

#### Landscape Proposals

#### Sound of Islay Tidal Energy Substation

ScottishPower Renewables August 2013

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Ction ntrodu

## **1.1 Introduction**

ScottishPower Renewables has received consent to develop a Demonstration Tidal Array in the Sound of Islay, between the islands of Islay and Jura on the west coast of Scotland. It will be the first of its kind and is considered to be a Demonstration Tidal Array.

The proposed development will see ten 1MW devices installed in deep water (>48m), fully submerged on an area of the seabed within the Sound of Islay, just south of Port Askaig. These will then be linked by seabed cable to Islay, to connect to the grid via a substation (indicated on Figure 1).

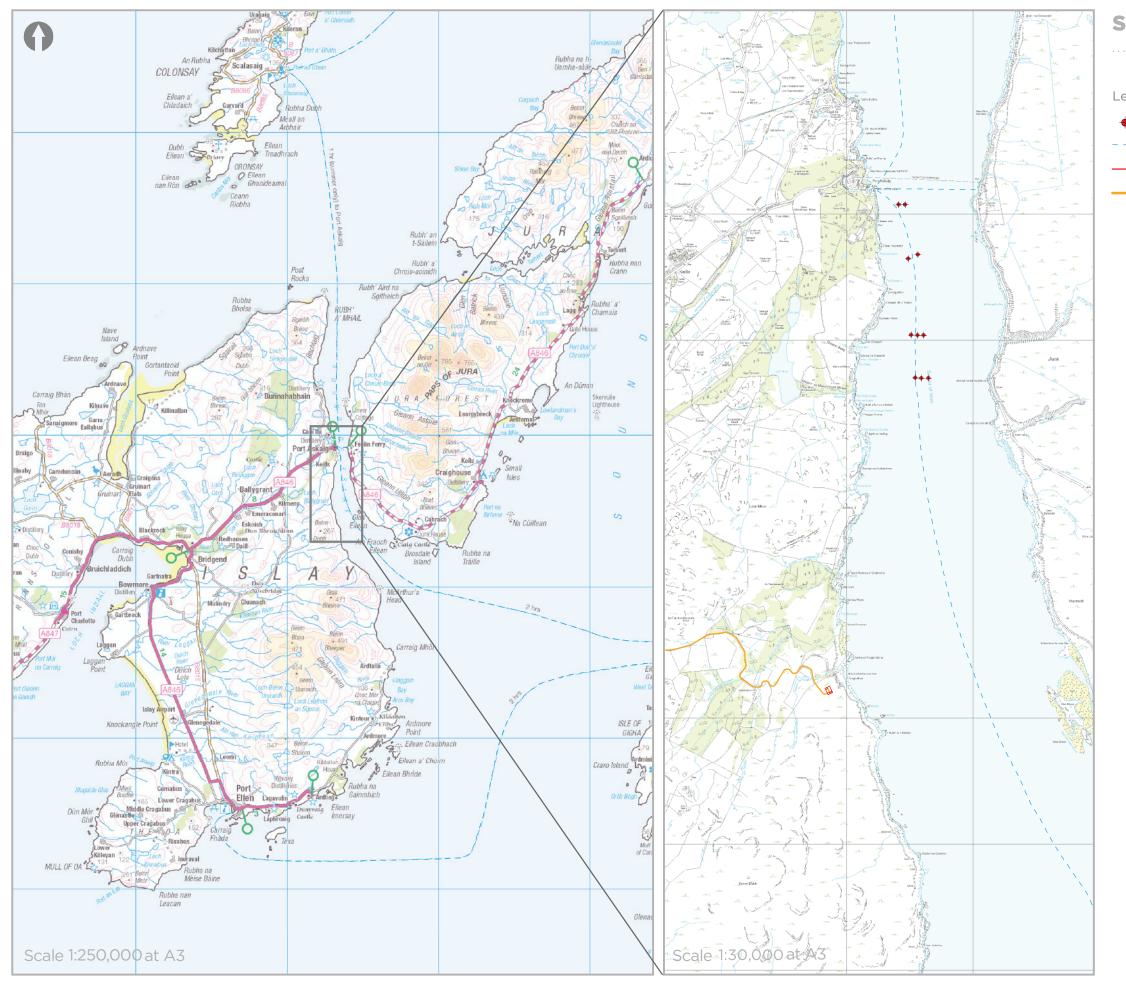
Optimised Environments Ltd (OPEN) were commissioned by ScottishPower Renewables to prepare landscape mitigation proposals for the substation for the Sound of Islay Tidal Energy Project (the substation) that will assist with the integration of the substation in the landscape. OPEN have produced an accurate 3D computer model of the substation and this was used to consider the appearance of the substation in the landscape and determine options for an appropriate landscape mitigation strategy.

This document describes and illustrates these landscape proposals to accompany the planning submission for the substation. It includes a description of the substation development (Section 2); and descriptions of the landscape proposals for the substation (Section 3), principally relating to the colour of the substation buildings (Section 3.1); proposals for a re-graded landform adjacent to the substation (Section 3.2); and proposals for native woodland planting (Section 3.3). The document includes a number of graphic figures which illustrate the landscape proposals, including maps and computer generated visual representations (Figures 1 - 35).



Photograph of Sound of Islay tidal energy substation site location

Sound of Islay Tidal Energy Substation: Landscape Proposals



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#### SITE LOCATION

Legend

- Proposed Turbine
- --- Islay Sound Ferry Route
- ----- Proposed Substation Development
- Proposed Access Road

#### Figure 1: Site Location



The following section presents a description of the main components of the substation development which were considered in the landscape proposals.

## **2.1 The Proposed Development**

#### 2.1.1 Site Selection

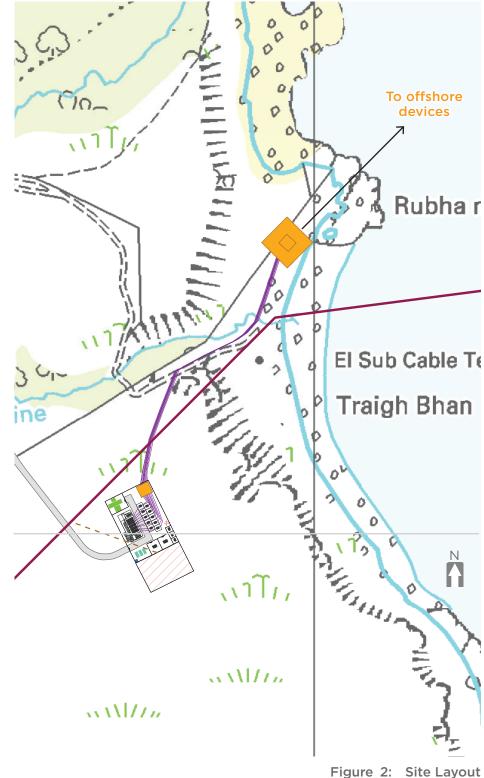
The substation site (Figure 2) was selected primarily for geographic and topographic reasons, whilst also providing associated technical benefits. The substation location possesses significant geographical advantages in relation to the project's High Voltage electrical network. The substation is strategically located close to both the landfall location and therefore connection point of the tidal devices' offshore cables and the distribution network connection point. The close proximity of the substation import and export connection points significantly decreases the requirement for onshore cabling and associated construction activity. The topography of the selected location was also a contributory factor as the site is flat and sheltered by a tree line to the north and a gently sloping elevated landform to the west. The ease of accessibility to the site along an existing access road and track was also considered as this greatly reduces the requirement for extensive road construction works and associated disruption.

#### 2.1.2 Substation Components

The substation compound (Figure 3) will include a control building, step-down transformers, auxiliary transformers, export (step-up) transformers and reactive compensation equipment. The control building will house frequency convertors and associated electrical infrastructure as well as offices and welfare facilities. Onshore cables will enter the substation from the offshore devices. A number of these cables will terminate into the step-down transformers located opposite to the control building. The step-down transformers will reduce the voltage in the cables and subsequently connect to frequency convertors within the control building. One of the cables entering the compound from the offshore devices will bypass the step-down transformers and connect directly into the frequency convertors within the control building. The frequency convertors are designed to modulate power generated by the offshore devices. Underground cables will connect the frequency convertors to the step-up export transformers, which will in turn connect to the capacitor bank. The purpose of the capacitor bank is to control voltage within specified levels between the substation and its grid connection at the nearby overhead 33kV distribution line. The substation compound will also include 3 auxiliary transformers to provide power for auxiliary equipment necessary for the operation of the offshore devices and the substation and control building services.

The	indicative	dimensions	of	the	Substation	control	building	and	
elec	trical infras	tructure are	det	ailed	in the follow	wing tab	le:		

<u> </u>				
	Length (m)	Width (m)	Height (m)	
Control Building	24	11.5	5.9 (Apex)	
Step-down Transformers	1.1	1.7	1.3	
Auxiliary Transformers	0.7	0.9	0.9	
Export (Step-up) Transformers	4.8	3	4.5	
Reactive Compensation Equipment Heat Exchanger	4	3	2	
Reactive Compensation Equipment Surge Arrestors	5	5	4.6	
Reactive Compensation Container	12	3.5	3.6	



#### SITE LAYOUT

#### Legend

- $\oplus$ **Proposed Communication Mast Proposed Reactive Compensation Equipment** Proposed Transitional Pit Proposed Septic Tank Proposed Car Park
- Proposed Access Road
- Proposed Underground 6.6kV Cable
- Proposed 33kV Cable \_ \_ \_
- Existing SSE Overhead 33 kV Line
- **Temporary Construction Compound**

Sound of Islay Tidal Energy Substation: Landscape Proposals



Scale 1:500 at A3

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#### SUBSTATION LAYOUT

- Proposed Communication Mast
- Proposed Reactive Compensation Equipment
- Proposed Transitional Pit
- Proposed Access Road
- ---- Proposed Underground 6.6kV Cable
- --- Proposed 33kV Cable
  - Existing SSE Overhead 33 kV Line

The following section describes and illustrates the landscape proposals for the substation development



# andscape Proposals

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## **3.1** Colour

#### 3.1.1 Existing Conditions

The choice of a particular colour for the control building and HV infrastructure has been considered in the context of the existing environment of Islay. The landscape of Islay has a wide ranging seasonal colour variation, relating to the biological nature of colour in the prevailing habitats of Islay, as shown in the summer and winter photographs of Islay in Figure 4. Summer colours are predominantly shades of green, while winter colours are predominantly shades of brown, while the dark grey colours of Islays rock outcrops remain constant throughout the year. Variations in light at different times of day and during the seasons also have strong influence on the perception of colour in the landscape.

#### 3.1.2 Substation Colour Comparison

A colour comparison was undertaken to inform the choice of colour for the substation buildings. A range of existing colours in the landscape were sampled and compared as potential colour options for the substation (Figure 5 and Appendix A). Indicative images of the substation were produced from the computer model to compare the colour options in relation to the baseline conditions at the site and the prevailing summer/winter colours of Islay (Appendix A and Figure 6). The site layout, location and scale of these images are not representative of the final on site solution and were used for colour comparison / illustrative purposes only.

#### **3.1.3** Proposed Substation Colour

The colour comparison found that darker green colours may be suitable to integrate the substation with the colour of the spring/ summer landscape, but tended to contrast with the browner colour of the autumn/winter landscape. Stronger brown colours may be suitable with the colour of the autumn/winter landscape, but tended to contrast with the colour of the spring/summer landscape.

The colour proposed for the substation (Figure 6) (R128, G129, B113) is considered to be a suitable colour that avoids strong contrast with the existing site conditions in both summer and winter, achieving harmony of substation colour and site context. This colour, sampled from a substation at the European Marine Energy Centre (EMEC), Orkney, is considered to achieve an optimum balance between the strong seasonal colour variations on Islay.



