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## SCREENING OPINION REQUEST

Middleton Farm Solar Array

Applicant: Bluestone Energy Ltd.

Version 1.0

EXPERTISE | KNOWLEDGE | SUPPORT

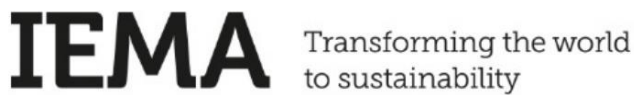
## Document Version Control

### Revision Control Table

Issue	Date	Change	Prepared	Reviewed	Approved
1.0	10/23	Screening Report for Client Comment	LW	BL	
1.1	01/24	Screening Report for Submission	LW	BL	CS

## Contributors

Date	Report	Prepared
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## 1. INTRODUCTION

### 1.1. Request for Screening Opinion

This report seeks a Screening Opinion from Renfrewshire Council (RC) for the installation of a 49MW ground-mounted (GM) solar photovoltaic (PV) array development at Middleton Farm.

The development consists of the array itself, along with associated infrastructure including security measures, inverter kiosks and electrical substations at Middleton Farm, Linwood, Paisley, PA3 3AG.

As per Part 2 (8) of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, Cogeo seek a screening opinion from the Local Planning Authority for the development proposed.

### 1.2. Requirement for an EIA

To comply with The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, this Screening Opinion Request (Screening Report) is required to include:

- a) A plan sufficient to identify the land;
- b) A description of the development, including in particular -
  - i. A description of the physical characteristics of the development;
  - ii. A description of the location of the development, with particular regard to the environmental sensitivity of geographical areas likely to be affected;
- c) A description of the environmental aspects likely to be significantly affected by the development;
- d) A description of the possible significant effects, to the extent of the information available on those effects, of the proposed development on the environment resulting from -
  - i. The expected residues and emissions and the production of waste, where relevant;
  - ii. The use of natural resources, in particular soil, land, water and biodiversity; and
- e) Such other information or representations as the person making the request may wish to provide or make.

These points have all been addressed within this report and its attached appendices; however, should you require further detail on any of the above, please contact Cogeo who will provide the information as requested.

Under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, the proposal is viewed to fall within Section 3(a) of Schedule 2.

**Table 1.1 Schedule 2, Section 3(a)**

Description of Development	Applicable thresholds and criteria
<i>3 Energy Industry</i>	
Industrial installations for the production of electricity, steam and hot water (Unless included in Schedule 1);	The area of the development exceeds 0.5 hectare.

Schedule 2 developments require an Environmental Impact Assessment (EIA) if considered likely to have significant effects on the environment by virtue of factors such as its nature, size, or location. This Screening report details the proposed development for review of RC Planning Department.

It is perceived that an application for planning consent will be made under the Town and Country Planning (Scotland) Act (as amended) 2006 in due course. If it is dictated that an Environmental Impact Assessment (EIA) is required, an EIA Report will follow. Where an EIA is deemed unnecessary, an Environmental Report will be submitted at the next planning stage. This report will include an assessment of those areas of the environment deemed at risk of significant adverse impact in line with guidance.

### 1.3. Applicant Details

This Screening Opinion request is submitted on behalf of Bluestone Energy Ltd.

The company's aim is to create a sustainable future via smart green solutions. Helping reduce the current dependency on fossil fuels, assisting in driving down the escalating energy costs and reducing harmful carbon emissions in support of Net Zero.

Founded in the UK in 2018, Bluestone Energy has built a notable pipeline of over 30GW in the UK of solar, battery energy storage, and onshore wind infrastructure, with customers ranging between local authorities, water companies, utilities and large corporate businesses.

With a national drive towards reduced reliance on carbon heavy generators, increased renewable, clean projects are being proposed throughout the country to diversify the energy mix. Such projects include solar and wind, supplemented by battery storage as a means of providing a reliable energy source. This scheme offers an excellent opportunity for a ground-mounted solar installation on open ground in close proximity to end-users.

## 2. PROJECT DESCRIPTION

### 2.1. Development Location

The development site is accessed via Middleton Road and is situated at the northeastern fringe of Linwood, within a rural environment. The existing land use is a turf farm.

The Linwood Recycling Centre and Incinerator is located to the west of the farmhouse property at 5 Middleton Road and Black Cart Water bounds the southern and eastern edge of the farm boundary. Appendix 2.1 illustrates the development site locality.

