Rugby Borough Council

Renewable Energy Potential Mapping – methodology

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Introduction

Bioregional has been commissioned by Rugby Borough Council to undertake a Renewable Energy Potential Mapping (REPM) study.

The scope of the REPM is to identify suitable broad locations for renewable energy development based on their technical potential. It is not intended to pinpoint specific locations for renewable energy sites at a granular level.

Other constraints, such as national designations (e.g. Sites of Special Scientific Interest), are already available to the council and will be used in combination with this study to determine suitability of renewable energy sites.

It is important to note that this study does not intend to rule out areas for renewable energy development where they have been found to be unsuitable. It is the right of the renewable energy developer to produce a case to justify whether a specific site is suitable or not, under site-specific conditions at a more granular level than the REPM addresses, which subsequently may comprise an area identified as unsuitable in this study.

The REPM assesses three renewable energy technologies:

- Ground-mounted solar PV
- Onshore wind
- Battery energy storage systems

Methodology

Ground-mounted solar PV

1. Buffer and exclusion zones

Layer 1 intends to minimise potential impacts on residents or infrastructure by applying various buffers and ruling out of other areas:

a. Ancient woodland – 15 metres to avoid root damage
b. Buildings – 20 metres to avoid disruption
c. Major and minor transport infrastructure (open roads and railway lines) – 20 metres
d. Airports and aerodromes
a. Large bodies of water (rivers, canals, lakes and reservoirs)
e. Operational/consented renewable energy sites[1]

2. Technical performance

Layer 2 draws on Layer 1 by mapping landscape factors that impact solar PV technical performance to ensure that subsequent land identified as suitable in Layer 3 is appropriate from an efficiency perspective.

It is important to note that it is the choice and responsibility of the renewable energy development to determine whether a suitable area would enable high solar PV efficiency. However, Layer 2 is a useful resource for both Development Management officers and renewable energy developers to better understand the potential technical performance of suitable areas.

The following assumptions have been made and mapped:

- All areas with inclinations of 0 – 3 degrees from the horizontal are assumed suitable and optimal for solar PV development.
- For areas with inclination between 3 – 15 degrees from the horizontal, only south-west to south-east facing areas are assumed to be suitable for solar PV development.
- All other areas (15 degrees inclination or higher) were deemed unsuitable for solar PV development.

3. Grid connection

Layer 3 addresses the feasibility of grid connection to primary substations, which are the typical connection point for many medium and large-scale renewable energy sites.

As with the assumptions made in Layer 2, it is the decision of the renewable energy developer to determine what distance from an existing grid connection is feasible and viable for a renewable energy development site. However, Layer 3 is a useful addition to preceding layers to understand the likelihood of whether a suitable area determined by Layers 1 – 2 is suitable in terms of grid connection suitability.

The following assumption was made for Layer 3:

- Any area more than 1 mile from a primary substation point is determined to be unsuitable.

[1] This input uses point data as polygon data was not available, which does not represent the full spatial extent of operational/consented renewable energy sites. A 200m buffer is assumed to represent general coverage.

Onshore wind

1. Buffer and exclusion zones

Layer 1 intends to minimise potential impacts on residents or infrastructure by applying various buffers and ruling out of other areas:

The following buffers are applied assuming a 100m tip height wind turbine:

a. Ancient woodland – 15 metres to avoid root damage
b. Buildings
   - Noise buffer: 400m
   - Topple distance – tip height + 10%
c. Major and minor transport infrastructure (open roads and railway lines)
   - Topple distance – tip height + 10%
d. Airports and aerodromes
b. Large bodies of water (rivers, canals, lakes and reservoirs)
e. Operational/consented renewable energy sites[2]

2. Technical performance

Layer 2 draws on Layer 1 by mapping factors that impact onshore wind technical performance to ensure that subsequent land identified as suitable in Layer 2 is appropriate from an efficiency perspective.

It is important to note that it is the choice and responsibility of the renewable energy development to determine whether a suitable area would enable high onshore wind efficiency. However, Layer 2 is a useful resource for both Development Management officers and renewable energy developers to better understand the potential technical performance of suitable areas.

A wind speed of 6.0 m/s (50m altitude) is assumed to be sufficient to determine a suitable area appropriate for onshore wind development from a technical performance perspective.

3. Airspace restrictions

To accommodate interference with airspace restrictions from onshore wind, Layer 3 maps safeguarding zones produced by the Civil Aviation Authority. The zones relevant to this study are associated with Coventry Airport.

Restrictions are in place for structures above 15m, 45m and 90m. As this study assumes a wind turbine tip height of 100m, all restriction zones are applicable.

4. Grid connection

Layer 4 addresses the feasibility of grid connection to primary substations, which are the typical connection point for many medium and large-scale renewable energy sites.

As with the assumptions made in Layer 2, it is the decision of the renewable energy developer to determine what distance from an existing grid connection is feasible and viable for a renewable energy development site. However, Layer 4 is a useful addition to preceding layers to understand the likelihood of whether a suitable area determined by Layers 1 – 3 is suitable in terms of grid connection suitability.

The following assumption was made for Layer 4:

- Any area more than 1 mile from a primary substation point is determined to be unsuitable.

[2] This input uses point data as polygon data was not available, which does not represent the full spatial extent of operational/consented renewable energy sites. A 200m buffer is assumed to represent general coverage.

Battery energy storage systems (BESS)

1. Buffer and exclusion zones

Layer 1 intends to minimise potential impacts on residents or infrastructure by applying various buffers and ruling out of other areas:

The following buffers are applied:

c. Ancient woodland – 15 metres to avoid root damage
d. Buildings – 100 metres noise buffer and to minimise disruption to residents
e. Major and minor transport infrastructure (open roads and railway lines) – 20 metres
f. Airports and aerodromes
g. Large bodies of water (rivers, canals, lakes and reservoirs)
h. Operational/consented renewable energy sites[3]

2. Landscape suitability

Layer 2 draws on Layer 1 by mapping landscape factors that impact suitability of BESS sites. The primary factor is slope angle, since BESS sites must be situated on flat land. Therefore, the following assumption is made:

- All areas with inclinations of 0 – 3 degrees from the horizontal are assumed suitable and optimal for BESS sites.

3. Grid connection

Layer 3 addresses the feasibility of grid connection to primary substations, which are the typical connection point for many medium and large-scale renewable energy sites.

As with the assumptions made in Layer 2, it is the decision of the renewable energy developer to determine what distance from an existing grid connection is feasible and viable for a renewable energy development site. However, Layer 3 is a useful addition to preceding layers to understand the likelihood of whether a suitable area determined by Layers 1 – 2 is suitable in terms of grid connection suitability.

The following assumption was made for Layer 3:

- Any area more than 1 mile from a primary substation point is determined to be unsuitable.

[3] This input uses point data as polygon data was not available, which does not represent the full spatial extent of operational/consented renewable energy sites. A 200m buffer is assumed to represent general coverage.