#### Islay Coastal photograph - Spring/Summer



#### Islay Coastal photograph - Autumn/Winter

Sound of Islay Tidal Energy Substation: Landscape Proposals

Figure 4: Existing Colour in the Landscape



Source: Islay coastal\_Summer



Source: Islay coastal winter



G: 123 B: 138

Source: Islay coastal\_Rock outcrops



Source: Islay local wildlife\_Golden Eagle



Source: Site Photograph



#### Source: RGB ref for RAL 6005



Source: RGB ref EMEC cladding A



Source: RGB ref EMEC cladding B



Source: RGB ref EMEC cladding C

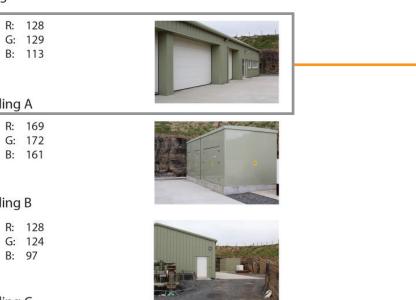












R: 128 G: 129 B: 113







Figure 5: Colour Comparison

pg. 11

Below images are for colour comparison / illustrative purposes only. Site layout, location and scale are not representative of final on site

### **3.2** Landform

#### **3.2.1** Existing Conditions

The proposed substation site is located near the eastern coastline of Islay, near the Sound of Islay. The landform is part of the plateau moorland massif which extends from Port Ellen to Port Askaig. The high, rocky plateau has an undulating landform and a massive scale. The steep slopes are broken by numerous rocky outcrops and massive boulders and by upland lochs. The plateau forms a steep, rocky coastline, often with cliffs, however the sheltered coastline of the Sound of Islay has a more indented character, with some narrow bays and shingle beaches amongst the cliffs.

The site itself is located on a plateau, between 26-30m AOD, between the steeply rising landform of Beinn Dubh which backdrops the site to west/south-west; and the steep, rocky raised beach edge which drops steepy down to sea level in the Sound of Islay to the east. The existing site contours have been surveyed (Figure 7) and show the position of the site on a relatively flat area of ground, with a localised hill form evident in the northern part of the site, at around 28m, with the contours dropping gradually to the south and east, before then dropping steeply at low cliffs on the coastal edge. An incised valley, 'Sruthan na Traighe Baine', is located to the north of the site. The contours rise steeply to the west/south-west up Beinn Dubh (267m).

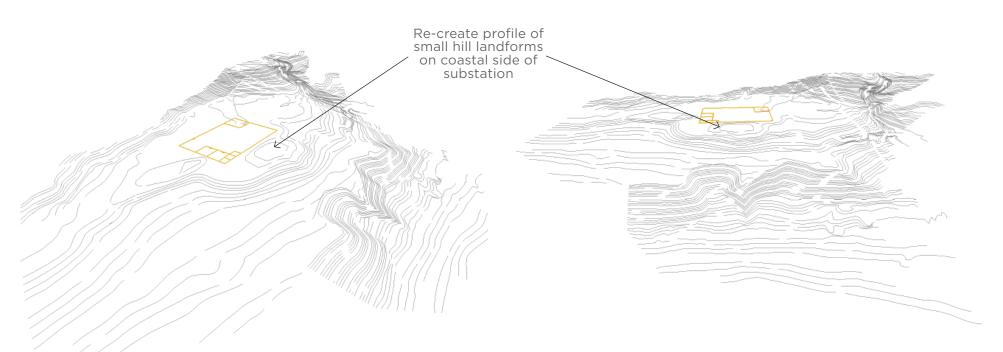
#### 3.2.2 Proposed Landform

The proposed substation site will be visible from the Sound of Islay, in views from the Kennacraig to Port Askaig Ferry (Figure 1), as it is located on the coastal edge of the Sound of Islay. The proposed landform contours aim to provide a degree of visual screening and integration of the development in views from the Kennacraig to Port Askaig Ferry, the principal visual receptor in the Sound of Islay.

A re-profiling of the site contours is proposed as part of the development, levelling the ground within site footprint and grading to the east and south, creating a slightly higher landform on the coastal side of development. Proposed landforms will be constructed utilising site won material from the construction activities. The concept for this proposal illustrated in Figure 7, is to move and re-create the profile of the small hill within the site, in a new location to the east and south of the substation site. The proposed landform (Figure 8) creates a gently sloped landform profile that helps integrate the development within the coastal landform setting and provide a degree of visual screening of the development in views from the Sound of Islay. Visual representations of the proposed landform are illustated in the oblique views in Figures 9 and 10, and from viewpoints in the Sound of Islay in Figures 18, 22 and 26, and from Jura in Figures 30 and 34. The proposed landform avoids the creation of landscape 'bunds' with steep triangular forms, which are inappropriate in this landscape.



Existing site contours - oblique view north





Proposed site contours - obligue view west

Sound of Islay Tidal Energy Substation: Landscape Proposals

#### Figure 7: Landform Concept



Scale 1:1,000 at A3

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#### **PROPOSED CONTOURS**

Legend

- ----- Proposed Substation Development
- ----- Proposed Contours

Figure 8: Proposed Landform

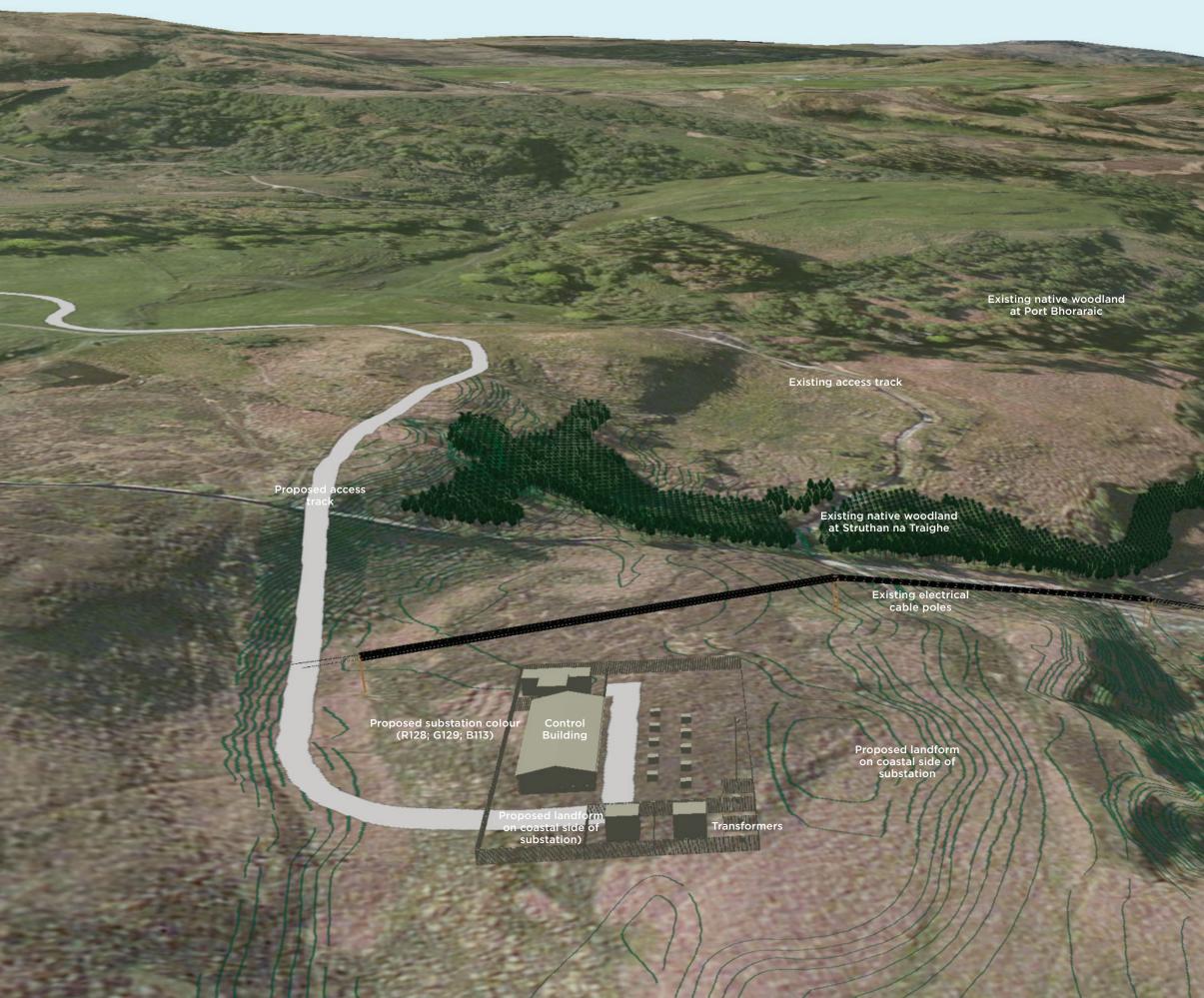


Figure 9: Visual Representation - Oblique View with Landform Proposals (South)

tMappingPlc (c)2010GeoEye (c)2010Intermap (c)2013Microsoft Corporation



Existing native woodland at Struthan na Traighe

Existing access track

1010

Figure 10: Visual Representation - Oblique View with Landform Proposals (East)

## **3.3 Native Woodland**

#### 3.3.1 Existing Conditions

The proposed substation will be visible in the context of existing native woodland located on the coastal edge of the Sound of Islay. There are extensive areas of native woodland around the coastal areas of Port Bhoraraic and Am Tamhanach to the north of the proposed substation, which form a characteristic element of the landscape along this stretch of the Sound of Islay between Port Askaig and Traigh Bhan. In particular, these native woodlands tend to be within small incised valleys near the coast, and along sheltered coastal cliffs of the eastern coastline of Islay, as shown in Figure 11 and the photographs opposite. An area of native woodland is located immediately north of the substation, within the incised valley of 'Sruthan na Traighe Baine'.

#### 3.3.2 Proposed Native Planting

Native woodland planting is proposed as part of the development to help integrate the substation compound within the coastal landscape, particularly when viewed from the Kennacraig to Port Askaig Ferry, the principal visual receptor in the Sound of Islay. Native tree planting is proposed to replicate the succession woodland to the north at Sruthan na Traighe Baine and increase the size of the small areas of existing scrub woodland on the coastal side of the substation compound (photographs, Figure 11). Two main areas of native woodland are proposed (i) to the east/coastal side of the substation compound in small stands on the newly proposed landform; and (ii) to the east/ coastal side of the proposed access track, as shown in the landscape proposals plan in Figure 12. These areas are proposed as a natural extension of the native woodland to the north of the development and connect to the native woodland at Sruthan na Traighe Baine. Further planting in these areas will enhance the characteristic native coastal woodland evident on the eastern coast of Islay and assist with improving the integration of the substation compound and access track within a natural envelope. Planting is proposed at low density, in small stands of hardy native pioneer species, including Alder, Ash, Birch and Hazel to replicate and expand the existing native woodland in the existing environment. Visual representations of the landscape proposals are illustrated in the oblique views in Figures 13 and 14, and from viewpoints in the Sound of Islay in Figures 19, 23 and 27, and from Jura in Figures 31 and 35.