The area outlined for the solar array consists of open, flat farmland positioned either side of Middleton Road. Existing field entrances are to be optimised during the construction and operational phases of the development to minimise works. The site is located approximately 830m west of Glasgow Airport, 790m from the M8 and 250m north of the A737 and it is considered that the site is easily accessible via these large trunk routes. See Figure 2.1 for the location of the proposed development with the local road network highlighted.



Figure 2.1 Location of the Proposed Development Site

### 2.2. Development Specifications

#### 2.2.1. Solar Array

Development comprises of a series of ground-mounted solar panels with a combined generating capacity of up to 49MW. PV panels will be arranged in rows, supported off the ground by a series of narrow metal frames, usually composed of aluminium. An initial site plan is displayed in Appendix 2.2, with an elevation plan of a typical GM solar panel attached as Appendix 2.3.

General specifications of the proposed solar array are displayed in Table 2.1. Details present the largest array likely at the site and numbers may reduce prior to full permission being sought following further onsite assessments. In addition to the panels, the proposal includes mounting systems, cabling, and electrical equipment.



**Table 2.1 Array Specifications**

Details	Specifications
Number of panels	71,512
Development generating capacity	49MW
Number of Inverters	19 units/kiosks
Maximum panel height	2.96m
Panel Angle	17°
Panel Spacing	3.4m separation between rows
Frame Fixtures	Metal frames mounted on screw foundations

2.2.2. Security Features

Security fencing will be erected around the perimeter of the development to safeguard the electrical equipment installed. Fencing will likely consist of mesh wire panels measuring 3.5m wide at a height of 2.4m. Panels are anticipated to include a 100mm gap at the base to allow passage for small animals. Pole-mounted CCTV cameras, most likely at 4m height, will also be erected along the fringe of the site, overlooking the installation to deter crime and anti-social behaviour.

2.2.3. Electrical Connection

Electrical components to be installed at the site include inverters, positioned within 40ft shipping containers. A containerised switchgear unit will also be installed alongside a new brick-built substation. Electrical components will be commissioned to step-up the generation for use within the wider network, in consultation with the Distribution Network Operator (DNO).

2.2.4. Access

Access to the site is via public roadways, with the main access off Middleton Road. Given ground conditions at the Farm and existing tracks, it is not anticipated that additional internal tracks will be constructed throughout the rows of panels to allow for access, construction, maintenance, and security. Indicative plans propose construction and maintenance access routes off Middleton Road to the containerised inverters, which are to be constructed to 4.5m width composed of compacted type-1 aggregate allowing for continued percolation to ground. However, these tracks are anticipated to optimise existing tracks as much as possible.

### 3. PLANNING POLICY

#### 3.1. Local Council

To ensure compliance with regional and wider guidance, numerous planning policies have been reviewed during the initial siting and design stages of this project. At a national level, the main policy document is the National Planning Framework 4 (2023). On a regional level, the guiding document is the Renfrewshire Local Development Plan 2021<sup>1</sup>. This plan pre-dates the 2023 NPF4 and therefore makes reference to NPF3 and the Scottish Planning Policy (2014).

Further guidance provided within various Supplementary Planning Guidance is also of note, including:

- Renfrewshire Local Development Plan; Proposed Plan Green Belt Review 2019 Background Paper 3<sup>2</sup>
- Renfrewshire Local Development Plan; New Development Supplementary Guidance 2022<sup>3</sup>

The Renfrewshire Local Development Plan 2021 guides development and the use of land within Renfrewshire. It sets out policies used to make decisions on Planning Applications. In assessing development proposals, the Council will in the first instance, consider whether the proposal accords with the Renfrewshire Local Development Plan.

#### 3.2. Policies to Review

Upon review of the above documents, the policies presented in Table 3.1 are considered to be of note for the proposed development. RC are invited to review the policies highlighted, with comment provided on any further policies to consider during the application process to ensure a full and comprehensive analysis in any future application seeking permission.

