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of Exeter

Centre for Energy
and the Environment

Exeter's potential for wind and solar energy

Centre for Energy and the Environment

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and the Environment

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Management summary

The Centre for Energy and the Environment was commissioned by Exeter City Council to review renewable energy constraint mapping previously undertaken to support the Greater Exeter Strategic Plan. Potential for onshore wind turbines and large-scale ground-mounted photovoltaic arrays has been considered.

The smaller study area has made it possible to review the individual areas identified by the mapping, to an extent not previously practicable. Areas recently urbanised or allocated or granted planning permission for housing or employment development have been removed from the analysis. Additionally, school playing fields, valley parks, parks and other public open spaces, county wildlife sites and historic parks and gardens have also been omitted as these areas are designated for purposes that are not compatible with the delivery of wind turbines or photovoltaic arrays. The study remains a high level analysis of potential for large scale wind and photovoltaic generation in the city; suitability of the identified areas would require further investigation and planning permission may not necessarily be granted for such development. Likewise, areas additional to those identified may exist and may be granted planning permission.

The vast majority of the potential is from photovoltaic arrays, with a potential generation capacity of 17.9 MW_p yielding up to 15.7 GW h per annum. Most of the areas identified are around the periphery of the city, with the greatest potential on farmland and flood plain to the north.

Only one wind turbine site has been identified to the north of Exeter and its potential contribution is small at 0.5 to 1.0 MW_p capacity.

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1 Introduction

The Centre for Energy and the Environment was commissioned by Exeter City Council (ECC) to review and expand on renewable energy constraint mapping previously undertaken to support the Greater Exeter Strategic Plan (GESP)¹. The previous work considered potential sites for onshore wind turbines and areas for large-scale ground-mounted photovoltaic (PV) arrays across East Devon, Exeter, Mid Devon and Teignbridge. It was necessarily a generalised review as a consequence of the large area under consideration.

- The physical constraints applied have been reviewed. Changes in the intervening five years have been minor, and little value was to be gained from rebuilding the resource maps from source data, although some enhancements have been made. Firstly, the reduced study area has made it feasible to review individual areas, and those deemed unsuitable due to current land use, extant planning permissions, allocations, or designations incompatible with delivery of wind turbines or photovoltaic arrays, have been omitted. The following land use designations have been omitted: valley parks,
- public open spaces,
- county wildlife sites, and
- historic parks and gardens.

Secondly, the boundaries have been cleaned to eliminate features less than 10 m in width (the method for achieving this was devised after the GESP work had been completed²).

Thirdly a connection constraint is applied in the analysis imposing a maximum distance of 2 km from the 33 kV or greater electricity distribution network. Future technological developments including battery storage, smart grids and electric vehicles may increase the feasibility of installing PV further downstream on the grid or autonomously. However, within the Exeter Plan period, and with the known grid capacity/connection issues^{*}, this is considered a reasonable constraint for a high level analysis.

Finally, an optional constraint was applied when assessing PV, and concerns agricultural land classification (ALC). Ideally grade 3a agricultural land would be excluded from development and grade 3b included, but the sub-classification of grade 3 land is only available for very limited areas (those surveyed since 1988). Since comprehensive mapping of grade 3a and 3b land is unavailable, the maps identify areas that are on grade 3 agricultural land. Only about one-half of grade 3 land is likely to be grade 3b; the analysis of total generating potential has taken this into account.

Assumptions made to determine the renewable energy resource have been reviewed, with the installed capacity of 0.13 MW_p per acre (32.1 MW_p per square kilometre) previously applied

^{*} These issues are currently widespread with connection of sizeable schemes being delayed well into the next decade. The 1.2 MW_p array with associated battery storage recently installed by ECC at Water Lane is subject to restrictions on grid export and had to be provided with remote disconnection equipment.

being revised to 0.17 MW_p per acre (41.0 MW_p per square kilometre) on the basis of a review of the installed capacity and gross land area of all PV farms over 4 MW_p in Devon.

The study remains a high level analysis of potential for large scale wind and photovoltaic generation in the city; suitability of the identified areas would require further investigation and planning permission may not necessarily be granted for such development. Likewise, areas additional to those identified may exist and may be granted planning permission.

2 Wind

The constraints applied to identify potential sites are listed in Table 1.

The percentage of the Exeter area excluded by applying each constraint is shown. This indicates which constraints have the greatest effect in limiting the available area for wind turbines. The parameters that individually exclude 10% or more of the area are:

1. residential buildings within 400 m (94%),
2. road within 150 m (88%),
3. listed building within 400 m (59%),
4. microwave link protection zone (57%),
5. building within 25 m (53%),
6. 33 kV or 132 kV overhead power line within 100 m (52%),
7. average annual wind speed less than 6.5 m/s at 80 m elevation (45%)^{* 3},
8. primary surveillance radar zone (39%),
9. valley parks (15.9%), and
10. railway line within 150 m (14%).

Table 1: Spatial constraints applied to determine the wind power resource in Exeter.

Parameter	Constraint	Source of data	% of Exeter removed
Transport & communications			
Airfield	> 3 km	DCC GIS	5.2%
Microwave link protection zones [†]	Exclude	DCC GIS	57.0%
NATS parameters[‡]			
<i>Air-ground-air communication site</i>	> 10 km	NATS	0.0%
<i>En-route navigation aid site</i>	> 10 km	NATS	0.0%

^{*} The average annual wind speed criterion originally applied was a minimum of 6.5 m/s at 80 m elevation; this criterion was revised in an update of that work following a review of the constraint applied in other studies in the region, and better reflects the wind speed at the hub height of turbines now most commonly being installed.

[†] 300 m wide zones between microwave communication transmitters and receivers within which a wind turbine could adversely affect communications.

[‡] Formerly National Air Traffic Services.