Photograph of scrub woodland established on coastal side of substation



Photograph of native woodland to north of substation at Sruthan na Traighe Baine



etMappingPlc (c)2010GeoEye (c)2010Intermap (c)2013Microsoft Corporation

Figure 11: Aerial Photograph - Existing Native Woodland



Scale 1:1,000 at A3

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#### **LANDSCAPE MITIGATION**

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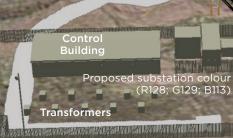
- ••••• Existing Overhead Line
  - Existing Trees
  - Proposed Trees
- Proposed Communication Mast
- Proposed Contours
- Proposed Substation Development
- Proposed Underground Cable
- --- Proposed 33Kv Cable
- Temporary Construction Compound
- Proposed Access Road



Figure 13: Visual Representation - Oblique View with Woodland Proposals (South)

**Traigh Bhan** 

Sound of Islay



Proposed landform on coastal side of substation

Proposed access track

Proposed native woodland planting on coastal side of substation

Existing ele cable p ctrica

Native woodland planting on coastal side of access track

Existing native wood-land at Struthan na Traighe Baine

See the Abberry

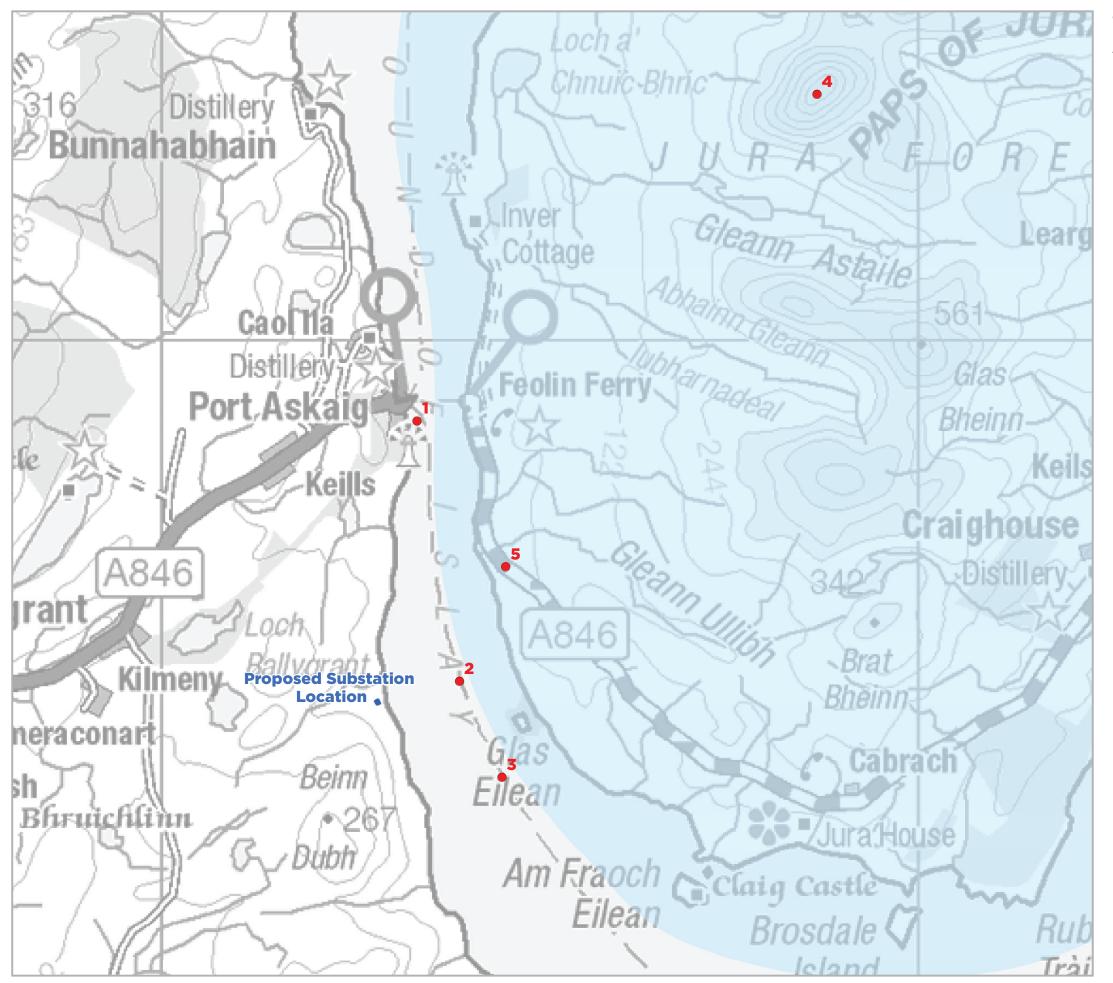
Existing access track

Figure 14: Visual Representation - Oblique View with Woodland Proposals (East)



The following section presents a series of visual representations of the proposed substation and landscape proposals from viewpoints within the Sound of Islay and Jura.





Scale 1:250,000 at A3

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#### **VIEWPOINT LOCATIONS**

Legend

Proposed Substation Location

National Scenic Area

Viewpoints

- 1 Kennacraig to Port Askaig Ferry (North)
- 2 Kennacraig to Port Askaig Ferry (East)
- 3 Kennacraig to Port Askaig Ferry (South)
- 4 Beinn Chaolais
- 5 A846, Jura

Figure 15: Viewpoint Locations

## Viewpoint 1 Kennacraig to Port Askaig Ferry (North)

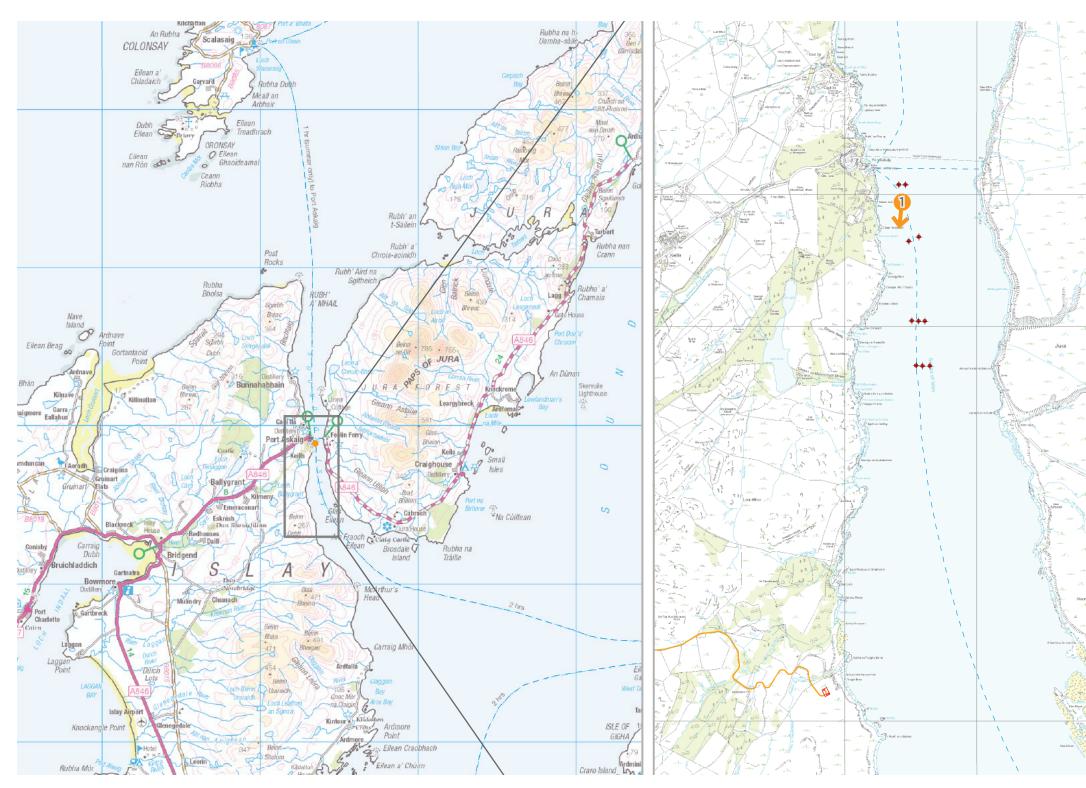
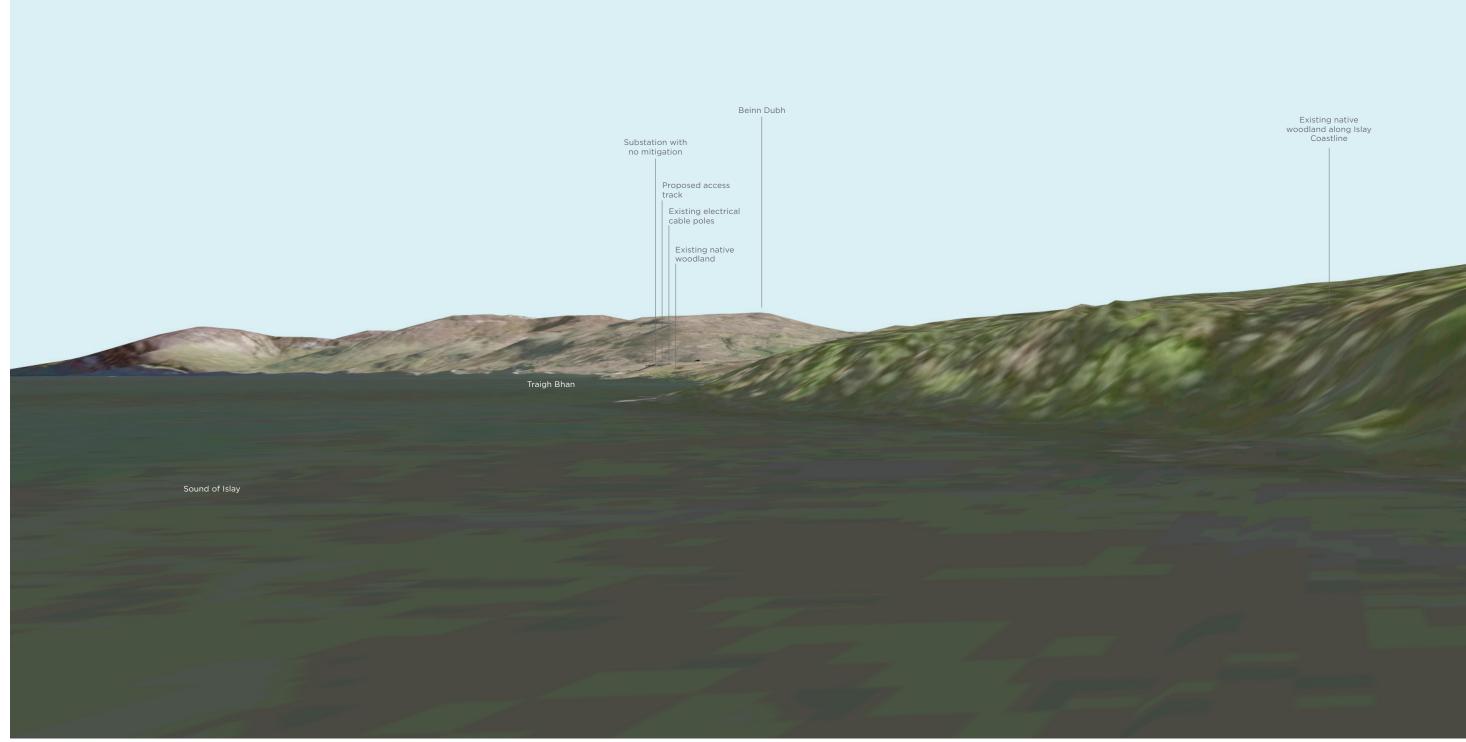


Figure 16: Viewpoint 1 Location - Kennacraig to Port Askaig Ferry (North)