**Table 3.1 Renfrewshire Council Local Development Plan Policies**

Policy	Policy
Policy I4 Renewable and Low Carbon Energy Developments	Policy ENV3 Built and Cultural Heritage
Policy I3 Flooding & Drainage	Policy ENV4 The Water Environment
Policy ENV1 Greenbelt	Policy ENV6 Natural Resources (Soil)
Policy ENV2 Natural Heritage	

With the development site falling within the Greenbelt (LI2 – North & East), the proposal is subject to Policy ENV1, alongside NPF4. As noted within the Green Belt Review guidance document, “almost 75% of Renfrewshire is designated as green belt, comprising almost all of the landscape outside of urban areas”<sup>4</sup>. Supplementary Guidance sets out that, amongst other proposals, renewable energy developments are considered appropriate in principle in the green belt<sup>5</sup>. Recognisable and defined green belt features in this area include Linwood Moss Woodland and Black Cart Water; for which the design of the development will be finalised to ensure no adverse effect. With vast areas of Renfrewshire

<sup>1</sup> <https://www.renfrewshire.gov.uk/article/3070/Local-Development-Plan-2>

<sup>2</sup> Available for download at: <https://www.renfrewshire.gov.uk/article/3070/Local-Development-Plan-2>

<sup>3</sup> Available for download at: <https://www.renfrewshire.gov.uk/article/3070/Local-Development-Plan-2>

<sup>4</sup> Renfrewshire Local Development Plan; Proposed Plan Green Belt Review 2019 Background Paper 3

<sup>5</sup> Renfrewshire Local Development Plan; Proposed Plan Green Belt Review 2019 Background Paper 3, paragraph 4.6

covered by Glasgow Airport radar restrictions limiting wind energy proposals, alternative forms of renewable and low carbon technologies will be promoted, as per the Local Development Plan<sup>6</sup>.

The application compiled will review the proposed development against the constraints of the local development plan and NPF4.

On receiving the Screening Opinion, required changes will be made, and a full assessment will be conducted for the planning application following the policies set out in these documents. Should RC feel that additional assessment is required, we request that these are stated in the Screening Opinion.

### 3.3. Climate Change Emergency

With the effects of climate change becoming more prominent year-on-year and both rural and urban receptors feeling the impacts in various ways, Councils are seeking to tackle the issue through the adoption of relevant policies, strategies and targets. In June 2019, RC declared a Climate Emergency<sup>7</sup>, acknowledging the urgent action needed by all to ensure a decarbonised future and setting out the intention to make Renfrewshire net zero by 2030. A working group was subsequently set up and formalised into a Planning and Climate Change Policy Board, meeting every 2-3 months. Renfrewshire's Plan for Net Zero was then published in August 2022, setting out how the ambitious 2030 target is to be met. This involves works falling under five headings: Clean Energy; Sustainable Transport; Circular Economy; Connected Communities; Resilient Place<sup>8</sup>. The identification of renewable energy as being positive contributors to achieving these targets is noted; however, action must be taken, and difficult decisions made in order to make a real and meaningful change.

With this development seeking to install a new GM PV array within Renfrewshire, it is considered a positive contribution to the Plan for Net Zero. This development provides an opportunity for various commercial parties within the region to reduce their carbon emissions through reliance upon a clean, renewable energy generator at Middleton Farm. This project will contribute positively to the carbon reduction targets of Renfrewshire Council.

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<sup>6</sup> Renewable & Low Carbon Technologies, Delivering the Spatial Strategy – Infrastructure; Renfrewshire Local Development Plan 2021

<sup>7</sup> Renfrewshire Council: <https://www.renfrewshire.gov.uk/article/11733/Climate-change-action-to-make-Renfrewshire-net-zero>

<sup>8</sup> Renfrewshire Council: <https://www.renfrewshire.gov.uk/article/12759/Renfrewshires-Plan-for-Net-Zero>

## 4. LANDSCAPE AND VISUAL APPRAISAL

### 4.1. Introduction

The purpose of this section is to ascertain the baseline landscape and visual amenity of the area, with further study proposed to assess the degree of potential impact the proposed development will have on the existing environment. Important factors to be considered include the characteristics and sensitivity of the landscape, and the visual amenity and receptors of the area.

Landscape impact can be defined as changes in the physical landscape which may give rise to changes in its character and how it is experienced. Visual impact comprises the change in the composition of available views from dwellings and public areas resulting from the proposal.

Methodology adopted within this chapter and followed throughout assessments undertaken is based on recommendations provided in 'Guidelines for Landscape and Visual Impact Assessment, 3<sup>rd</sup> Edition (GLVIA3)'<sup>9</sup> and draws on experiences gained on alike proposals over a number of years.

### 4.2. ZTV Mapping

Given the scale of development proposed, a Zone of Theoretical Visibility (ZTV) map has been calculated to 5km from the boundary of the solar development and is attached as Appendix 4.1. An excluded ZTV has been generated, utilising appropriately scaled exclusion zones for both natural and artificial features. This step has been taken to provide a more representative assessment of the likely impact and visibility of the proposed development within the landscape. This ZTV calculates the project's theoretical visibility from the viewer height of 1.7m to the highest point of the array.

