	24 m
Direction of view:	220° from North
Distance to development:	3.27 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	16/11/2018 11:25

Billia Croo Test Site: SLVIA Addendum

Figure 2b

Viewpoint 1: Yesnaby

LUC

OS reference:	321823 E 1015675 N
AOD:	24 m
Direction of view:	220° from North
Distance to development:	3.27 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	16/11/2018 11:25

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Figure 3a

Viewpoint 2: Black Craig

LUC

OS reference:	322009 E 1010994 N
AOD:	109 m
Direction of view:	225° from North
Distance to development:	701 m to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 10:15

Billia Croo Test Site: SLVIA Addendum

Figure 3b

Viewpoint 2: Black Craig

LUC

OS reference:	322009 E 1010994 N
AOD:	109 m
Direction of view:	225° from North
Distance to development:	701 m to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 10:15

Billia Croo Test Site: SLVIA Addendum

Figure 3c

Viewpoint 2: Black Craig

OS reference:	322009 E 1010994 N
AOD:	109 m
Direction of view:	315° from North
Distance to development:	701 m to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 10:15

Billia Croo Test Site: SLVIA Addendum

Figure 3d

Viewpoint 2: Black Craig

LUC

OS reference:	322009 E 1010994 N
AOD:	109 m
Direction of view:	315° from North
Distance to development:	701 m to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 10:15

Billia Croo Test Site: SLVIA Addendum

Figure 4a

Viewpoint 3: Outertown

LUC

OS reference:	323344 E 1010055 N
AOD:	78 m
Direction of view:	275° from North
Distance to development:	1.87 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 11:20

Billia Croo Test Site: SLVIA Addendum

Figure 4b

Viewpoint 3: Outertown

LUC

OS reference:	323344 E 1010055 N
AOD:	78 m
Direction of view:	275° from North
Distance to development:	1.87 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 11:20

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Figure 5a

Viewpoint 4: Warbeth Beach

OS reference:	323569 E 1008526 N
AOD:	7 m
Direction of view:	295° from North
Distance to development:	2.7 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 12:10

LUC

OS reference:	323569 E 1008526 N
AOD:	7 m
Direction of view:	295° from North
Distance to development:	2.7 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 12:10

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Figure 5b

Viewpoint 4: Warbeth Beach

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Figure 6a

Viewpoint 5: Cuilags

LUC

OS reference:	321013 E 1003368 N
AOD:	431 m
Direction of view:	355° from North
Distance to development:	6.4 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	15/11/2018 11:20

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Figure 6b

Viewpoint 5: Cuilags

LUC

OS reference:	321013 E 1003368 N
AOD:	431 m
Direction of view:	355° from North
Distance to development:	6.4 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	15/11/2018 11:20

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Figure 7a

Viewpoint 3: Outertown

LUC

OS reference:	323344 E 1010055 N
AOD:	78 m
Direction of view:	275° from North
Distance to development:	1.87 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 16:30

Billia Croo Test Site: SLVIA Addendum

Figure 7b

Viewpoint 3: Outertown

OS reference:	323344 E 1010055 N
AOD:	78 m
Direction of view:	275° from North
Distance to development:	1.87 km to nearest component

Horizontal field of view:	90° (cylindrical projection)
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 230 mm

Camera:	Nikon D600
Lens:	Nikkor AF 50mm f/1.8D
Camera height:	1.5 m (above AOD)
Date and time:	14/11/2018 16:30