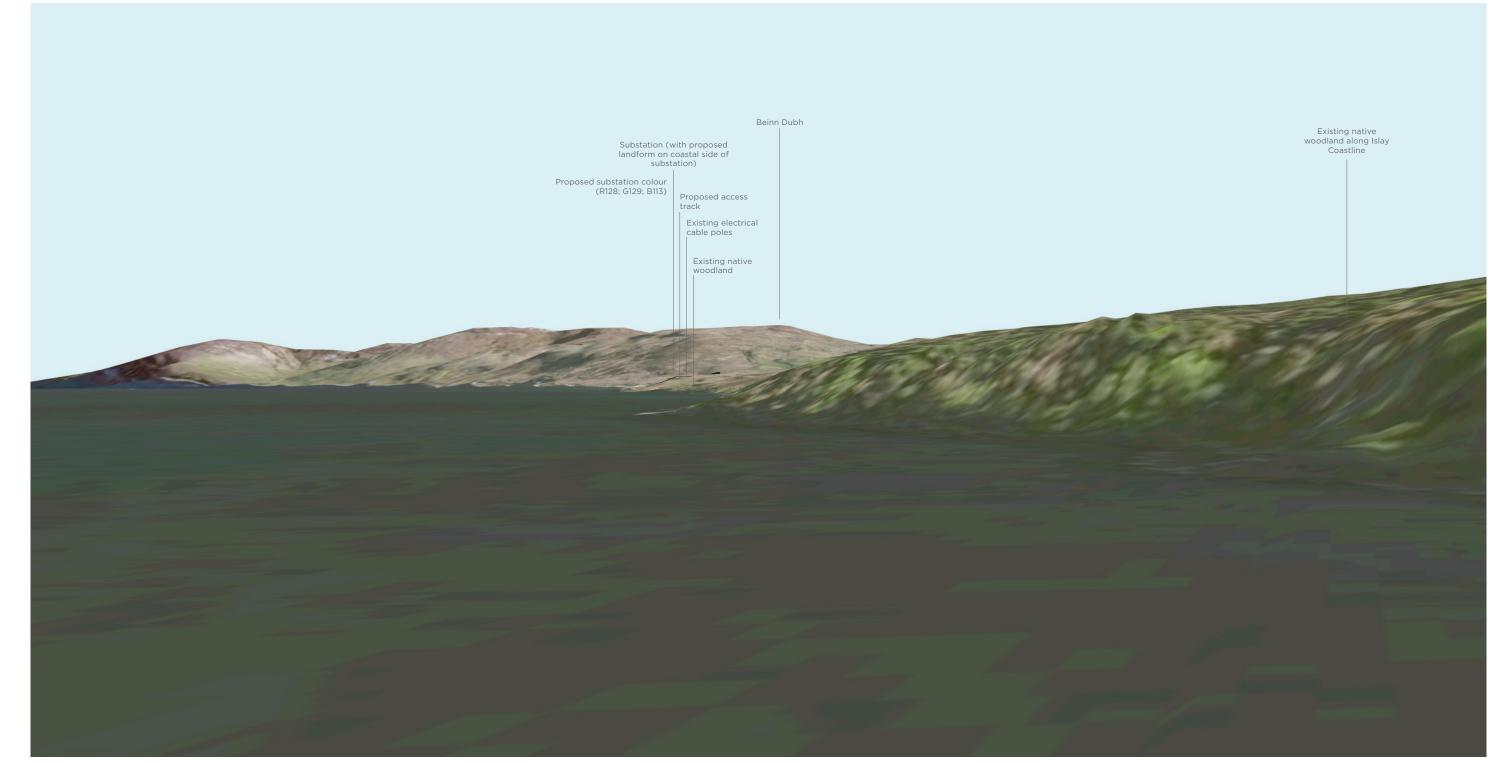
# Viewpoint 1 No Mitigation



Visual representation of the development with **no mitigation** from Viewpoint 1, Kennacraig to Port Askaig Ferry (North)

Figure 17: Viewpoint 1 - Visual Representation (No Mitigation)

## Viewpoint 1 Landform Proposals

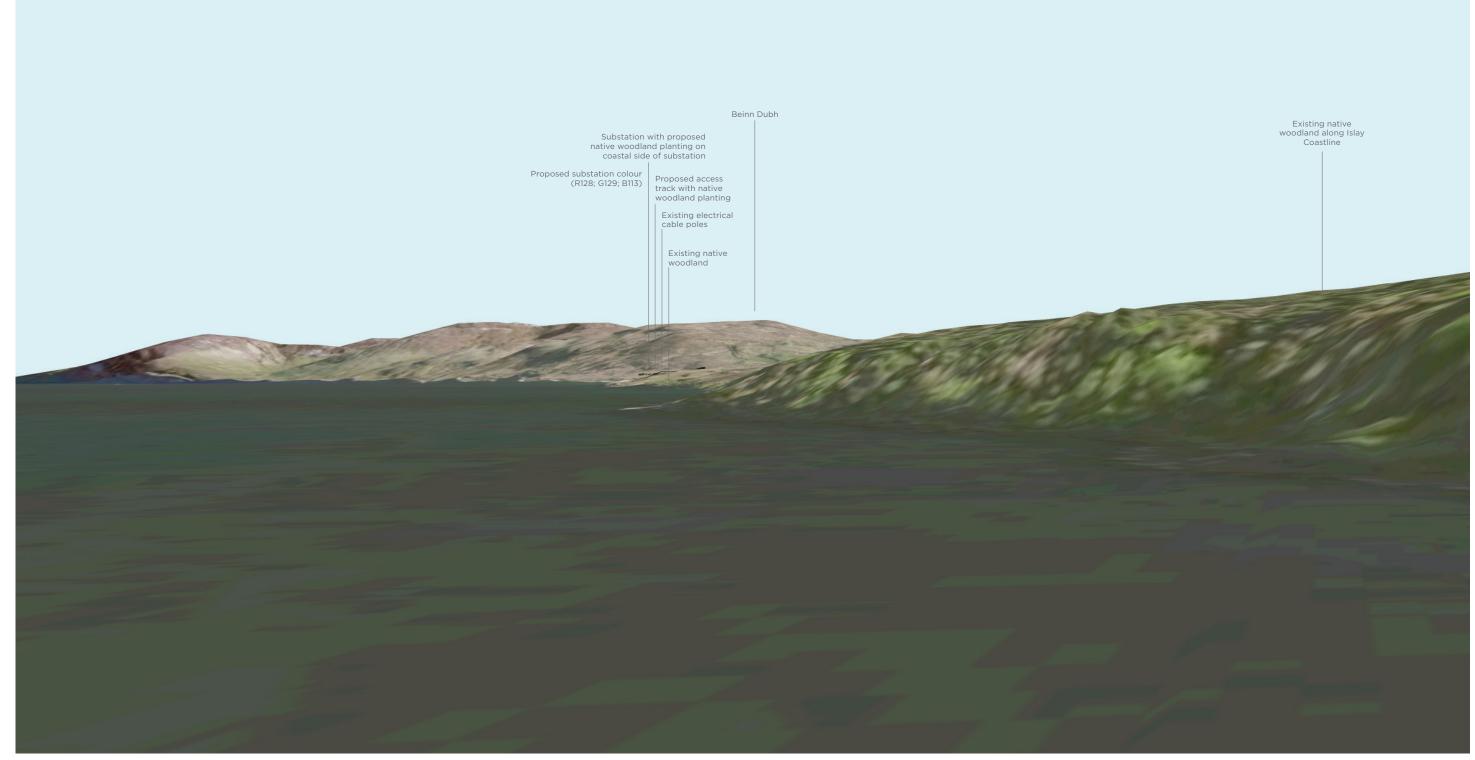


Visual representation of the development with proposed colour and landform mitigation from Viewpoint 1, Kennacraig to Port Askaig Ferry (north)

Figure 18: Viewpoint 1 - Visual Representation (Landform Proposals)

Viewer height 10m (estimated for ferry)

## Viewpoint 1 Woodland Proposals



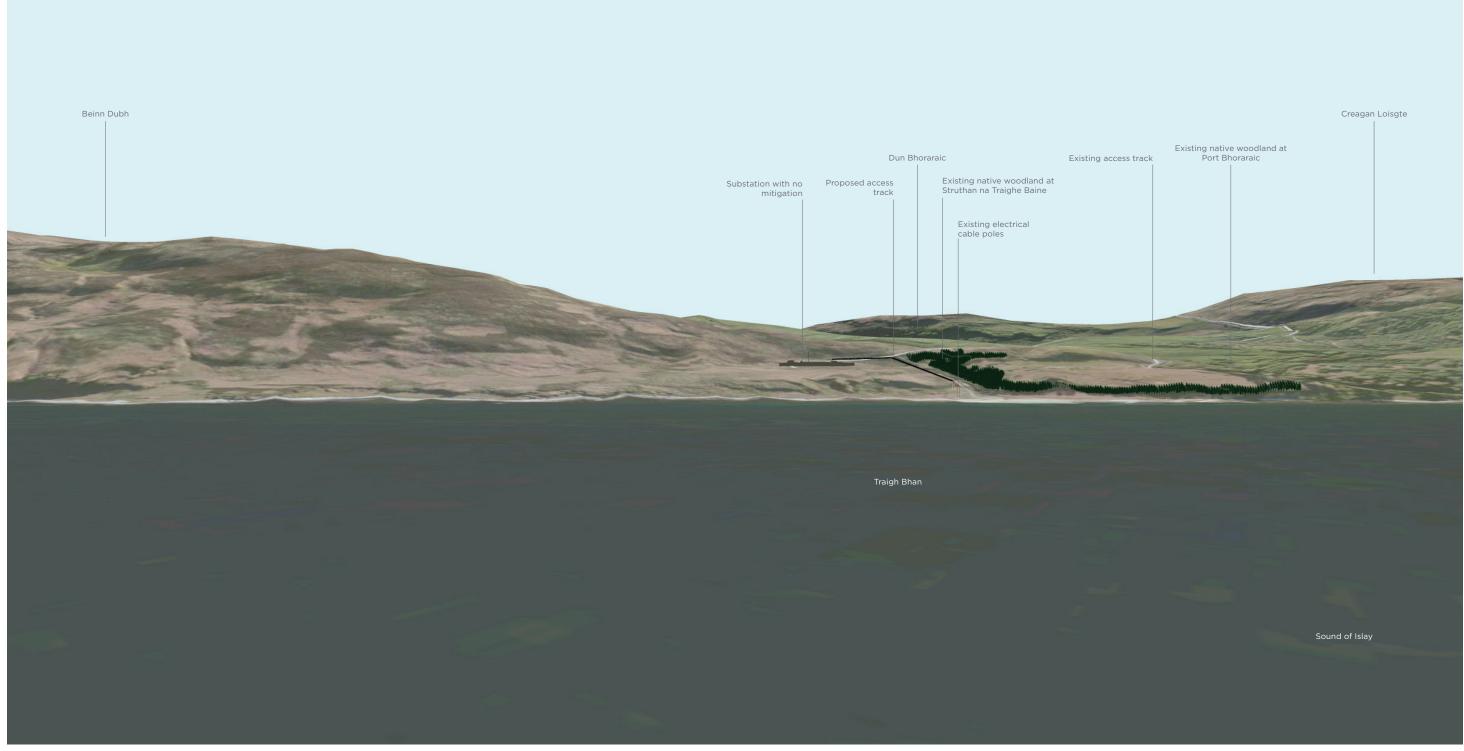
Visual representation of the development with proposed colour, landform and woodland planting mitigation from Viewpoint 1, Kennacraig to Port Askaig Ferry (North) Figure 19: Viewpoint 1 - Visual Representation (Woodland Mitigation)