As illustrated in Appendix 4.1, the ZTV falls predominantly around the immediate vicinity of the site, stretching towards the northeast of the study area. Scattered areas to the south and west are also noted, contained by the built-up nature of the area. Woodland along the northwest of the site and to the north of the B790 limit far reaching views.

### 4.3. Landscape Character

NatureScot's (formerly SNH) documentation confirms that the proposed development site at Middleton Farm is located within the Glasgow and Clyde Valley Agricultural Plain<sup>10</sup> Landscape Character Area (LCT 198), as shown in Appendix 4.2. This landscape unit occurs only within Renfrewshire. Bordered by the Black and White Cart Waters to the east, the east and western fringes of the unit are characterised by the rolling farmlands of Kilmacolm. Key features of the LCT include its distinctive low-lying landform, open character through woodland blocks and remnant field boundary trees creating containment in some areas. Open areas of lush pastures and arable fields are interspersed with a number of surviving, valuable mosses. Significant urban influences are notable in some areas, as a result of urban expansion, transport, infrastructure and activities, including waste disposal.

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<sup>9</sup> Landscape Institute & IEMA, Guidelines for Landscape and Visual Impact Assessment, 3<sup>rd</sup> Edition (2013)

<sup>10</sup> LCT Profile: Glasgow and Clyde Valley Agricultural Plain LCT 198: <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions>

As a low-lying, flat landscape, large areas of the LCT are susceptible to flooding and remain wet with drainage and subsidence issues. Agricultural land is largely improved pasture, fertile arable farmland with hedgerows, pockets of deciduous woodland and semi-natural vegetation bounding watercourses.

#### 4.4. Designated and Notable Landscape Features

While the proposed development site does not fall within a recognised landscape, designated landscapes are present within the 5km study area, as detailed in Table 4.1.

**Table 4.1 Designated Landscapes**

Name	Designation	Distance (km)
Gleniffer Braes	Country Park	3.93

Gleniffer Braes Country Park is located to the southeast of the development and is expected to gain partial views of the proposed installation as illustrated in Appendix 4.2.

#### 4.5. Visual Assessment

As with all new developments, there is the potential for visual impact given the introduction of a new feature to the landscape. A well designed and considered development will go towards mitigating the visual impact of an installation, minimising effect to local and wider receptors. Receptor sensitivity can vary depending on their location and relationship with the landscape; multiple factors will influence the overall severity of impact posed. Whilst GM solar developments cover a larger area than other forms of renewable energy installations, the visual impact associated with an array is generally contained within a smaller area. With a maximum height of 2.96m above ground level, the visual envelope of the development is largely confined to the immediate vicinity of the site, reducing with increased distance from the farm.

Potential viewpoint locations for future photomontage generation have been chosen following further desk-based study. Utilising the excluded ZTV ensures that the chosen viewpoints are more representative of possible receptors affected by the proposal within the local area. Photomontages compiled in accordance with GLVIA3 and guidance produced by the Landscape Institute and SNH<sup>11</sup> will be presented within the planning application submitted to RC for consideration. Appendix 4.3 details the positions selected, with **Error! Reference source not found.** presenting specific details of the viewpoints.

**Table 4.2 Proposed Viewpoint Locations**

Viewpoint Number	Viewpoint	Distance (km)	Receptor
1	Middleton Road	0.42	Core Path/Residential
2	Candren Road/Blackstone Road	0.27	Core Path/Residential
3	A8/Greenock Road	4.24	Core Path/Road
4	Rear of Spiers Place	0.25	Indicative Residential

<sup>11</sup> Landscape Institute & IEMA, Guidelines for Landscape and Visual Impact Assessment, 3<sup>rd</sup> Edition (2013)

Viewpoints have been selected to provide a comprehensive analysis of the impact of the proposed development within the local and wider landscape. Viewpoints cover different elevations, distances, receptors and sensitivities to allow both full assessment and contextualisation of the development in relation to the wider landscape. In addition to being representative, positions must also be easily and safely accessible to complete the required photography. These viewpoints have been selected via desk-based assessment and professional judgement will be utilised during fieldwork to ensure accurate, unobstructed views of the development. This may result in minor alterations to the positions detailed and as such, no co-ordinates have been provided, only indicative positions.

