



macroworks

# LVIA PHOTOMONTAGES

Knockraha BESS

This book contains imagery for the viewpoints chosen for the LVIA study

February 2026



LVIA | TVIA | Landscape Design | Visibility Analysis | Glint and Glare | Verified Photomontages | CGI | Shadow Flicker Analysis



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**\*Please Note:** There is no Photomontage or Mitigated Photomontage from this viewpoint as the proposed development is completely screened by existing vegetation and/or terrain

## Introduction

There is no industry-standard definition of what constitutes a ‘verified photomontage’, and it has been applied in two different ways, namely in terms of image size/scaling, and the accuracy of the camera location. Both are essentially concerned with the ability to audit the accuracy of the visual material.

The Landscape Institute Technical Guidance Note 06/19 – Visual representation of development proposals (TGN 06/19) states that:

“Visualisations should provide the viewer with a fair representation of what would be likely to be seen if the proposed development is implemented and should portray the proposal in scale with its surroundings. In the context of landscape/townscape and visual impact assessment, it is crucial that visualisations are objective and sufficiently accurate for the task in hand. In short, visualisation should be fit for purpose.”

Macro Works has produced the Verified View Montages (VVM) included in this document in accordance with TGN 06/19, guidance which is broadly consistent with Scottish Natural Heritage (now NatureScot) ‘Visual Representation of Wind Farms’ 2017. This guidance advocates a proportionate approach and appropriate levels of accuracy to the production of visual material.

In the context that the visual material is to accompany a planning application, Macro Works has followed a highly accurate and verifiable process to accurately communicate the scale, appearance, context, form, and extent of development, and ensure that the visual material is accurate, objective, and unbiased. The VVM are considered consistent with Type 4 in the guidance.

The photography was captured during good weather conditions with high levels of visibility. Photography has been taken to a very high standard in accordance with the guidance, and locational information is captured with a high degree of accuracy with regard to location and elevation.

The locations of the visualisations have been identified through the Landscape/Townscape and Visual Impact Assessment (LVIA or TVIA) process, and produced from 3D model information received from project architects/engineers.

This methodology has been prepared by Macro Works to explain the production of the VVM, ensuring the process is transparent and auditable.

## Photography and GPS/GNSS Data

At the agreed locations, high-quality photography is captured in RAW format using either a Canon 5D Mark II or Canon 6D Mark II Full Frame Sensor camera. A Manfrotto tripod and panoramic head and leveller are used to ensure the photography is taken level and at consistent angles to ensure consistent overlapping.

Viewpoint locations are captured by inhouse trained personnel using a survey-grade GNSS unit and made compatible with the GIS referenced drawings of the proposed development. Where deemed necessary, the camera location is paint-marked and photographed and subsequently surveyed by a qualified topographical surveyor. In these circumstances, surveyors are given the photograph locations, together with marked-up photography that shows elements in the view (parapet heights, kerbing, lamp posts, etc.) that are to be surveyed as control points for model alignment within the panorama.

TGN 06/19 advocates the use of a 50mm prime lens as the industry standard, and this is the default approach adopted. In urban contexts, where a 50mm lens cannot fully capture the proposed development, the guidance accepts the use of alternative fixed-length prime lenses (Appendix 11, P.28). This approach is adopted dependent on the proximity of the development.

Following the site visit, RAW images are processed via Adobe Lightroom and panoramas are stitched and generated using the recommended industry standard software, PTGui Pro.

## Post Production and Formatting

Post-production, the rendered image is taken into Adobe Photoshop where it is ‘masked’ into the existing captured panorama. This essentially involves ensuring that anything in the foreground of the proposals is brought in front of the rendered image.

Adjustments are made as required to ensure that the lighting, reflections, and material characteristics of each render are accurate to the time and date of the photography and that the images meet GDPR standards (via blurring faces and car registrations, etc.).

Proposed mitigation is added where indicated via a Landscape Mitigation Plan.

Each VVM is subject to a thorough review and approval process which includes discussions with project engineers and architects to ensure it accurately reflects the architectural proposals.

## 3D Modelling and VVM Creation

The proposed development is accurately modelled into a 3D environment in GIS mapping software and 3DS Max 2023 using a combination of data sources (REVIT files, AutoCAD drawings, DTM/DSM data etc.) received from the project architects and engineers.

Virtual 3D cameras are positioned according to the survey coordinates, and the focal length is set to match the captured photography.