## Viewpoint 2 Kennacraig to Port Askaig Ferry (East)



Figure 20: Viewpoint 2 Location - Kennacraig to Port Askaig Ferry (East)

# Viewpoint 2 No Mitigation



Visual representation of the development with no mitigation from Viewpoint 2, Kennacraig to Port Askaig Ferry (East)

Figure 21: Viewpoint 2 - Visual Representation (No Mitigation)

pg. 27

## Viewpoint 2 Landform Proposals

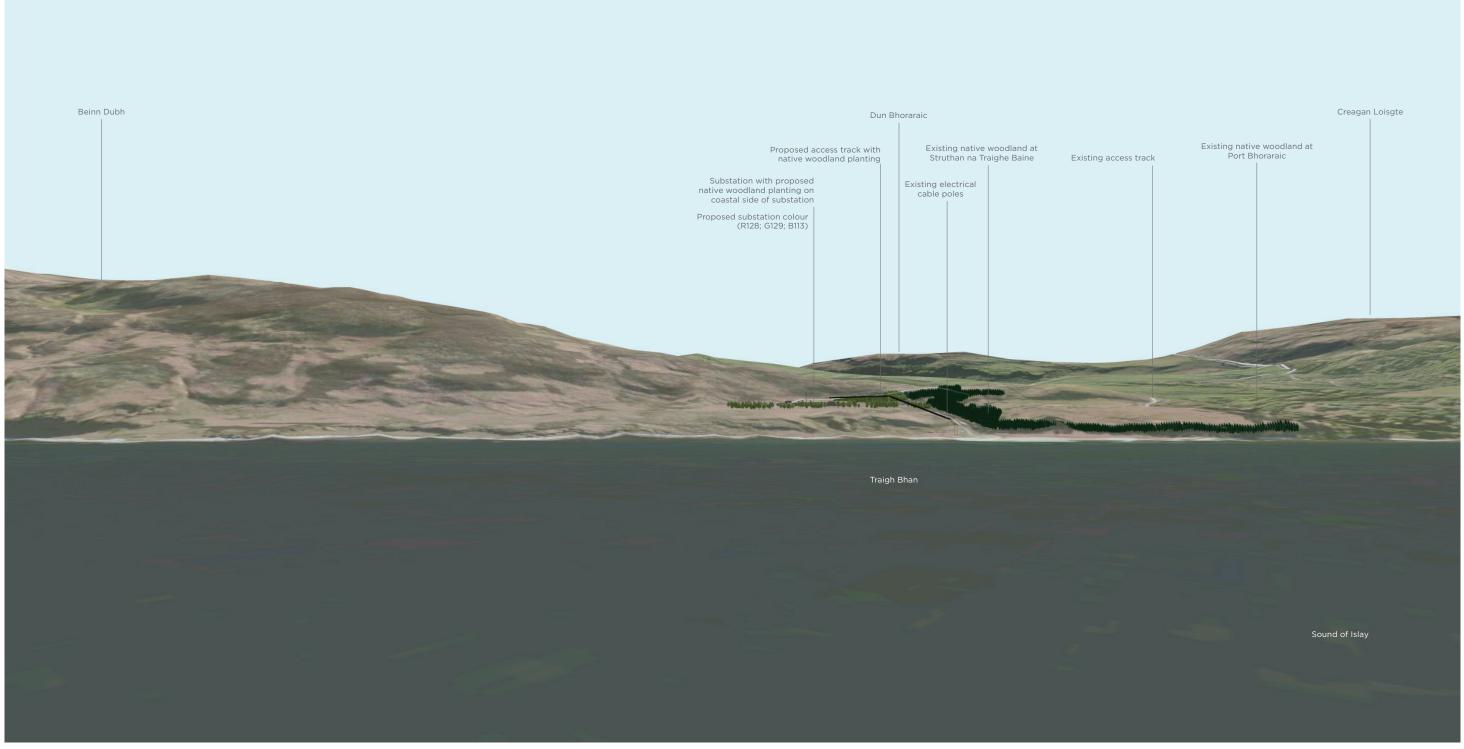


Visual representation of the development with proposed colour and landform mitigation from Viewpoint 2, Kennacraig to Port Askaig Ferry (East)

Figure 22: Viewpoint 2 - Visual Representation (Landform Proposals)

Viewer height 10m (estimated for ferry)

# Viewpoint 2 Woodland Proposals



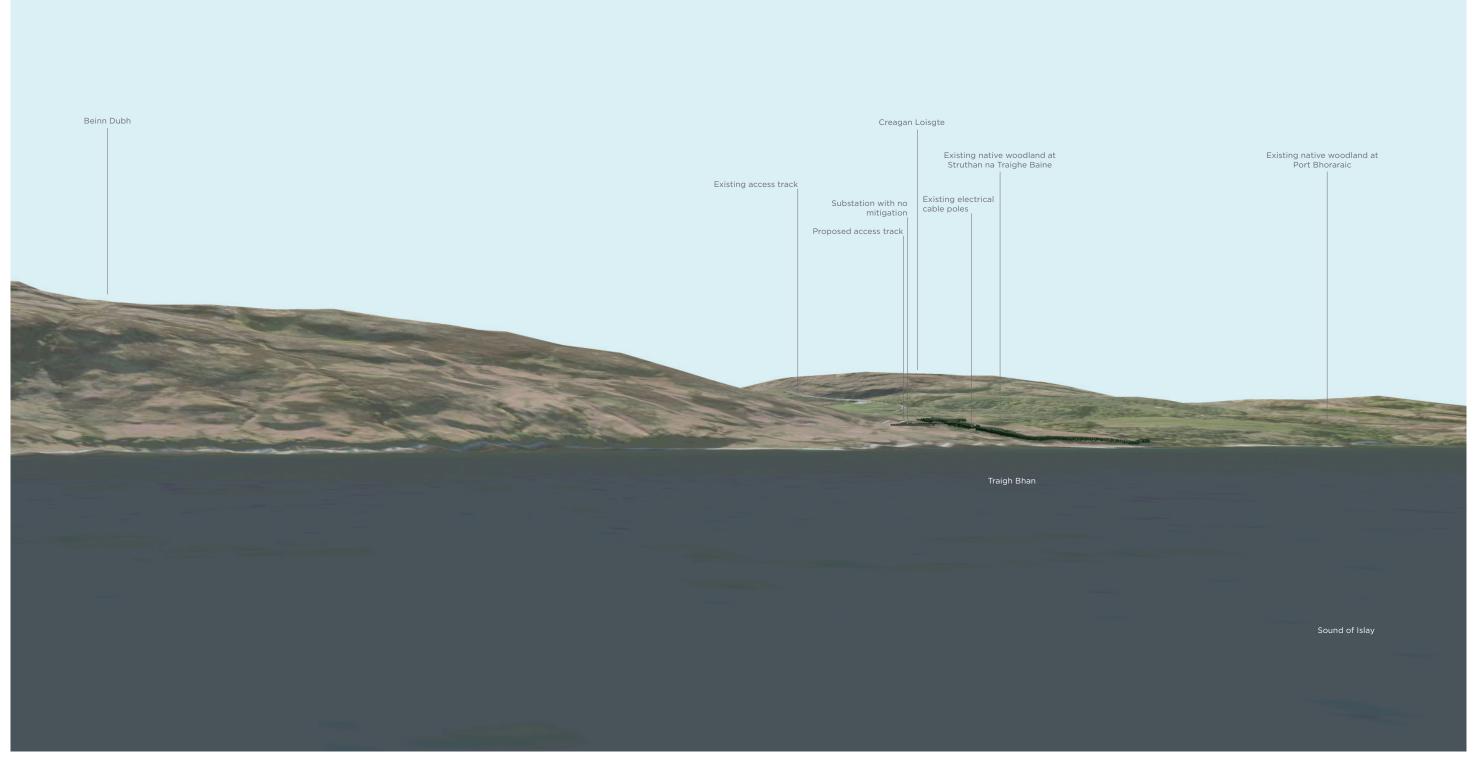
Visual representation of the development with proposed colour, landform and woodland planting mitigation from Viewpoint 2, Kennacraig to Port Askaig Ferry (East) Figure 23: Viewpoint 2 - Visual Representation (Woodland Mitigation)

## Viewpoint 3 Kennacraig to Port Askaig Ferry (South)



Figure 24: Viewpoint 3 Location - Kennacraig to Port Askaig Ferry (South)

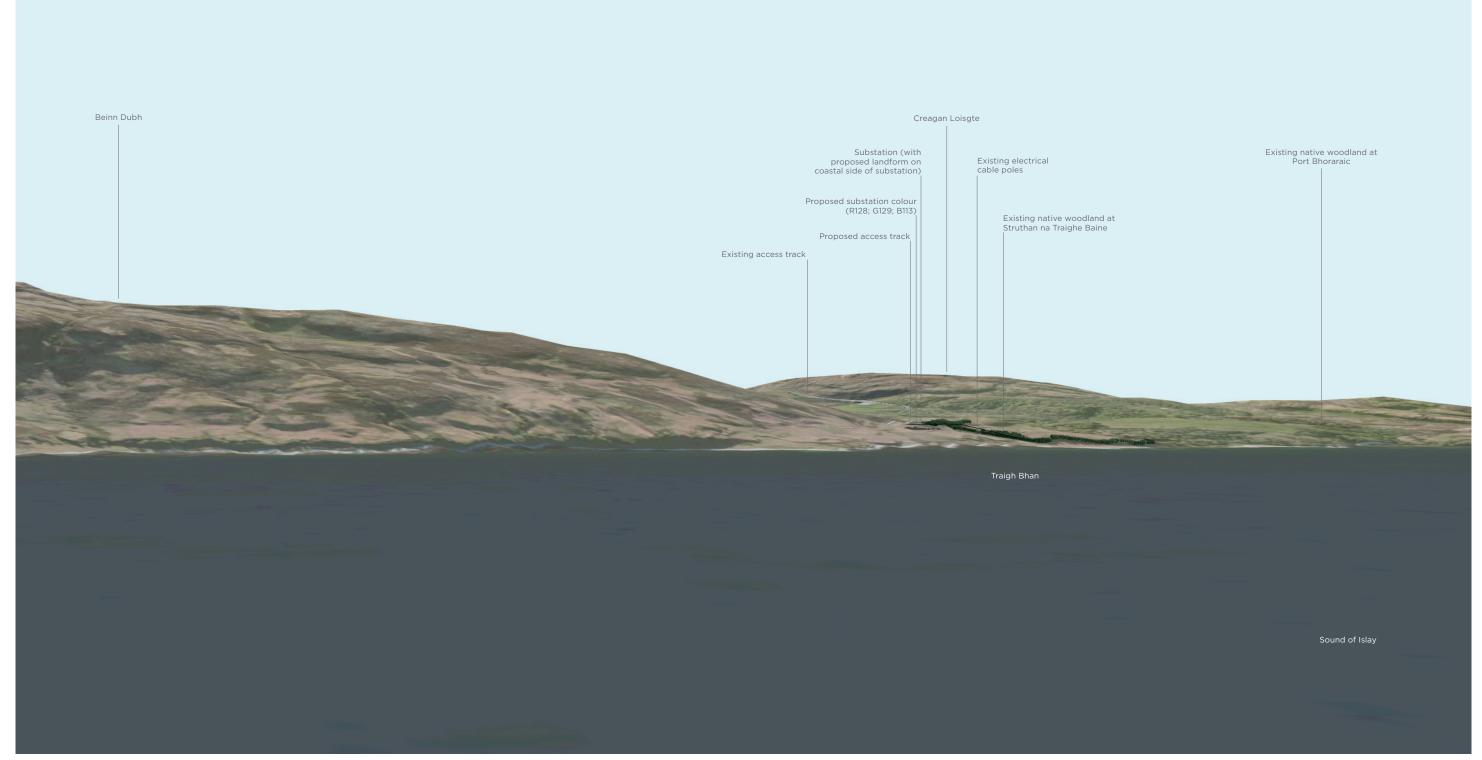
# Viewpoint 3 No Mitigation



Visual representation of the development with no mitigation from Viewpoint 3, Kennacraig to Port Askaig Ferry (South)