#### 4.6. Request for Confirmation

Cogeo request that RC confirm the following information as part of the Screening Opinion:

Element	Request for Confirmation
LVIA Study Area	Confirmation that a 5km study area is both proportionate and acceptable for this development.
Viewpoint Locations	Confirmation that the viewpoints proposed are acceptable and representative of receptors.

## 5. HISTORIC ENVIRONMENT

### 5.1. Introduction

It is acknowledged that renewable energy developments can have an effect on the historic environment either directly through physical impacts or indirectly by affecting the setting of the asset if sited inappropriately.

### 5.2. Methodology

To allow an assessment of the potential impacts posed by the development sought, an initial desk-based assessment will be undertaken in line with the Planning (Listed Buildings and Conservation Areas) (Scotland) Act (1997) (as amended by Historic Environment Scotland 2014), National Planning Framework 4 for Scotland (2023), Historic Environment Policy for Scotland (HEPS) (2019) as well as relevant Planning Advice Notes and Best Practice Guidance. A review of available records for heritage assets will be completed within a set search area. Based on the scale of development proposed, a 5km buffer study area has been drawn from the development boundary.

Records for the following designations have been consulted:

- World Heritage Sites (WHS);
- Listed Buildings (LBs);
- Conservation Areas (CAs);
- Scheduled Monuments (SMs);
- Garden and Designed Landscapes (GDL); and
- Inventoried Battlefields.

#### 5.2.1. Search Area

The 5km study area encompasses Paisley and stretches to Erskine in the north, towards Renfrew to the east and to Gleniffer Braes Country Park in the south. Visual influence is not the only impact posed by a GM PV development; its presence can offer adverse direct or indirect impacts to the character and/or appearance of an asset itself or its setting, as well as the relationship it has with surrounding features within the landscape. The array will offer a new, modern feature to the landscape, therefore consideration of its influence over the area is important to assess.

Beyond 5km, the array is considered a less notable feature, therefore assessment will concentrate on those assets at most risk of effect. During detailed assessment, professional judgement will be used to concentrate analysis on those designations at most risk of impact from the proposal and if deemed appropriate, assets will be omitted from further study, with an explanation given within reporting.

#### 5.2.2. Visual Influence

A Zone of Theoretical Visibility (ZTV) has been generated, as per the methodology set out in the LVIA, to illustrate the potential inter-visibility between sensitive historic sites and the proposed array. Appendices 5.1 and 5.2 present heritage assets within the 5km study area overlain with the theoretical visibility of the development. To provide a more realistic illustration of the potential visibility of the array proposed, exclusion zones for both built form and natural features have been accounted for. Whilst this is a desk-based exercise with standard inaccuracies in mapping and software, this stage offers an opportunity to appraise potential indirect setting effects from the offset of a development.

Further analysis of the sites identified within the calculated ZTV will be conducted for the planning application. If it is deemed necessary, suitable mitigation strategies will be designed to minimise impacts on important historical sites.

### 5.3. Identified Heritage Assets

Identified historic designations within the search area are detailed in Appendices 5.1 (LBs) and 5.2 (CAs and SMs). There are no World Heritage Sites, Gardens and Designed Landscapes, or Inventoried Battlefields within the study area.

#### 5.3.1. Listed Buildings

All 494 LBs identified within the search area are illustrated in Appendix 5.1, shown with the theoretical visibility of the array, and listed in Appendix 5.1a. This includes group listing designations and as such there may be repetition of Historic Environment Scotland references. All distances provided are measured in kilometres from the development centre to provide consistency. Table 5.1 details those LBs within the ZTV.

**Table 5.1 Listed Buildings within 5km ZTV**

Ref.	HES Ref.	Listed Building Name	Category	Distance (km)	Within ZTV
32	LB12777	Bridge of Weir, Kilbarchan Road, Manswrae Farm	B	4.61	Partially
104	LB12833	Linwood, Clippens Road, Clippens House	B	1.05	Yes
129	LB18829	Leitchland Farm	C	3.27	Partially
310	LB39043	Paisley, 14 Mains Road, The Old House	B	2.94	Partially
365	LB39090	Paisley, 72 - 74 Oakshaw Street	C	2.61	Partially
391	LB39117	Paisley, Stanely Crescent, Stanely House	B	3.49	Partially
392	LB39118	Paisley, 7, 7G Stanley Road, Middlepark	C	3.51	Partially
394	LB39120	Paisley, 11 Stanely Road, Moredun Lodge	B	3.49	Partially
395	LB39121	Paisley, 8 Stanely Road, Sanctuary House	B	3.43	Partially
454	LB48033	Johnstone, Park Road, Laigh Park	C	3.01	Partially

#### 5.3.2. Conservation Areas

There are seven Conservation Areas within the 5km study area, as detailed in Appendix 5.2. Table 5.2 provides further details alongside their ZTV coverage.