For rural projects, the visualisation preparation methodology recommended in the Scottish Natural Heritage 2017 ‘Visual Representation of Wind Farms’ is strictly followed. This involves the creation of 360° wirelines using GIS software, which perfectly match the generated panoramas and 3DS Max renders for each viewpoint. This allows for the development to be accurately placed within the captured photography.

For urban projects, camera matching or photographic alignment is a method by which a combination of data is used to produce an accurate camera match for each view. Virtual 3D cameras are positioned and the captured photography is then placed into the background of the 3DS Max Viewpoint. The surveyed information is then matched to the existing buildings in the photography.

Where appropriate, colour palettes and material references provided by the wider design team are applied to the model to provide a real-world representation. To ensure a high degree of accuracy, renders of the development are generated from 3DS Max 2023 with identical image characteristics to that of the baseline photography, including reference to the date and time of capture.

## Image Presentation

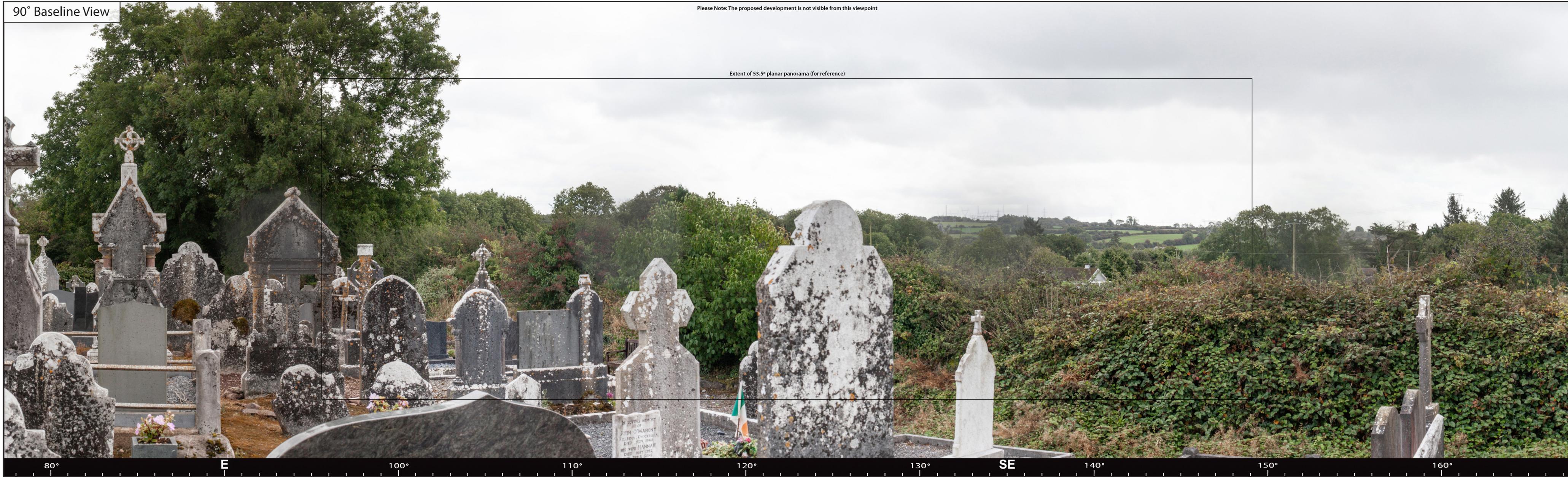
The objective of Type 4 visualisation is to present a printed image which gives a realistic impression of scale and detail.

VVMs are presented in accordance with the TGN 06/19 guidance, and final views are formatted into a booklet using Adobe InDesign, with all accompanying information relating to the photography, modelling, topography, post-production and viewpoints included.

For each viewpoint location, a 90° Horizontal Field of View (HfOV) cylindrical baseline photograph is provided to allow a 96% enlargement contextual reference. Image enlargement of 150% is recommended in the guidance (where feasible) to allow for binocular image scaling when printed, which results in an image with a 53.5° HfOV. Where this is not feasible because of proximity, or infrastructure occupying a wide field of view well beyond 53.5° that would necessitate splitting the view across multiple images, 90° HfOV cylindrical images are presented to avoid confusion for the viewer. A bounding box illustrates the extent of a 53.5° image where this is the case.

This document contains a site location map with VVM locations plotted, and all reference information, including photography, modelling, topographic, post-production, formatting, viewpoint and viewing instructions.