Figure 25: Viewpoint 3 - Visual Representation (No Mitigation)

## Viewpoint 3 Landform Proposals

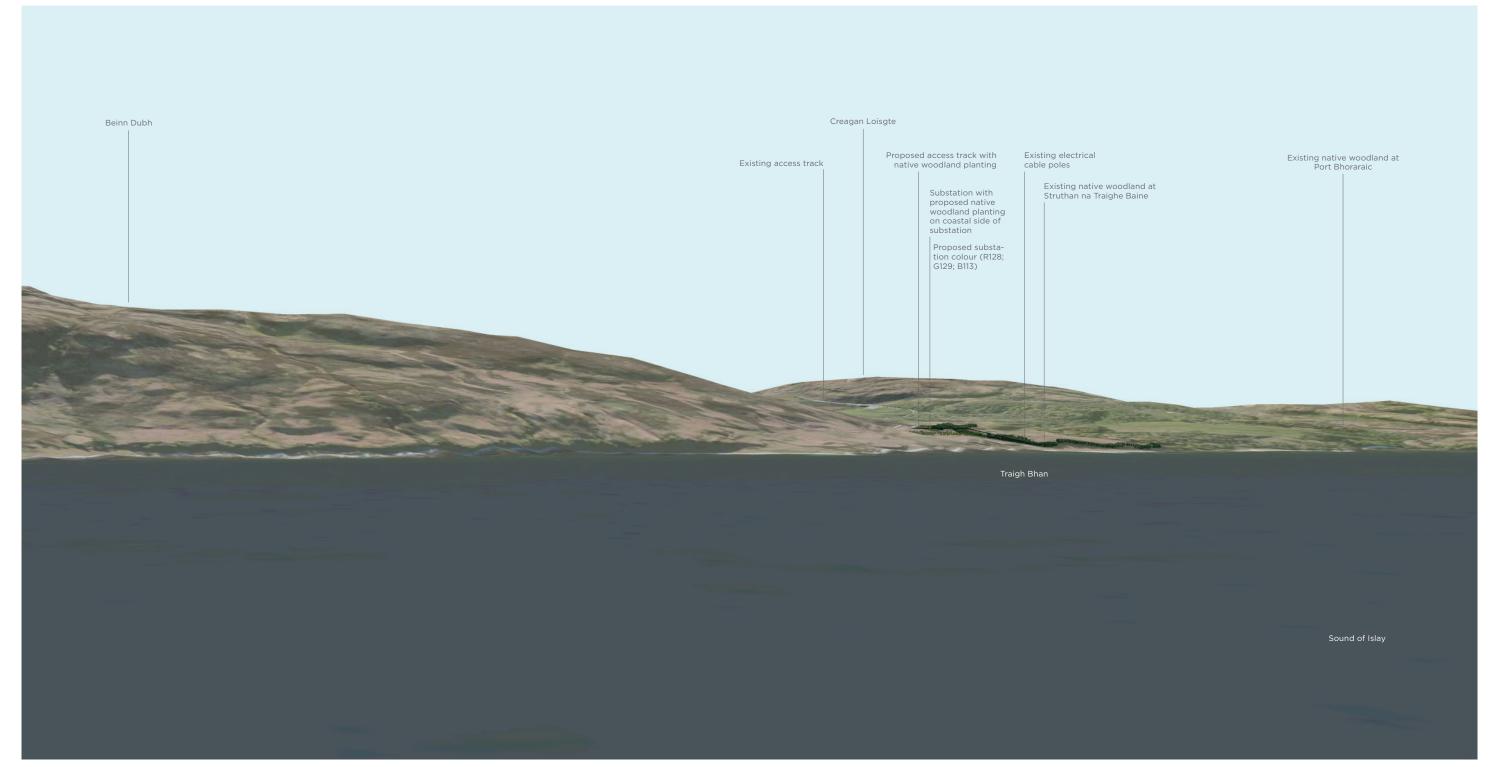


Visual representation of the development with proposed colour and landform mitigation from Viewpoint 3, Kennacraig to Port Askaig Ferry (South)

Figure 26: Viewpoint 3 - Visual Representation (Landform Proposals)

Viewer height 10m (estimated for ferry)

# Viewpoint 3 Woodland Proposals



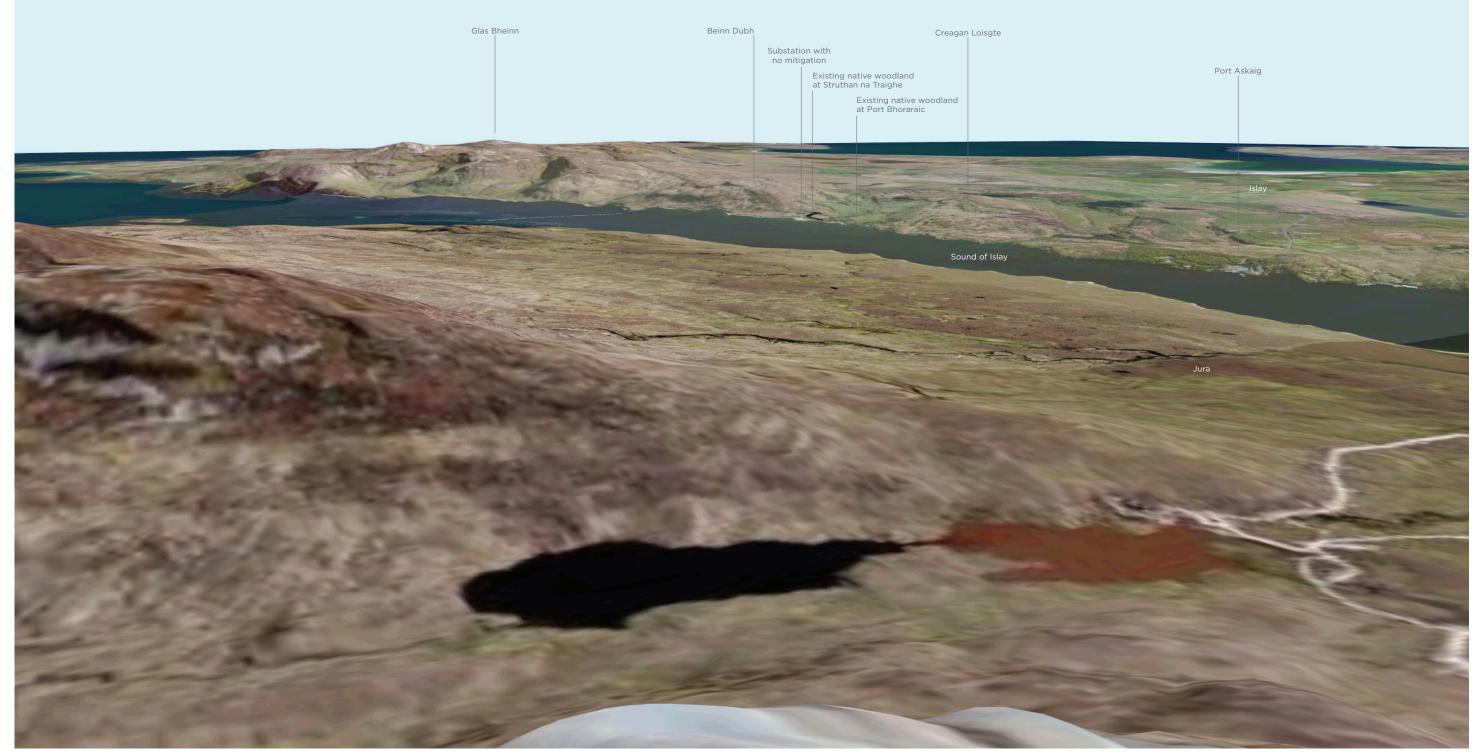
Visual representation of the development with proposed colour, landform and woodland planting mitigation from Viewpoint 3, Kennacraig to Port Askaig Ferry (South) Figure 27: Viewpoint 3 - Visual Representation (Woodland Mitigation)

## Viewpoint 4 Beinn Chaolais



Figure 28: Viewpoint 4 Location - Beinn Chaolais

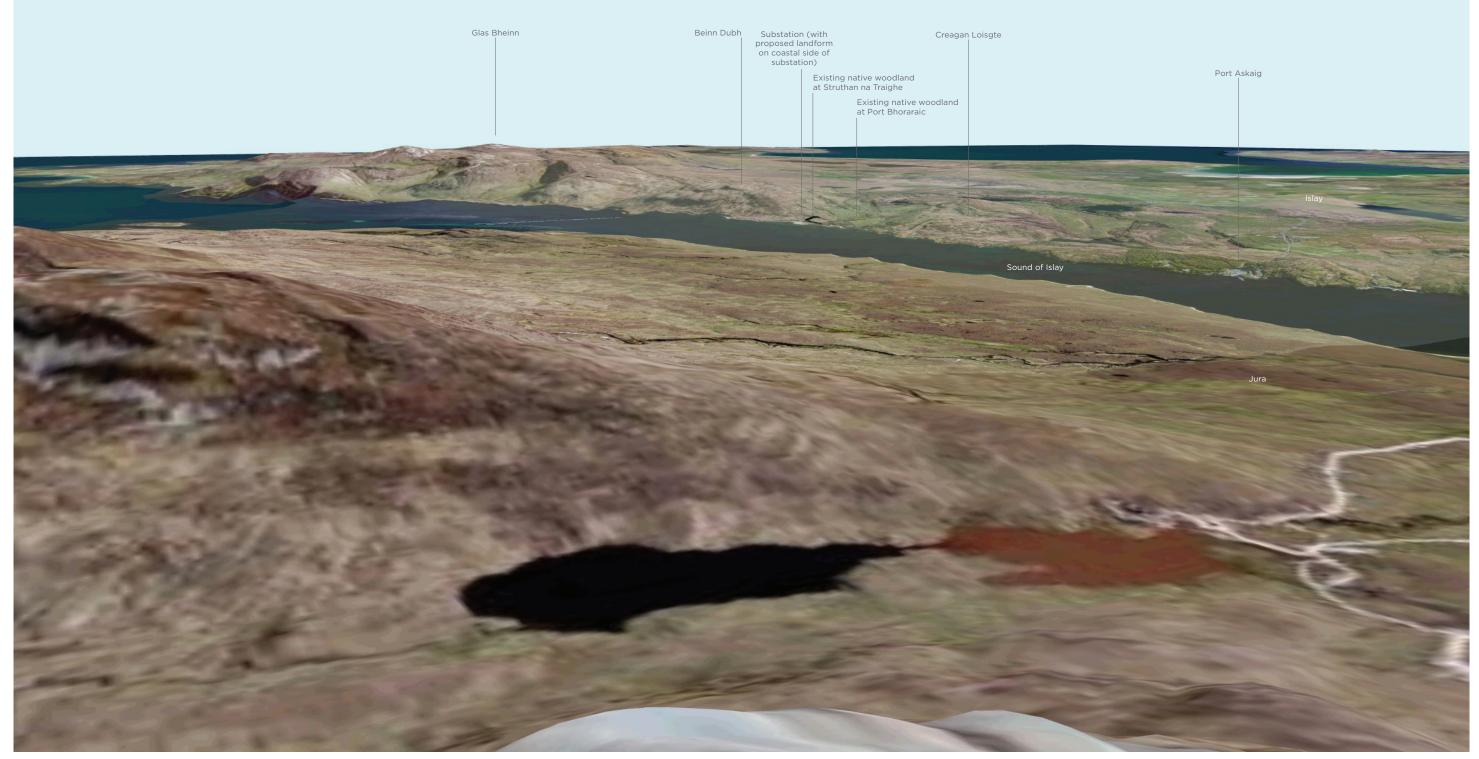
## Viewpoint 4 Beinn Chaolais



Visual representation of the development with no mitigation from Viewpoint 4, Beinn Chaolais