Parameter	Constraint	Source of data	% of Exeter removed
<i>Primary surveillance radar zone</i>	Exclude	NATS	39.1%
<i>SSR or HMU site*</i>	> 15 NM	NATS	0.0%
Overhead power line (33, 132 kV)	> 100 m	National Grid, WPD	51.9%
Railway line	> 150 m	Ordnance Survey OpenMap	14.3%
Road	> 150 m	Ordnance Survey OpenMap	88.0%
Built environment & heritage			
Building	> 25 m	Ordnance Survey OpenMap	53.3%
Greenspace	Exclude	Ordnance Survey Greenspace	7.6%
Landfill site	> 1 km from centroid	Google Earth	0.0%
Listed building	> 400 m from centroid	Historic England	59.2%
MOD danger area	Exclude	DCC GIS	0.0%
Quarry	Exclude	Google Earth	0.0%
Registered park or garden	Exclude	Historic England	0.1%
Residential building	> 400 m from centroid	District authority GIS	94.2%
Scheduled monument	Exclude	Historic England	0.2%
Natural Features			
Area of outstanding natural beauty	Exclude	Natural England	0.0%
County wildlife site	Exclude	Devon Biodiversity Records Centre	6.5%
Heritage coast	Exclude	Natural England	0.0%
Local nature reserve	Exclude	Natural England	0.4%
Marshland	Exclude	Ordnance Survey Landcover	0.6%
National nature reserve	Exclude	Natural England	0.0%
National park	Exclude	Natural England	0.0%
RAMSAR Site	Exclude	Natural England	3.0%
Site of special scientific interest	Exclude	Natural England	5.0%
Special area of conservation	Exclude	Natural England	0.0%
Special protection area	Exclude	Natural England	3.0%
Tidal water	Exclude	Ordnance Survey OpenMap	1.8%
Valley park	Exclude	ECC GIS	15.9%
Water	Exclude	Ordnance Survey OpenMap	1.7%
Woodland	Exclude	Ordnance Survey OpenMap	8.4%

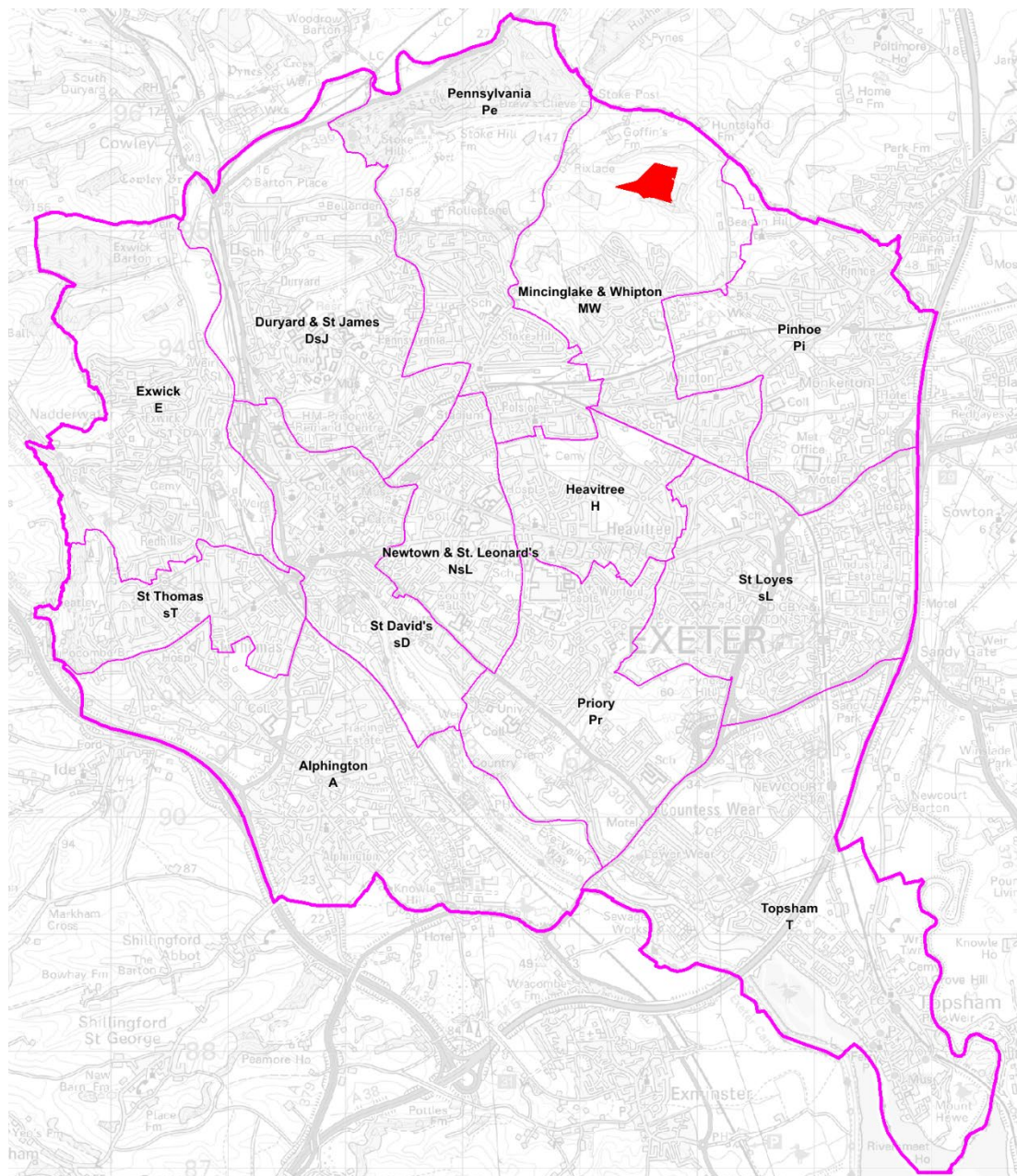
* SSR is secondary surveillance radar; HMU is height monitoring unit.

Parameter	Constraint	Source of data	% of Exeter removed
World heritage site	Exclude	Historic England	0.0%
Technical Constraints			
Wind speed	> 6.5 m/s at 80 m elevation	NOABL	45.0%
WPD grid connection (33, 132 kV)	< 2 km	WPD	7.2%

The NATS parameters pertain to national air traffic control infrastructure, and do not represent a blanket ban on wind turbine development within the identified areas. A number of existing wind farms in Devon (including Fullabrook and Den Brook) lie within the constraint areas. The final identification of potential wind turbine sites within Exeter reduced the extent of the NATS parameters by 75%, with the result that the only parameter affecting Exeter, the Primary Surveillance Radar zone, no longer had any impact within the boundary of Exeter.

The data for each of the constraints was converted to digital mapping format where necessary and distance buffers were applied. Any overlaps were eliminated and the resulting areas subtracted from the total Exeter area to identify areas potentially available for wind development. Areas smaller than a minimum size threshold of 250 m² ⁴ were eliminated.

One potential wind turbine site was identified in Exeter by this exercise. The site is to the north of the city. The site is shown in Figure 1 and Figure 2. Data for the site is included in Appendix 1.