**Table 5.2 Conservation Areas within 5km**

HES Ref.	Conservation Area Name	Distance (km)	Within ZTV
CA298	Castlehead	2.62	Partially
CA299	Greenlaw	3.47	No
CA300	Houston	3.27	No
CA301	Kilbarchan	4.01	No
CA303	Ranfurly	4.57	Partially
CA304	Paisley Town Centre	2.46	Partially
CA305	Thornly Park	4.58	No



### 5.3.3. Scheduled Monuments

There are ten Scheduled Monuments within the study area as shown and tabled within Appendix 5.2. One SM is partially within the ZTV, being Barochan Hill, Roman fort 440m NNW of Barochan House<sup>12</sup>, which will consequently require further assessment.

### 5.4. Potential for Further Investigation

Potential impacts on the historic environment will be carefully considered as part of the Planning Application. To compile an accurate and comprehensive study of the impact of the proposed array at Middleton Farm, further targeted desk-based, and potentially field survey analysis, will be undertaken. Through this study, the impact of the proposed development can be clearly and accurately demonstrated upon any vulnerable areas of the historic environment to a level sufficient to satisfy LPA and national heritage bodies.

Appendices 5.1 and 5.2 illustrate heritage assets within the study area and their suggested theoretical visual connectivity with the proposed array. The ZTV suggests that potential visibility of the proposal is greatest within immediate vicinity of the site, reaching towards the north and northeast of the search area and as such, away from concentrated clusters of heritage assets.

Whilst the omission of views alone does not mean no impact, the setting and therefore significance of heritage assets not included in the ZTV are unlikely to be altered, therefore not warranting further detailed assessment. Further study of the potential impact to those heritage assets identified with theoretical visibility of the development will be conducted for the full Application, with pre-application consultation undertaken with local and national heritage authorities to discuss the scope of the analysis and methodology, if necessary. If it is deemed appropriate, suitable mitigation strategies will also be designed to minimise impacts to important historical sites to the greatest extent possible.

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<sup>12</sup> HES Ref: <https://portal.historicenvironment.scot/designation/SM3318>

## 6. ECOLOGY

### 6.1. Introduction

A Preliminary Ecological Appraisal (PEA) of the development site has been undertaken by EP Ecology Limited. Reporting is attached as Appendix 6.1 of this statement for review, with an extract of the Executive Summary presented here for completeness. Given the sensitive nature of the reporting submitted, relevant Authorities are directed to the full PEA for comment.

### 6.2. Executive Summary

EP Ecology was commissioned by Cogeo Planning & Environmental Services Ltd. to conduct a preliminary ecological appraisal to accompany a planning application for the construction of a solar farm with associated access and infrastructure at Middleton Farm, Linwood, Renfrewshire.

The proposed site area was surveyed for habitats and their likelihood to support protected and notable species, including (but not limited to) signs of badgers, water vole, INNS, and pine marten as well as nesting birds and other ecological features of interest. This included accessible habitats within 50m of the site boundaries.

Several designated sites may be indirectly affected by the proposed works, and careful pollution prevention and control in line with the Guidelines for Pollution Prevention is advised to mitigate the risk of this.

The requirement for Habitats Regulations Appraisal should be established owing to potential likely significant effects on the Black Cart Water Special Protection Area.

Himalayan balsam, Butterfly bush, Giant hogweed and Japanese knotweed are present along the bank of the Black Cart Water with Himalayan balsam being found extensively along most of the field margins. Care will need to be taken to manage the risk of spreading these invasive weeds.

General recommendations to improve the sites value for biodiversity are also made, including installation of hedgehog boxes, bat and bird boxes, and invertebrate hotels/log piles.

## 7. SOIL AND HYDROLOGY

### 7.1. Soil Condition

When designing and installing a commercial solar development, soil organic levels should be retained or enhanced, and compaction should be avoided<sup>13</sup>. GM PV arrays should avoid prime agricultural land (classes 1, 2 and 3.1)<sup>14</sup>. This site is split across two agricultural capability Classes; being Class 3.2 and Class 4.2<sup>15</sup>. Class 3.2 relates to land capable of average production (high yields of barley, oats and grass are possible), while Class 4.2 regards the capability of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops. Furthermore, there is no record of peat at the site with no resultant impact posed.