Figure 29: Viewpoint 4 - Visual Representation (No Mitigation)

## Viewpoint 4 Landform Proposals

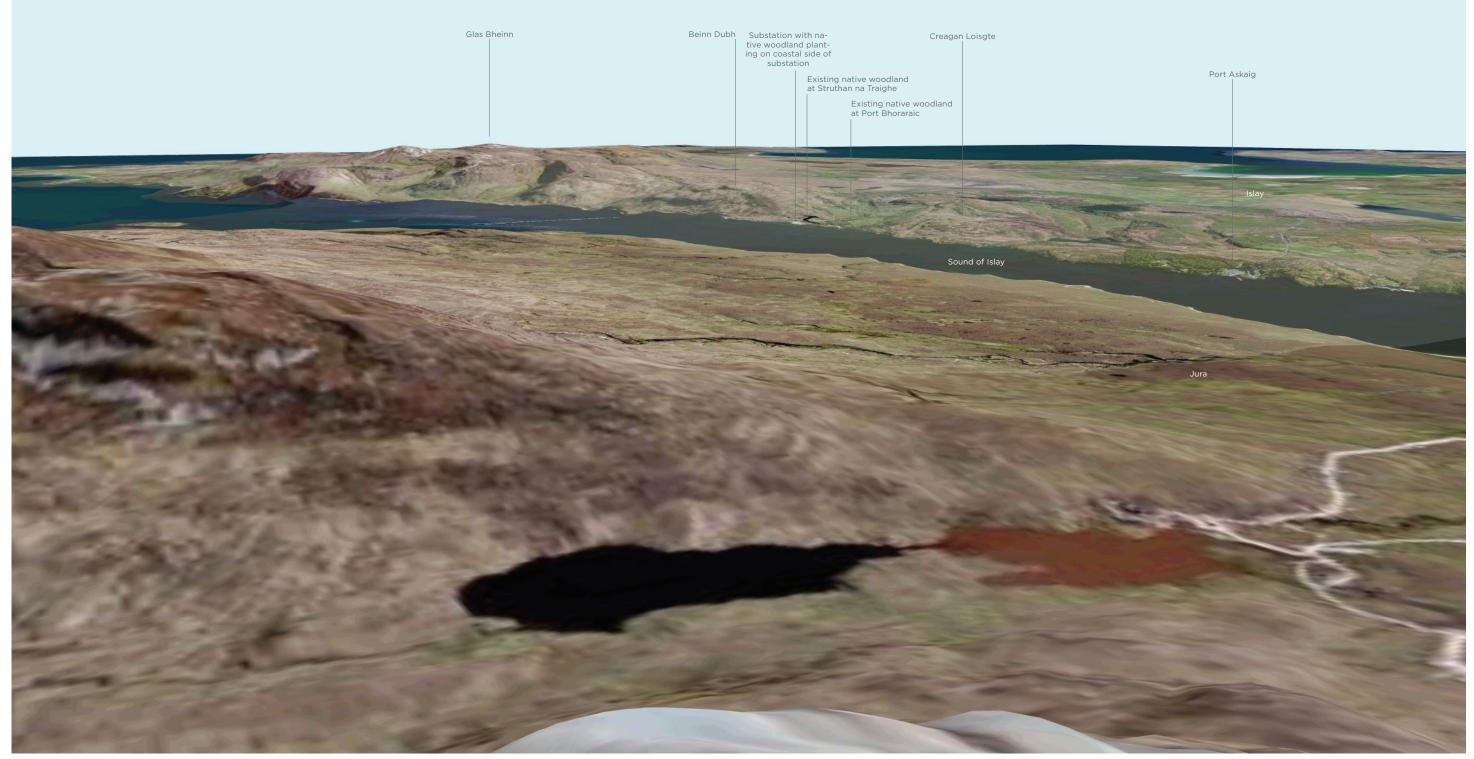


Visual representation of the development with proposed colour and landform mitigation from Viewpoint 4, Beinn Chaolais

Figure 30: Viewpoint 4 - Visual Representation (Landform Proposals)

Viewer height 2m

### **Viewpoint 4 Woodland Proposals**



Visual representation of the development with proposed colour, landform and woodland planting mitigation from Viewpoint 4, Beinn Chaolais

Figure 31: Viewpoint 4 - Visual Representation (Woodland Mitigation)

#### Viewpoint 5 A846, Jura

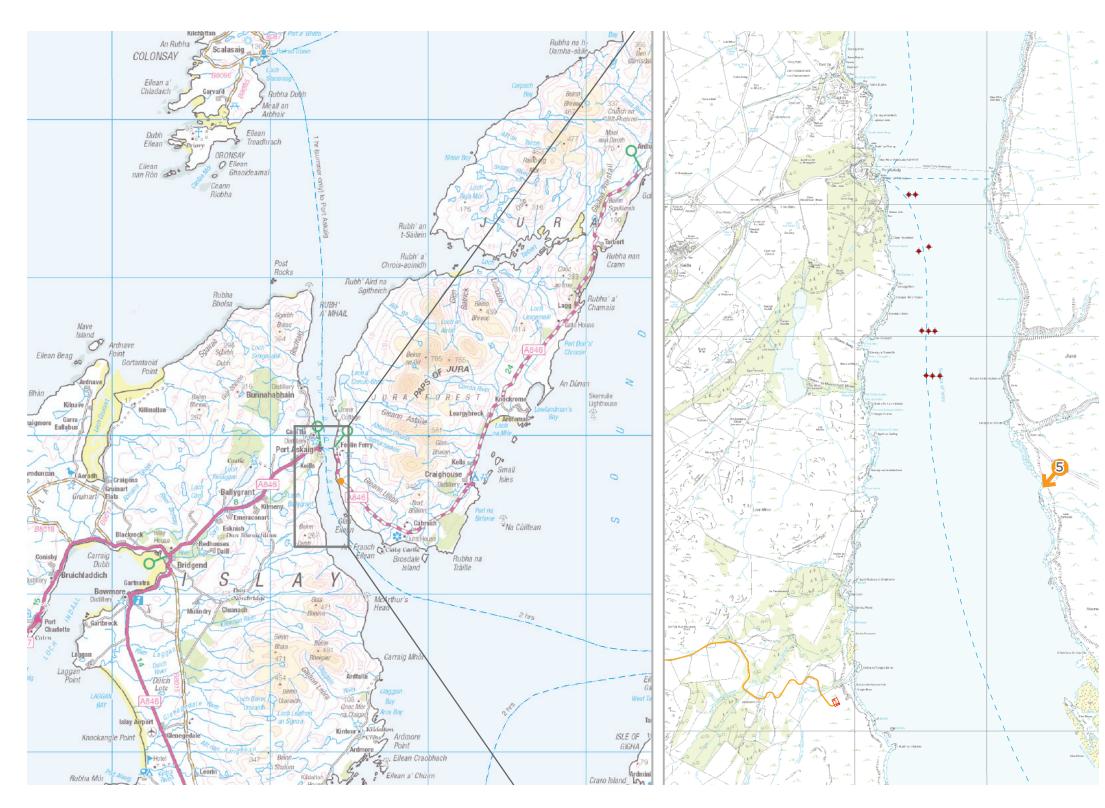
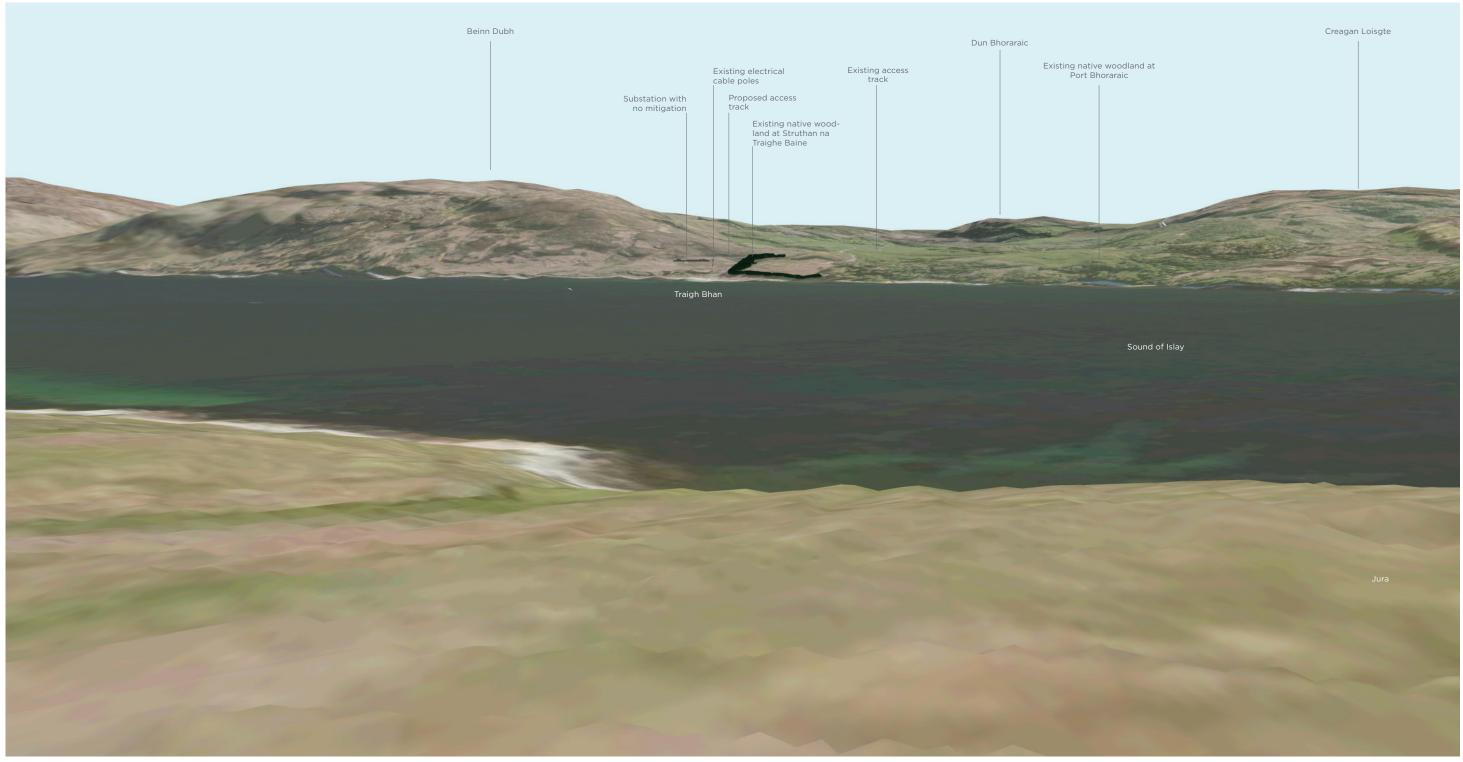