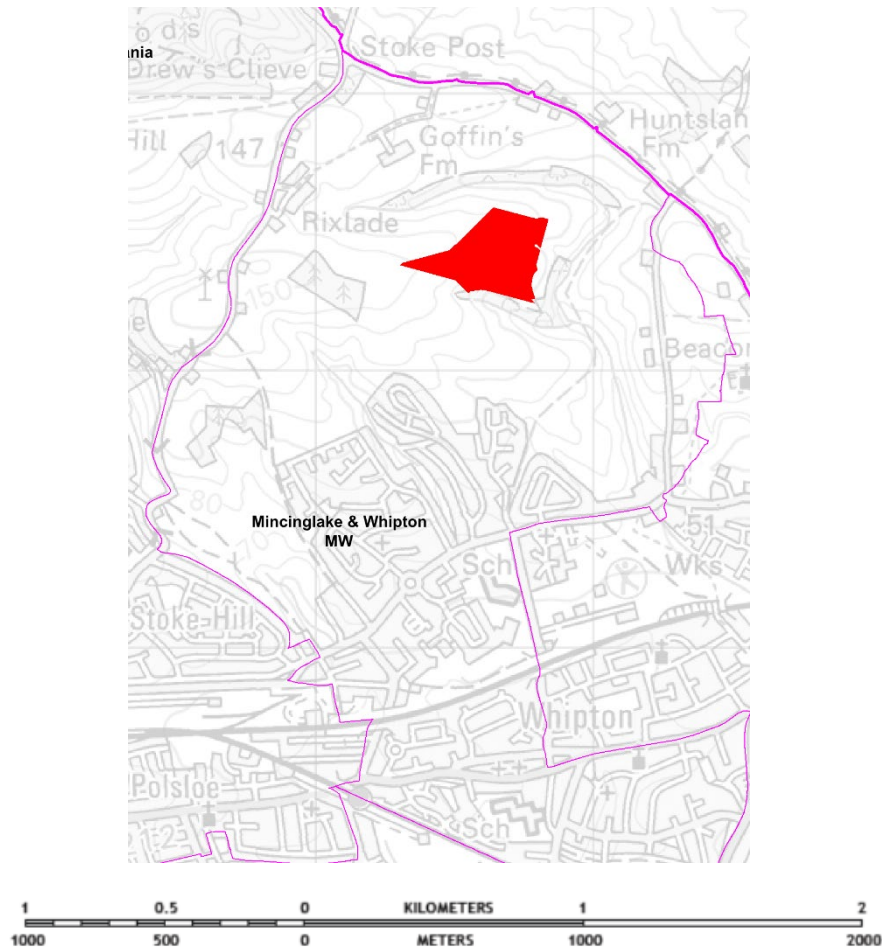


- Exeter city boundary
- Ward boundary
- Potential wind turbine site

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Figure 1. Potential site identified in Exeter for wind turbines.



- Exeter city boundary
- Ward boundary
- Potential wind turbine site

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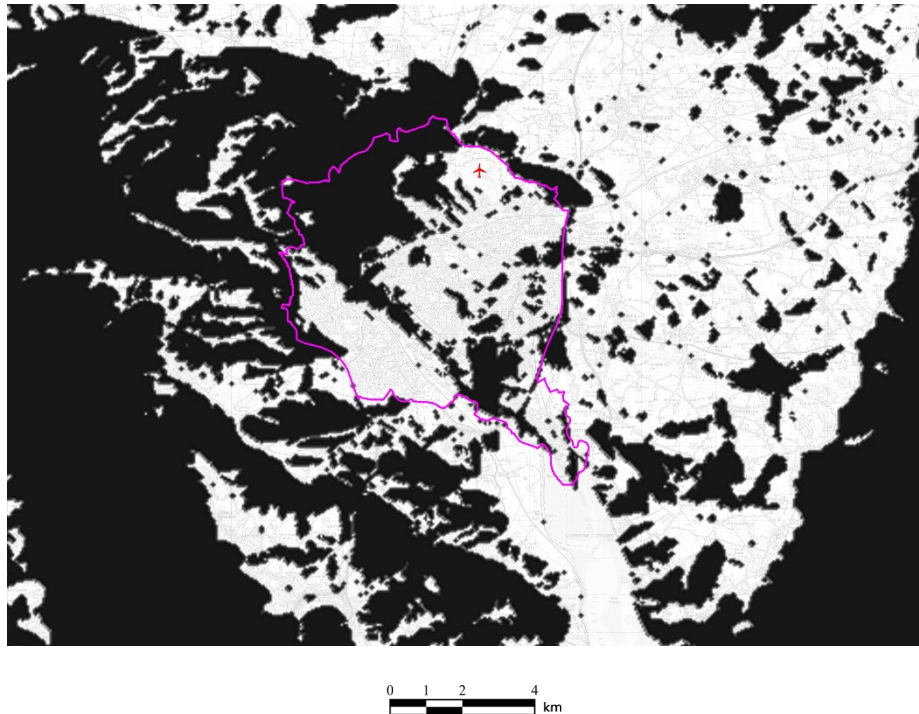
Figure 2. Potential site identified in Exeter for wind turbines: detailed map.

In previous mapping work^{1,2} the size of wind turbine on a site has been allocated on the basis of site area. This follows the approach taken in similar studies^{4,5}. Sites below 0.125 km² are allocated a single 500 kW_p turbine. The site identified within Exeter falls within this size threshold. It should be appreciated that site selection has already required a minimum distance from surrounding features, as specified in Table 1, so the wind turbine (including its blades) could extend to the site boundary. The site is 0.09 km² (or about 300 m in each direction), approaching the 0.125 km² threshold, and could potentially accommodate a larger turbine. Allocating a 1 MW or even a 2.5 MW turbine would significantly increase the implied wind power resource.

A density factor is usually applied to wind turbine development to ensure that the visual impact is limited to an acceptable level⁵. Since potential has only been identified for one turbine this approach is not appropriate. Visibility of the turbine has been considered by mapping areas that would have a clear line of site to the turbine's blade tip given the intervening topography. This is dependent upon the size of the turbine. This has been taken from previous work for Cornwall considering the wind power resource in the context of the

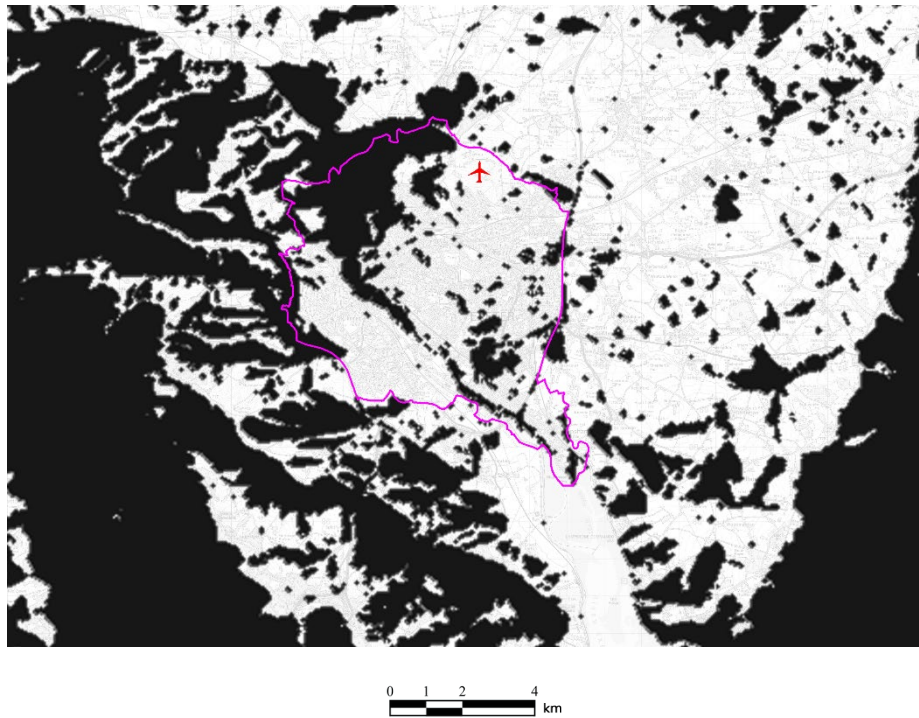
county's landscape character assessment⁶, which assumed tip heights of 50 m, 90 m and 135 m for 500 kW, 1 MW and 2.5 MW turbines respectively.