The open ground outlined for the array is vacant and is clear of structures. The land is sloping slightly; however it is unlikely site levelling works will be necessary during the installation phase.

### 7.2. Drainage

Commercial solar panels may disrupt or alter drainage pathways, for example through the addition of concrete foundations, with the removal of vegetation or earthworks affecting existing drainage patterns<sup>16</sup>.

Rainfall or snow falling on to the solar panels will runoff directly to the ground and infiltrate the permeable ground beneath. The array will not adversely alter the drainage at the site, as due to the construction design any flow of water will be able to continue around the solar panel framework as it would have pre-development.

### 7.3. Flood Risk

As discussed in Section 0, water run-off from panels drain to the existing permeable ground beneath the array. Solar farm developments are not generally associated with an increased risk of flooding; however, consideration must be made to any existing risk experienced at the site.

Online mapping tools which advise on the likelihood of flooding within an area<sup>17</sup> have been reviewed to assess the baseline conditions at the site. There are three sources of flooding recorded on SEPA's flood map:

- Flood Risk from Rivers or the Sea
- Flood Risk from Surface Water
- Flood Risk from Coastal

SEPA's flood map illustrates that there is High to Medium risk of all three sources of flooding, as noted above, within differing sections of the proposed development site. The array framework will be designed, incorporating mitigation measures where necessary to safeguard electrical equipment.

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<sup>13</sup> SNH (2016) Large scale solar photovoltaic installations: considering landscape, visual and ecological impacts

<sup>14</sup> BRE (2013) Planning Guidance for the development of large-scale ground mounted solar PV systems

<sup>15</sup> Scotland's Soils: <https://soils.environment.gov.scot/maps/capability-maps/land-capability-for-agriculture-partial-cover/#technicalAndReferenceMaterial>

<sup>16</sup> SNH (2016) Large scale solar photovoltaic installations: considering landscape, visual and ecological impacts

<sup>17</sup> SEPA flood risk map <http://map.sepa.org.uk/floodmap/map.htm>

## 8. GLINT & GLARE

Definitions of glint & glare relating to solar panels can vary. It is generally accepted that glint is defined as a direct reflection of sunlight, whilst glare is a less intense, continuous source of brightness. As solar panels are designed to absorb sunlight, rather than reflect it, there are low glint and glare risks in the UK. However, consideration should be given to aircraft safety<sup>18</sup>.

It is acknowledged that a common concern held is the potential impact solar farms have on aviation safety. CAA released safeguarding advice in relation to solar energy generation<sup>19</sup>, with further guidance published by the FAA<sup>20</sup>. It is common for airports to host solar PV panels themselves with no adverse impacts to aircraft interests. In addition, significant numbers of solar installations are operational on or around aerodromes throughout the country with no issues or sustained complaints arising on grounds of pilot distraction<sup>21</sup>.

The 2010 FAA Guidance includes a diagram illustrating the relative reflectance of solar panels compared to other surfaces. Surfaces in this figure produce reflections which are specular and diffuse. A specular reflection (those made by most solar panels) has a reflection characteristic similar to that of a mirror. A diffuse reflection will reflect the incoming light and scatter it in many directions. A table of reflectivity values, sourced from Figure 16 within the FAA guidance, is presented in Table 8.1. It should however be noted that this data does not consider the reflection of the sun, or whether the surface type is specular or diffuse.

**Table 8.1 Surface Reflection Values**

Surface	Reflection Value
Snow	80
White Concrete	77
Bare Aluminium	74
Vegetation	50
Bare Soil	30
Wood Shingle	17
Water	5
Solar Panels	5
Black Asphalt	2

An important comparison in this table is the reflectivity compared to water which produces a reflection of very similar intensity to that from a solar panel. This is confirmed in the study by Riley and Olsen (2011)<sup>22</sup> who concludes that still water has a very similar reflectivity to solar panels.