Figure 32: Viewpoint 5 Location - A846, Jura

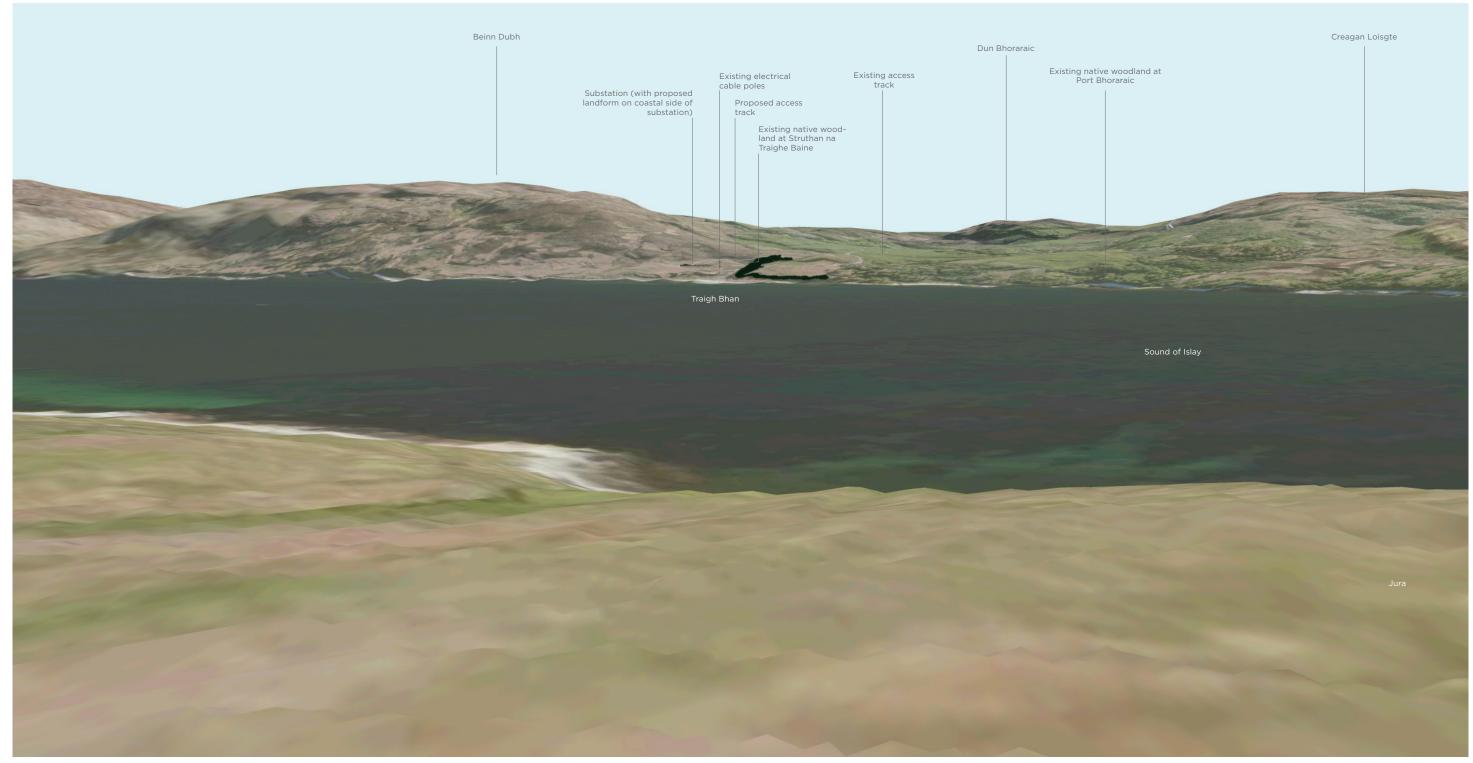
# Viewpoint 5 No Mitigation



Visual representation of the development with no mitigation from Viewpoint 5, A846 Jura

Figure 33: Viewpoint 5 - Visual Representation (No Mitigation)

#### **Viewpoint 5 Landform Proposals**

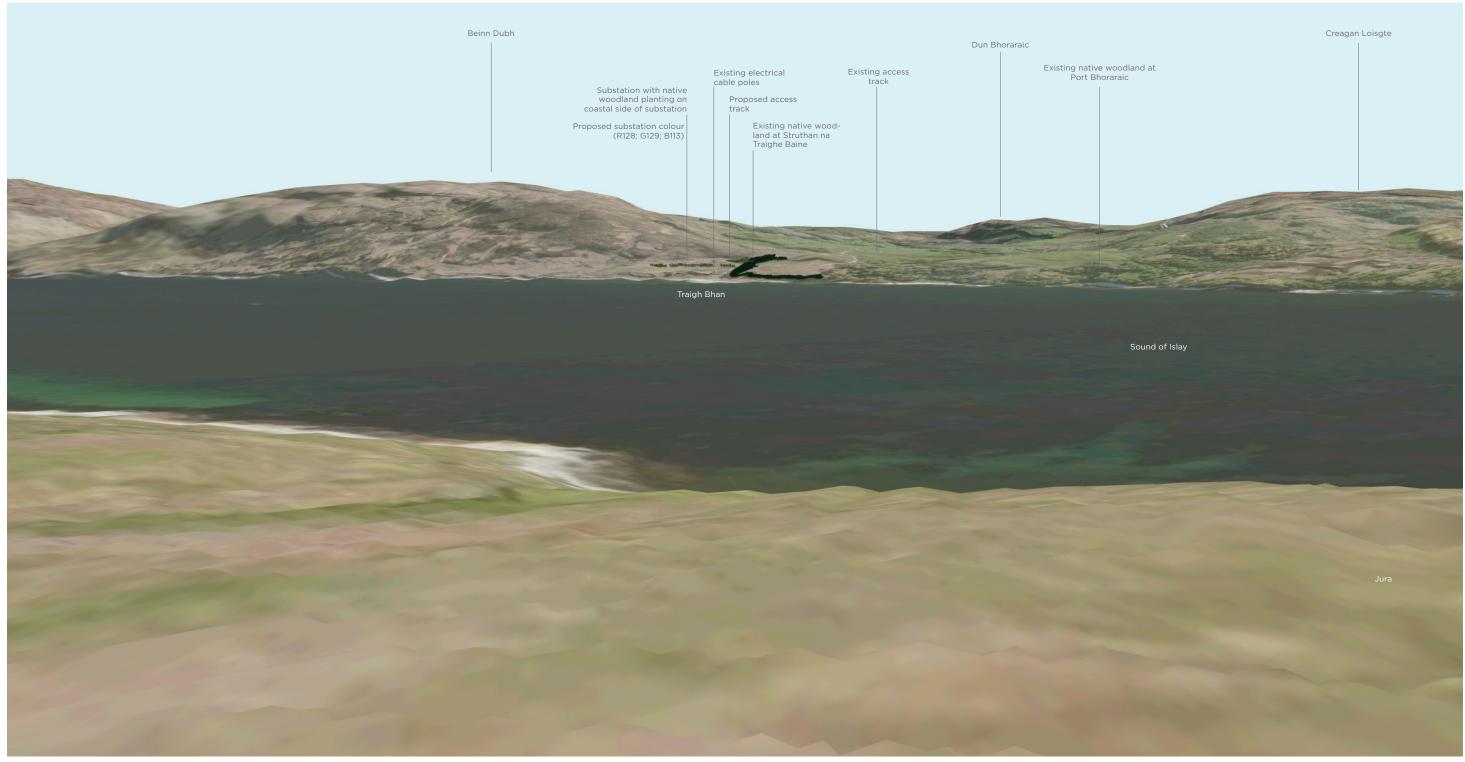


Visual representation of the development with proposed colour and landform mitigation from Viewpoint 5, A846 Jura

Figure 34: Viewpoint 5 - Visual Representation (Landform Proposals)

Viewer height 2m

## **Viewpoint 5 Woodland Proposals**



Visual representation of the development with proposed colour, landform and woodland planting mitigation from Viewpoint 5, A846 Jura

Figure 35: Viewpoint 5 - Visual Representation (Woodland Mitigation)





#### Sample Colours





Source: Islay coastal\_Summer



Source: Islay coastal winter



Source: Islay coastal\_Rock outcrops



Source: Islay local wildlife\_Golden Eagle



Source: Site Photograph

6	R: G:	66
	B:	53

Source: RGB ref for RAL 6005



Source: RGB ref EMEC cladding A

	R: 169
8	G: 172
	B: 161

Source: RGB ref EMEC cladding B



Source: RGB ref EMEC cladding C























2

Below images are for colour comparison / illustrative purposes only. Site layout, location and scale are not representative of final on site





Islay Autumn/Winter



3







Below images are for colour comparison / illustrative purposes only. Site layout, location and scale are not representative of final on site



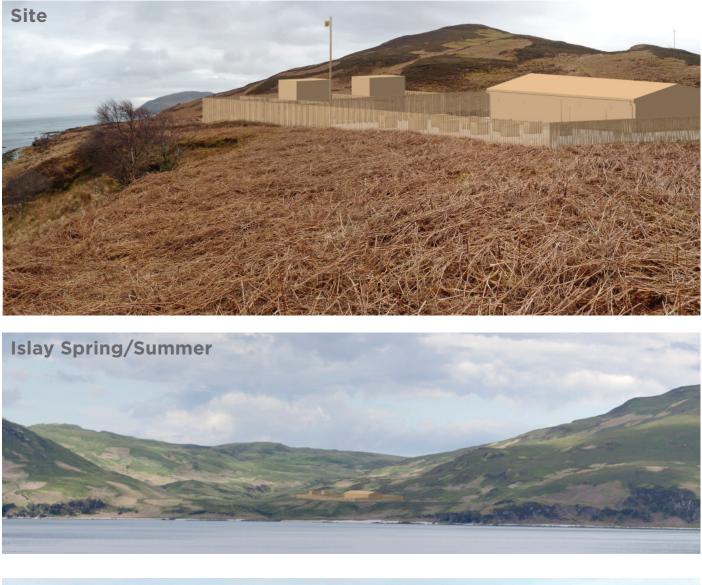


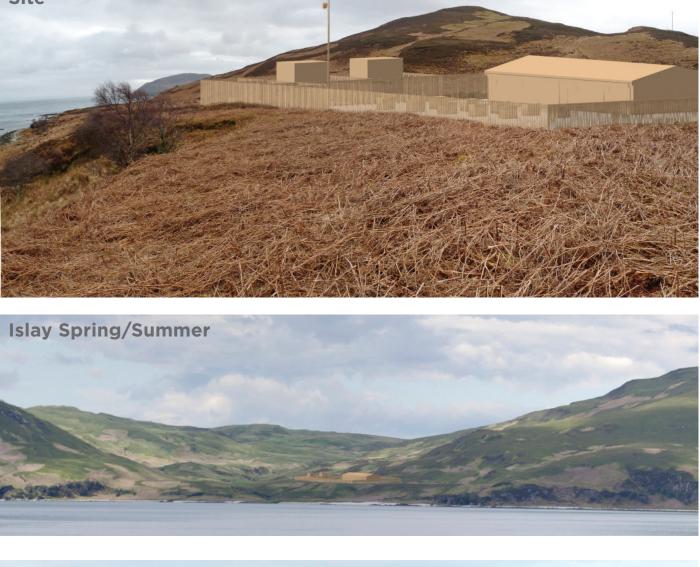
Islay Autumn/Winter



5

Below images are for colour comparison / illustrative purposes only. Site layout, location and scale are not representative of final on site





Islay Autumn/Winter



6

Below images are for colour comparison / illustrative purposes only. Site layout, location and scale are not representative of final on site





Islay Autumn/Winter



7









8

Below images are for colour comparison / illustrative purposes only. Site layout, location and scale are not representative of final on site





Islay Autumn/Winter









#### optimised environments Itd

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