The visibility mapping results in Figure 3 and Figure 4. Any turbine would be visible from much of Exeter, and surrounding areas in adjacent districts. Increasing the size of the turbine moderately increases its visibility.



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*Figure 3. Visibility of a 500 kW wind turbine (50 m tip height)
(the turbine is wholly or partly visible from areas of the map that are not shaded in black).*



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*Figure 4. Visibility of a 1 MW wind turbine (90 m tip height)
 (the turbine is wholly or partly visible from areas of the map that are not shaded in black).*

A landscape sensitivity assessment for Exeter was undertaken in 2022⁷ and defines the sensitivity of 38 land parcels for residential and employment development. A wind turbine will be significantly taller (and therefore more visible) than either of these types of development. The site is located in land parcels LP03 and LP10 within the landscape sensitivity assessment, which are categorised as having a high sensitivity to either housing or employment development, categorisations that are defined as landscapes which are very vulnerable to change without significant change to character, special qualities and features or adverse effects.

Output has been calculated for the turbine site. A capacity factor of 28% has been applied to account for the intermittency of wind when calculating the annual energy output. This is a typical figure used in other studies^{4,5,8}. With a 500 kW turbine, annual output is estimated at 1.2 GW h. With a 1 MW turbine this increases to 2.5 GW h.

3 Solar

The constraints applied to identify potential areas that could accommodate ground-mounted PV arrays are listed in Table 2. The percentage of the Exeter area excluded by applying each constraint is shown. This indicates which constraints have the greatest effect in limiting the available area for PV. The parameters that individually exclude 10% or more of the area are:

1. buildings within 25 m (53%),
2. roads within 25 m (41%),
3. valley parks (15.9%) and
4. agricultural land grade 1 or 2 (14%).

Table 2: Spatial constraints applied to determine the PV resource in Exeter.

Parameter	Constraint	Source of data	% of Exeter removed
Transport & communications			
Airfield*	Exclude	DCC GIS	0.0%
Railway line	> 25 m	Ordnance Survey OpenMap	2.5%
Road	> 25 m	Ordnance Survey OpenMap	41.0%
Built environment & heritage			
Building	> 25 m	Ordnance Survey OpenMap	53.3%
Greenspace	Exclude	Ordnance Survey Greenspace	7.6%
Landfill site	> 1 km from centroid	Google Earth	0.0%
MOD danger area	Exclude	DCC GIS	0.0%
Quarry	Exclude	Google Earth	0.0%
Registered park or garden	Exclude	Historic England	0.1%
Scheduled monument	Exclude	Historic England	0.2%
Natural features			
Agricultural land classification	Exclude 1, 2 [†]	Natural England	14.5%
Area of outstanding natural beauty	Exclude	Natural England	0.0%
County wildlife sites	Exclude	ECC GIS	6.5%
Heritage coast	Exclude	Natural England	0.0%
Local nature reserve	Exclude	Natural England	0.4%

* No constraint has been applied outside of the airfield boundary; EON has roof-mounted PV and had a temporary solar thermal installation in close proximity to Exeter and airport so it does not appear reasonable to have a blanket constraint within a certain proximity of the airfield boundary.

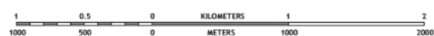
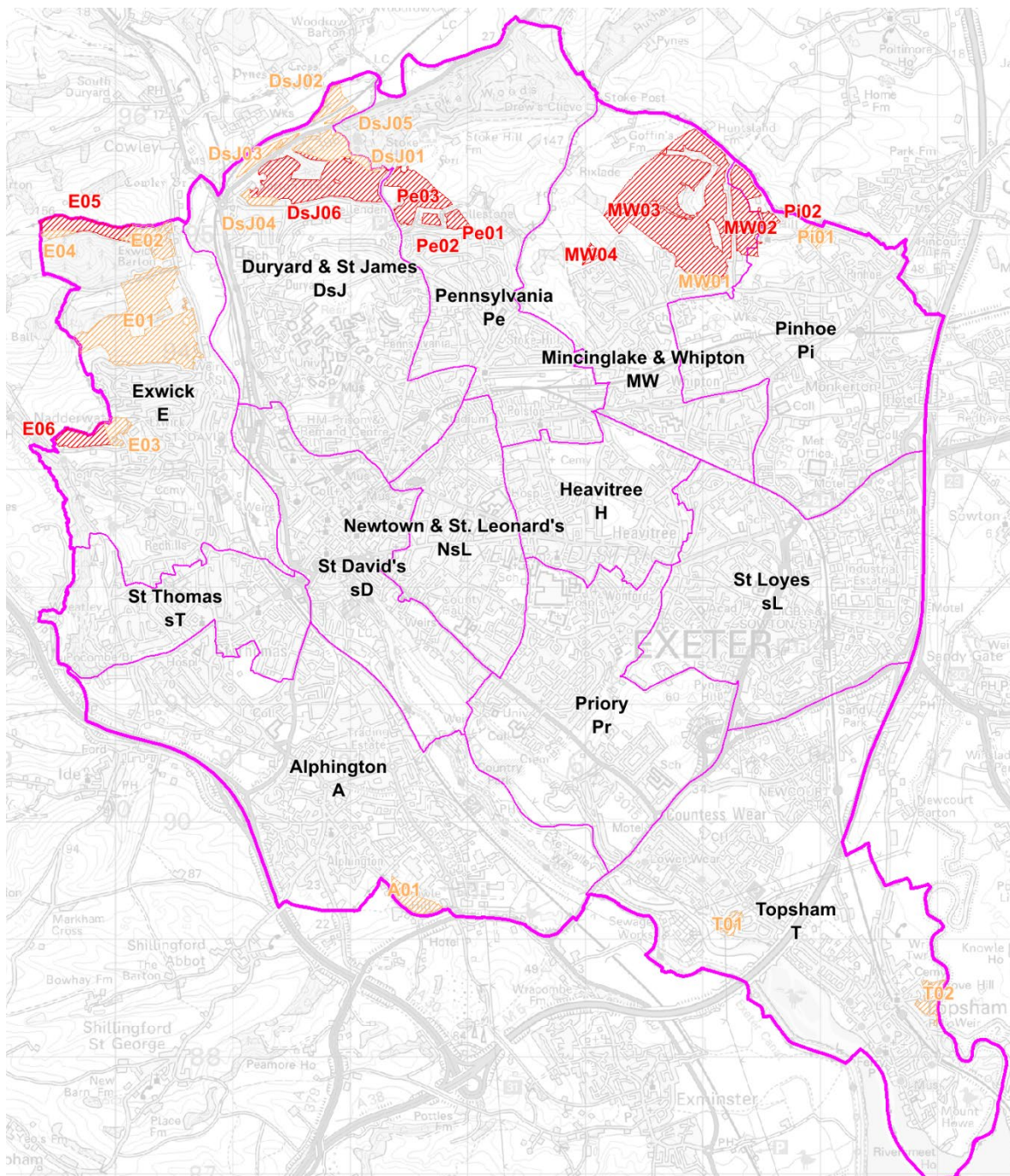
[†] Ideally grade 3a would also be excluded, but grades 3a and 3b have only been distinguished in post-1988 mapping. Where grade 3a and 3b data are available, approximately half (55.4%) is grade 3a and half is grade 3b, and this has been considered later in the analysis.