Extent of 53.5° planar panorama (for reference)



90° Outline View  
 indicating physical position and scale of the  
 proposed development irrespective of screening



Knockraha BESS - Landscape and Visual Impact Assessment  
 Viewpoint Ref: VP1      Kilquane Cemetery at Kilquane

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM): 576444  
 Northing (ITM): 579541  
 Direction of View: 122°  
 Distance to Site: 2.2 km  
 Elevation: 104.3 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

Date and Time: 2025/08/27 11:24  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

Photography Software: Adobe Lightroom  
 Panorama Stitching Software: PTGui Pro  
 Post-Production Software: Adobe Photoshop  
 Formatting Software: Adobe Illustrator/InDesign

Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Baseline View



Extent of 53.5° planar panorama (for reference)

Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP2 L-2964 at Ballynanelagh

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM): 576583  
 Northing (ITM): 578268  
 Direction of View: 91°  
 Distance to Site: 1.6 km  
 Elevation: 112.0 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

Date and Time: 2025/08/27 12:47  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

Photography Software: Adobe Lightroom  
 Panorama Stitching Software: PTGui Pro  
 Post-Production Software: Adobe Photoshop  
 Formatting Software: Adobe Illustrator/InDesign

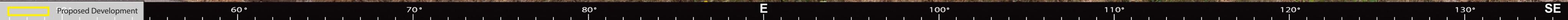
Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
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**90° Outline View**  
 indicating physical position and scale of the  
 proposed development irrespective of screening



Outline of Proposed Development



**Knockraha BESS - Landscape and Visual Impact Assessment**

Viewpoint Ref: VP2 L-2964 at Ballynanelagh

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 Post-Production Software: Adobe Photoshop  
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 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Baseline View

Please Note: The proposed development is not visible from this viewpoint.

Extent of 53.5° planar panorama (for reference)



Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP3 L-6989 at Killeena

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM): 577945  
 Northing (ITM): 577891  
 Direction of View: 48°  
 Distance to Site: 0.3 km  
 Elevation: 153.0 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

Date and Time: 2025/08/27 12:07  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

Photography Software: Adobe Lightroom  
 Panorama Stitching Software: PTGui Pro  
 Post-Production Software: Adobe Photoshop  
 Formatting Software: Adobe Illustrator/InDesign

Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Outline View  
 indicating physical position and scale of the  
 proposed development irrespective of screening



Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP3 L-6989 at Killeena

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 Northing (ITM): 577891  
 Direction of View: 48 °  
 Distance to Site: 0.3 km  
 Elevation: 153.0 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

Date and Time: 2025/08/27 12:07  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

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 Post-Production Software: Adobe Photoshop  
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Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Baseline View



Extent of 53.5° planar panorama (for reference)

Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP4 Knockraha 220kV Substation Entranceway on the L-6989 at Killeena

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM): 578160  
 Northing (ITM): 577965  
 Direction of View: 37°  
 Distance to Site: 0.1 km  
 Elevation: 153.9 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

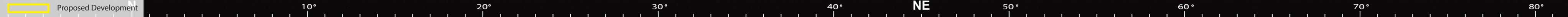
Date and Time: 2025/08/27 11:48  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

Photography Software: Adobe Lightroom  
 Panorama Stitching Software: PTGui Pro  
 Post-Production Software: Adobe Photoshop  
 Formatting Software: Adobe Illustrator/InDesign

Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Outline View  
 indicating physical position and scale of the proposed development irrespective of screening



Knockraha BESS - Landscape and Visual Impact Assessment  
 Viewpoint Ref: VP4 Knockraha 220kV Substation Entranceway on the L-6989 at Killeena

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM): 578160  
 Northing (ITM): 577965  
 Direction of View: 37°  
 Distance to Site: 0.1 km  
 Elevation: 153.9 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
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Knockraha BESS - Landscape and Visual Impact Assessment  
 Viewpoint Ref: VP4 Knockraha 220kV Substation Entranceway on the L-6989 at Killeena

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Easting (ITM):	578160	Horizontal Field of View:	90° (cylindrical projection)	Date and Time:	2025/08/27 11:48	Photography Software:	Adobe Lightroom	Modelling Software:	3DS Max 2023
Northing (ITM):	577965	Principal Distance:	522 mm	Camera:	Canon 5D Mark II Digital SLR	Panorama Stitching Software:	PTGui Pro	Rendering Software:	Mental Ray/Corona
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Distance to Site:	0.1 km	Correct printed image size:	820 x 251 mm	Panoramic Head:	Manfrotto Pano Head/Leveller	Formatting Software:	Adobe Illustrator/InDesign	Topographical Data:	LiDAR/OSI Terrain Data
Elevation:	153.9 m	Enlargement Factor:	96%	Camera Height:	1.7m (AGL)			GPS Ref:	Georeferenced/Surveyed DWGS