<sup>18</sup> BRE (2013) Planning guidance for the development of large-scale ground mounted solar PV systems

<sup>19</sup> CAA, Safeguarding of Aerodromes: Advice Note 5: Renewable Energy and Impact on Aviation (2016); <http://www.aoa.org.uk/wp-content/uploads/2016/09/Advice-Note-5-Renewable-Energy-2016.pdf>

<sup>20</sup> Federal Aviation Administration (FAA), Technical Guidance for Evaluating Selected Solar Technologies on Airports, Version 1.1, April 2018

<sup>21</sup> Solar Trade Association (2016) Impact of solar PV on aviation and airports; Summary of evidence compiled by the Solar Trade Association to help inform the debate around permitted development for non-domestic solar PV in Scotland

<sup>22</sup> Riley and Olsen (2011) A Study of the Hazardous Glare Potential to Aviators from utility-Scale Flat-Plate Photovoltaic Systems

## 8.1. Assessment of Impact

There is no specific methodology for assessing the effect of glint & glare on a receptor and due to the unpredictability of weather patterns, movement of receptors within the landscape and minor variances in onsite topography and vegetation, there is no definitive threshold for acceptance or refusal. As such, an accepted approach is to identify areas of potential issue and, where necessary, provide mitigation for the potential impact rather than attempting to provide non-permeable barriers to receptors.

The FAA sets out the following essential criteria to be met for solar energy systems located on airport property:

- No 'yellow' glare for any flight path from threshold to 2 miles.
- No glare of any kind for Air Traffic Control Tower(s) at cab height.

As such, to ensure continued safety, the planning application will consider the glint & glare impacts associated with the ATCT and the Flight Paths at Glasgow Airport.

At this site, fixed axis panels are proposed for installation at an angle of 17°. The panels are produced with an anti-reflective coating to mitigate the risk of glint and glare. Panels reflect as little as 2% of the incoming sunlight which evidence shows is slightly more than black asphalt, and level with bodies of water<sup>23</sup>. Existing established vegetation bordering the site may further reduce the risk of glint and glare to receptors of the site.

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<sup>23</sup> STA (2016) Impact of solar PV on aviation and airports; Summary of evidence compiled by the STA to help inform the debate around permitted development for non-domestic solar PV in Scotland

## 9. AMENITY CONSIDERATIONS

### 9.1. Transportation

Access to the site will make use of the existing entrance from Middleton Road to the southwest, utilising established agricultural tracks. Roadway geometry is adequate for the delivery of components into the site for development with no need for upgrading works. The existing access ensures no removal of trees or street furniture along the route is necessary, with secure access to the site available.

Components relating to the development of a solar PV array are capable of being transported on standard articulated vehicles. HGVs and vehicles of this scale utilise the local road network highlighting the areas' ability to accommodate the construction traffic with no modifications necessary.

The construction phase will present the busiest period along the road network with components being delivered to site. To minimise impact to the area, peak periods of traffic will be avoided. Given the scale of development proposed, onsite construction is estimated to take approximately 8-10 weeks.

Once operational, it is anticipated that there would be four-five visits to the site per year for works including cleaning the panels, maintenance and ad hoc checks. Visits during the operational phase will be light with small vans or cars being used for transportation; these would not significantly affect the local road network.

### 9.2. Noise & Vibration

Given the nature of the construction process, there may be noise and vibration emissions during this phase of works. However, the level of noise and vibration will not be significant or prolonged to the detriment of neighbouring properties.

Potential effects associated with onsite construction noise and vibration can be controlled through best practice methodologies and working conditions<sup>24</sup>. With the construction period anticipated to last approximately 20 weeks, any effects would be temporary and short-term.

Onsite operations which emit audible noise will be restricted, being carried out only between the hours of 08:00 and 19:00 hours, Monday to Friday and 08:00 and 13:00 hours on Saturday., with no work occurring on Sundays.

Operational noise from the array will be limited, with potential for low level noise from the inverters installed onsite running during day-light hours.

### 9.3. Residues, Emissions and Waste

There will be no residues or emissions generated as a result of the proposed development. Any materials excavated onsite during the groundworks will be reused onsite for filling and landscaping. As such, no waste material will be generated requiring removal from the site.

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<sup>24</sup> British Standard Institute (2008) Code of practice for noise and vibration control on construction and open sites; BS 5228 (Amendment February 2014)

#### 9.4. Use of Natural Resources

The proposed GM array will generate electricity from the solar radiation available onsite. The footprint of the development has been designed to utilise the available land to the greatest extent possible whilst ensuring minimal impact to the area. Impact to biodiversity is expected to be negligible, with the groundcover beneath panels left in-situ and maintained post-construction. As noted, any soil excavated will be reused within the boundary of the site. No water is necessary onsite for this development.