Parameter	Constraint	Source of data	% of Exeter removed
Marshland	Exclude	Ordnance Survey Landcover	0.6%
National nature reserve	Exclude	Natural England	0.0%
National park	Exclude	Natural England	0.0%
RAMSAR site	Exclude	Natural England	3.0%
Sand dunes	Exclude	Ordnance Survey Landcover	0.0%
Site of special scientific interest	Exclude	Natural England	5.0%
Slope	Exclude > 20° facing between east and west via north	Ordnance Survey OpenMap	0.2%
Special area of conservation	Exclude	Natural England	0.0%
Special protection area	Exclude	Natural England	3.0%
Tidal water	Exclude	Ordnance Survey OpenMap	1.8%
Water	Exclude	Ordnance Survey OpenMap	1.7%
Valley park	Exclude	ECC GIS	15.9%
Woodland	Exclude	Ordnance Survey OpenMap	8.4%
World heritage site	Exclude	Historic England	0.0%
Technical constraints			
WPD grid connection (33, 132 kV)	< 2 km	WPD	7.2%

The data for each of the constraints was converted to a digital mapping format where necessary and distance buffers applied. Any overlaps were eliminated and the resulting areas subtracted from the total Exeter area to identify areas available for PV development. Boundaries in different layers of source data sometimes do not exactly correspond, leading to artefacts in the form of small whiskers of land. Whilst these have negligible impact of the land areas identified they impair the clarity of mapped results, and have been removed by eliminating all features in the final identified areas with a width of less than 10 m. Areas smaller than a minimum size threshold of 1 ha⁴ were eliminated; the focus of the analysis is on large-scale ground mounted arrays. 1 ha could accommodate about 0.4 MW_p of photovoltaic generation capacity.

Some areas initially identified by the mapping process were identified as being inappropriate for ground-mounted PV, and were deleted from the results. These included school playing fields, public open spaces, historic parks and gardens and areas where housing developments are ongoing or have been completed and Exeter Plan allocated sites.

Figure 5 provides an overview of areas identified in Exeter. Greater detail is shown in Figure 6 to Figure 9. Data for each area is listed in Appendix 2. Each area is numbered, with a prefix denoting the ward containing the majority of its land area. The majority of the areas are around the edge of the city, outside of urban areas, with the greatest potential just north of the city.