90° Photomontage  
Established Mitigation



Knockraha BESS - Landscape and Visual Impact Assessment  
Viewpoint Ref: VP4 Knockraha 220kV Substation Entranceway on the L-6989 at Killeena

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90° Baseline View



Extent of 53.5° planar panorama (for reference)



Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP5 L-6989 at Ballynanelagh

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Easting (ITM): 578372  
 Northing (ITM): 578024  
 Direction of View: 332°  
 Distance to Site: 0.0 km  
 Elevation: 156.9 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

Date and Time: 2025/08/27 11:58  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

Photography Software: Adobe Lightroom  
 Panorama Stitching Software: PTGui Pro  
 Post-Production Software: Adobe Photoshop  
 Formatting Software: Adobe Illustrator/InDesign

Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
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**90° Outline View**  
 indicating physical position and scale of the  
 proposed development irrespective of screening



**Knockraha BESS - Landscape and Visual Impact Assessment**

Viewpoint Ref: VP5 L-6989 at Ballynanelagh

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290°      300°      310°      **NW**      320°      330°      340°      350°      **N**      10°

Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP5      L-6989 at Ballynelagh

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

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90° Photomontage  
Established Mitigation



290°      300°      310°      **NW**      320°      330°      340°      350°      **N**      10°

Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP5      L-6989 at Ballyanelagh

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 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS





Extent of 53.5° planar panorama (for reference)

Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP6 L-69841 at Ballynanelagh

Visualisation Type 4 - This 90° cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90° cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM): 578745  
 Northing (ITM): 578474  
 Direction of View: 232°  
 Distance to Site: 0.4 km  
 Elevation: 149.5 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

Date and Time: 2025/08/27 12:14  
 Camera: Canon 5D Mark II Digital SLR  
 Lens: Canon Fixed 50mm Full Frame Sensor  
 Panoramic Head: Manfrotto Pano Head/Leveller  
 Camera Height: 1.7m (AGL)

Photography Software: Adobe Lightroom  
 Panorama Stitching Software: PTGui Pro  
 Post-Production Software: Adobe Photoshop  
 Formatting Software: Adobe Illustrator/InDesign

Modelling Software: 3DS Max 2023  
 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Outline View  
 indicating physical position and scale of the  
 proposed development irrespective of screening



Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP6 L-69841 at Ballynanelagh

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90° Photomontage  
Established Mitigation



Knockraha BESS - Landscape and Visual Impact Assessment

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Extent of 53.5° planar panorama (for reference)



SE 140° 150° 160° 170° S 190° 200° 210° 220°

Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP7 L-6984 at Knockraha East

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Easting (ITM): 578340  
 Northing (ITM): 579762  
 Direction of View: 177°  
 Distance to Site: 1.5 km  
 Elevation: 178.4 m

Horizontal Field of View: 90° (cylindrical projection)  
 Principal Distance: 522 mm  
 Paper size: 841 x 297 mm  
 Correct printed image size: 820 x 251 mm  
 Enlargement Factor: 96%

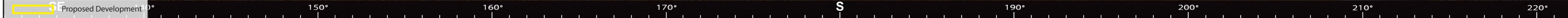
Date and Time: 2025/08/27 12:22  
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 Rendering Software: Mental Ray/Corona  
 GNSS Unit: Trimble Catalyst (GNSS)  
 Topographical Data: LiDAR/OSI Terrain Data  
 GPS Ref: Georeferenced/Surveyed DWGS



90° Outline View  
 indicating physical position and scale of the  
 proposed development irrespective of screening



Knockraha BESS - Landscape and Visual Impact Assessment

Viewpoint Ref: VP7 L-6984 at Knockraha East

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Knockraha BESS - Landscape and Visual Impact Assessment

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90° Photomontage  
Established Mitigation



Knockraha BESS - Landscape and Visual Impact Assessment

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90° Cumulative Outline View  
 indicating physical position and scale of the proposed  
 and cumulative developments irrespective of screening



 Cumulative - Planning Reg : 235992  
 Proposed Development 10°



Knockraha BESS - Landscape and Visual Impact Assessment

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