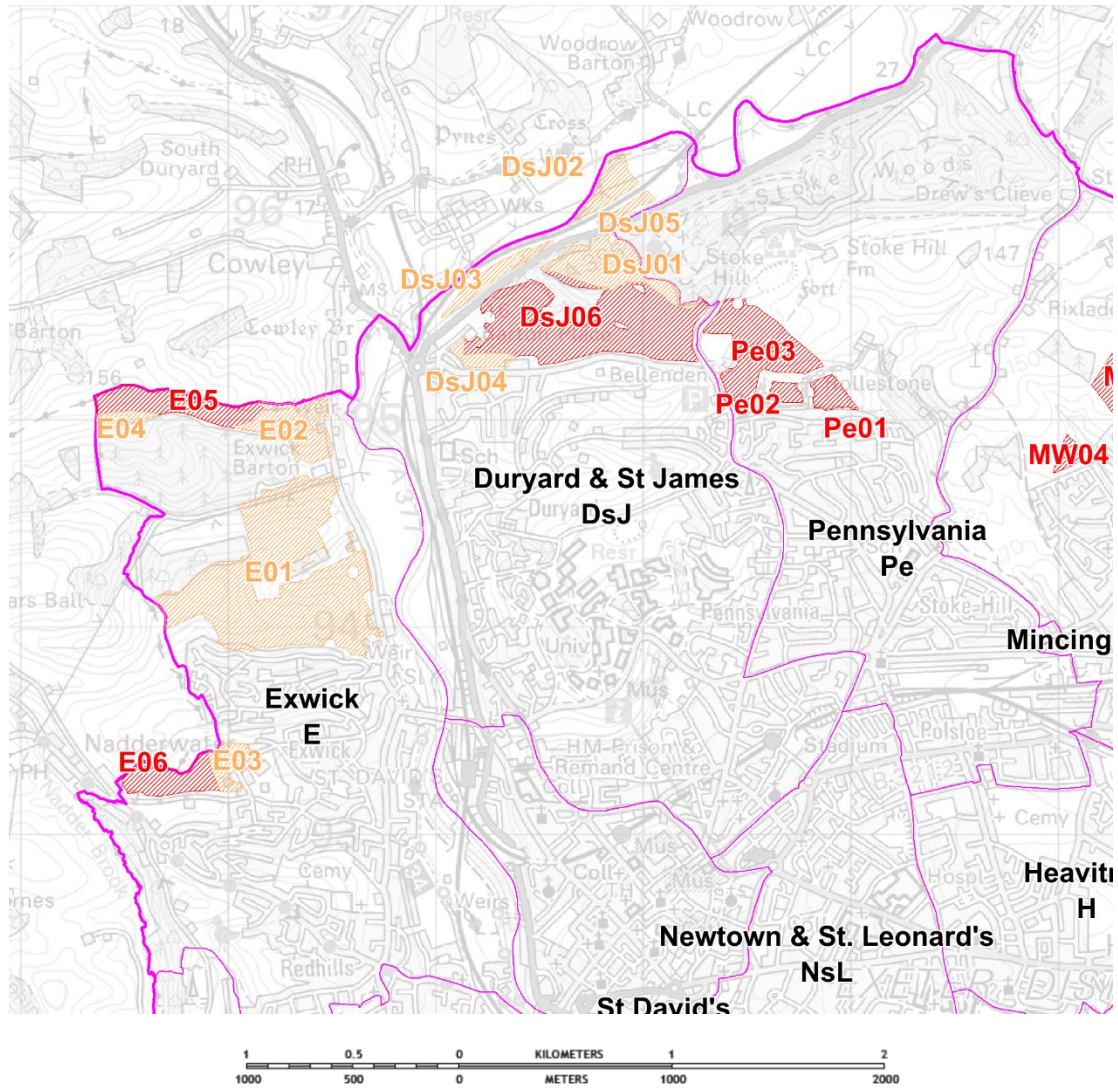


- Exeter city boundary
- Ward boundary
- Potential area for PV, grade 3 agricultural land
- Potential area for PV, grade 4 or 5 agricultural land

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Figure 5. Potential areas identified in Exeter for ground-mounted photovoltaic panels: overview map.

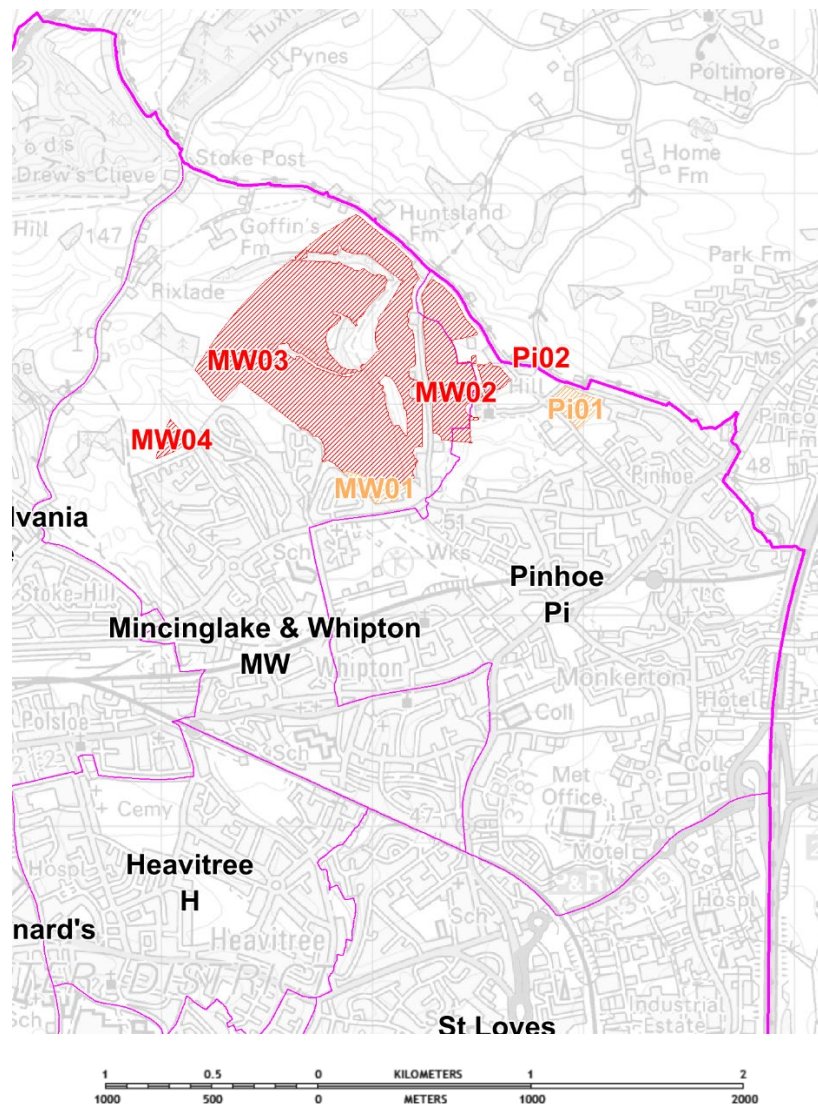


- Exeter city boundary
- Ward boundary
- Potential area for PV, grade 3 agricultural land
- Potential area for PV, grade 4 or 5 agricultural land

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Figure 6. Potential areas identified in north-west Exeter for ground-mounted photovoltaic panels.

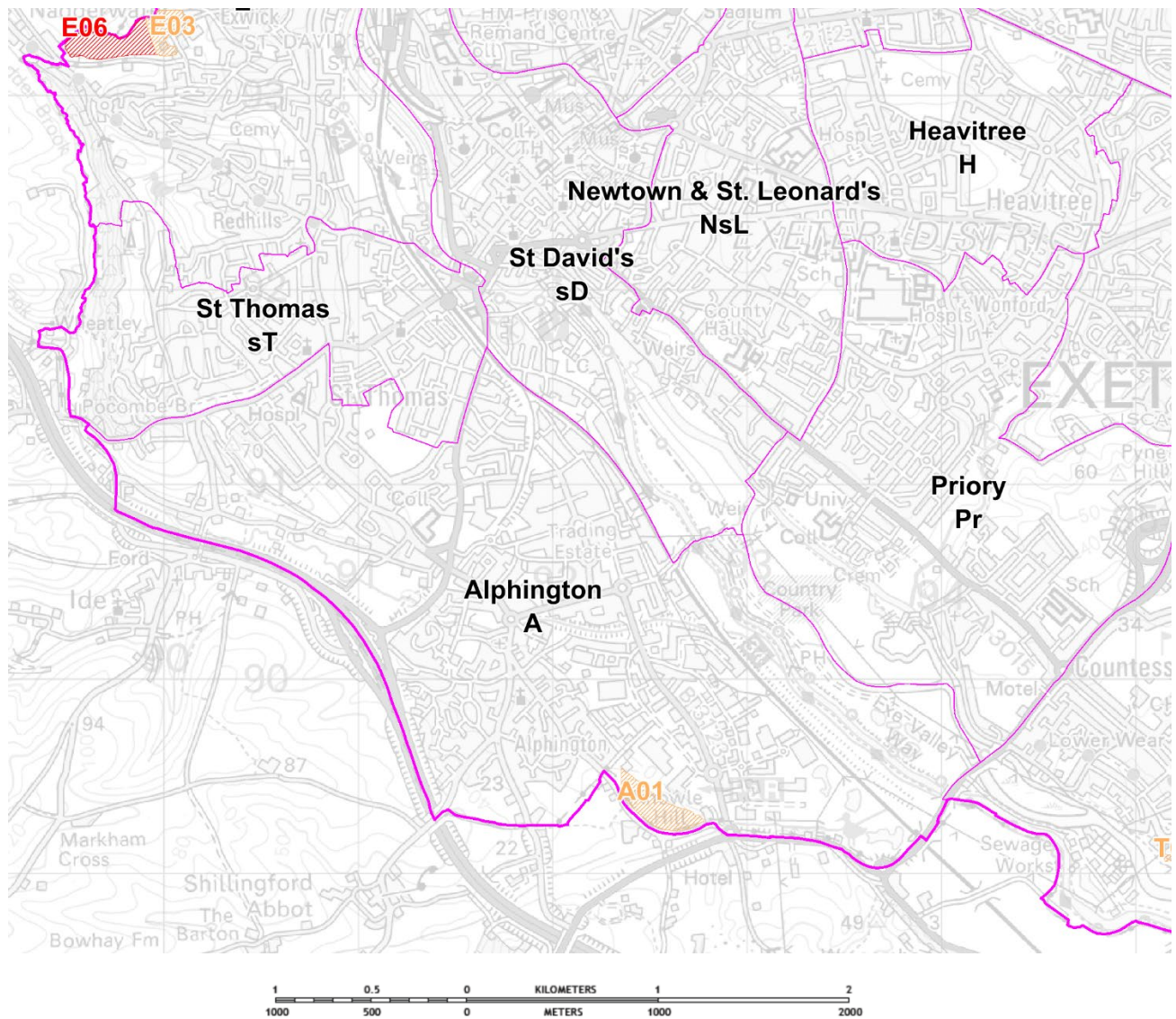


- Exeter city boundary
- Ward boundary
- ▨ Potential area for PV, grade 3 agricultural land
- ▨ Potential area for PV, grade 4 or 5 agricultural land

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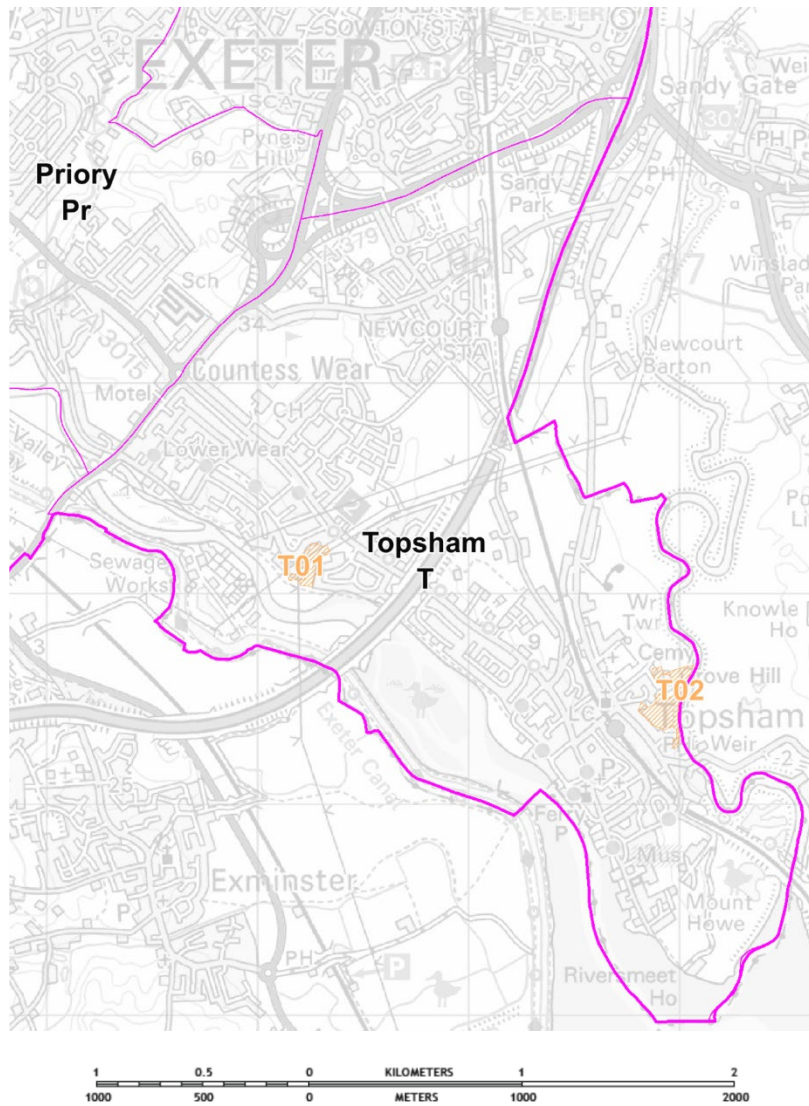
Figure 7. Potential areas identified in north-east Exeter for ground-mounted photovoltaic panels.



- Exeter city boundary
- Ward boundary
- ▨ Potential area for PV, grade 3 agricultural land
- ▨ Potential area for PV, grade 4 or 5 agricultural land

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Figure 8. Potential areas identified in south-west Exeter for ground-mounted photovoltaic panels.



- Exeter city boundary
- Ward boundary
- ▨ Potential area for PV, grade 3 agricultural land
- ▨ Potential area for PV, grade 4 or 5 agricultural land

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Figure 9. Potential areas identified in south-east Exeter for ground-mounted photovoltaic panels.

The landscape sensitivity assessment for Exeter undertaken in 2022⁷ defines the sensitivity of 38 land parcels for residential and employment development. Ground-mounted photovoltaic panels are relatively low to the ground compared to buildings, and hence less visible from a distance. They do, however, cover a greater plan area. Most of the identified areas are located within land parcels which are categorised as having a high sensitivity to either housing or employment development, categorisations that are defined as landscapes which are very vulnerable to change without significant change to character, special qualities and features or adverse effects. The corresponding land parcel for each area is listed in Appendix 2, along with its sensitivity to development.

The number of areas, total area and total capacity (at 41 MW_p per km²) are listed in Table 3.

Table 3. Data for potential PV areas identified by the mapping.

Parameter	ALC 4 or 5	ALC 3 4 or 5
Number of areas	14	18
Total area (km ²)	0.9	2.4
Total capacity (MW _p)	38.2	98.6

A density factor of 25% has been applied to restrict development from the extent identified to limit landscape impact. This factor is taken from similar studies in the South-west ^{4,5}. A capacity factor of 10% was applied to account for the intermittency of solar insolation when calculating the annual energy output. This figure was derived from the performance of PV installations in Exeter over the period 2017 to 2021⁹. A similar figure was used in other studies⁵ *. These factors have been applied to arrive at the predicted resource figures below, but are not included in the GIS mapping presented above.

Table 4 estimates the PV resource in Exeter once density and capacity factors have been applied (the number of areas resulting from the application of the density factor have been rounded to the nearest whole number).

Table 4. PV potential after accounting for density and capacity factors.

Parameter	ALC 4 or 5	ALC 3 4 or 5
Number of areas	4	5
Total area (km ²)	0.2	0.6
Total capacity (MW _p)	9.6	24.7
Annual output (GW h)	8.4	21.6

Table 5 incorporates an adjustment to estimate the amount of grade 3a agricultural land and exclude it from the available area. This is based on the percentage split between grades 3a and 3b where this survey data exists within Exeter. These results represent a more realistic constrained resource.

* The REGEN North Somerset study applied a capacity factor but the value is not stated; back-calculation from the rounded capacity and output figures in the report gives a value of about 10%.

Table 5. PV potential after accounting for density and capacity factors, and adjusted to estimate the impact of excluding grade 3a agricultural land.

Parameter	Value
Number of areas	4
Total area (km ²)	0.4
Total capacity (MW _p)	17.9
Annual output (GW h)	15.7

4 Conclusions

Mapping has identified a large number of potential areas for PV generation within the boundaries of Exeter. Most of these are around the periphery of the city, with the greatest potential on farmland and flood plain to the north. A single wind turbine site has also been identified.

The areas with potential for PV generation could accommodate about 18 MW_p of generation capacity, yielding up to 16 GWh per annum.

The wind sites could accommodate 0.5 to 1.0 MW_p of generation capacity, yielding up to 2.5 GWh per annum.

Appendix 1. Data for identified wind development site

Table 6 lists the grid references (of the centre of the area), areas and generation capacity for the potential wind turbine site identified by the mapping.

Table 6. Data for potential wind turbine site identified by the mapping.

Ward	Grid reference		Area (km ²)	Capacity (MW)
	Easting	Northing		
MW	294,570.1	95,413.4	0.093	0.5 – 1.0

Appendix 2. Data for identified PV development areas

Table 7 lists the grid references (of the centre of the area), areas and generation capacity (at 41 MW per km²) for each of the potential PV areas identified by the mapping. The agricultural land classification of the area is indicated. An area may expand if Grade 3 agricultural land is included, in which case the reference of that larger area is shown.

Table 7. Data for potential PV areas identified by the mapping.

Ref- erence	Grid reference		Area (km ²)	Capacity (MW)	Agricultural Land Classification	
	Easting	Northing			4 or 5	3 4 or 5
A01	292451.0	89425.4	0.054	2.203	✓	✓
DsJ01	291888.8	95710.7	0.093	3.828	✓	DsJ06
DsJ02	291820.6	96120.7	0.035	1.454	✓	✓
DsJ03	291234.2	95673.3	0.029	1.193	✓	✓
DsJ04	291220.7	95316.8	0.019	0.791	✓	DsJ06
DsJ05	291915.3	96022.1	0.011	0.432	✓	✓
DsJ06	291393.4	95569.6	0.408	16.746	✗	✓
E01	290194.2	94270.8	0.470	19.287	✓	✓
E02	290263.7	94953.0	0.076	3.113	✓	E05
E03	290039.2	93361.6	0.034	1.404	✓	E06
E04	289510.2	95001.4	0.014	0.560	✓	E05
E05	289450.1	94976.1	0.172	7.072	✗	✓
E06	289585.2	93353.0	0.093	3.803	✗	✓
MW01	295008.0	94603.0	0.019	0.770	✓	MW03
MW02	295391.0	95062.6	0.136	5.594	✗	✓
MW03	294406.7	95212.1	0.726	29.751	✗	✓
MW04	294043.1	94834.4	0.014	0.560	✗	✓
Pe01	292915.8	95128.6	0.024	0.989	✗	✓
Pe02	292685.7	95129.1	0.013	0.530	✗	✓
Pe03	292574.3	95333.6	0.128	5.228	✗	✓
Pi01	295962.3	94980.9	0.026	1.082	✓	✓
Pi02	295573.9	95123.6	0.014	0.566	✗	✓
T01	295205.2	89133.6	0.017	0.699	✓	✓
T02	297000.6	88542.6	0.035	1.417	✓	✓

Table 8 lists the land parcels which contain each area, and their sensitivity to housing and employment development, as defined in Exeter's landscape sensitivity assessment⁷. Where no

land parcel is listed, the area does not fall within one of the 38 land parcels defined in the assessment.

Table 8. Landscape sensitivities potential PV sites identified by the mapping.

Reference	Land parcel(s)	Sensitivity to housing development	Sensitivity to employment development
A01	LP28	H	H
DsJ01	LP01	HM	H
DsJ02	LP26	H	H
DsJ03	LP26	H	H
DsJ04	LP01	HM	H
DsJ05	LP26	H	H
DsJ06	LP01	HM	H
E01	LP33,34	H	H
E02	LP34	H	H
E03	LP32	HM	H
E04	LP34	H	H
E05	LP34	H	H
E06	LP32	HM	H
MW01	LP09,10	H	H
MW02	LP03,11	H	H
MW03	LP03,06,09,10	H	H
MW04	LP07	HM	H
Pe01	LP04	HM	H
Pe02	LP03	H	H
Pe03			
Pi01	LP11	H	H
Pi02	LP11	H	H
T01			
T02	LP20	H	H

References

- 1 Low carbon and climate change evidence base for the greater Exeter strategic plan. Internal document 948. 2018, Centre for Energy and the Environment.
- 2 2021 low carbon evidence base for the Teignbridge local plan. Internal document 994. 2021, Centre for Energy and the Environment.
- 3 Implications of Wind Speed on Wind Resource in the Greater Exeter Area. Internal Document 971. 2019, Centre for Energy and the Environment.
- 4 Technical paper E2. An assessment of the renewable energy resource potential in Cornwall. 2013, Cornwall Council.
- 5 Resource assessment for wind and solar in north Somerset and opportunities to support the wider sustainable energy sector. 2014, Regen SW.
- 6 An updated assessment of suitable areas for large-scale renewable energy in Cornwall based on the 2020 Landscape Character Assessment. Contract document 317. 2021, Centre for Energy and the Environment.
- 7 Exeter landscape sensitivity assessment. Final report. 2022, White Consultants.
- 8 South West renewable energy atlas DVD. 2005, Wardell Armstrong.
- 9 [Renewable Electricity by Local Authority, 2014 to 2021. 2022, UK Government Department for Business, Energy & Industrial Strategy. Available at: https://www.gov.uk/government/statistics/regional-renewable-statistics, accessed 14th March 2023.](https://www.gov.uk/government/statistics/regional-renewable-statistics)