Appendix D: Assessment Assumptions

Table 1 – Property statistics for Cotswold District (2019)	
No of domestic properties	
Terrace/end-terrace dwelling	9,082
Semi-detached dwelling	12,864
Detached dwelling	14,733
Dwelling in purpose-built block of flats or tenement	5,750
Bungalow	1,761
Total	47,624
No of non-domestic properties	
Commercial/industrial buildings	3,434
Total	3,434
Miscellaneous	
Overall proportion of 'off-gas' properties	36.75%
Average annual heat demand per dwelling	13,629 kWh
Average annual heat demand per non-domestic property	356,274 kWh

Notes:

- Dwelling statistics and non-domestic statistics from OS mapping datasets.
- Off-gas proportion from: https://www.gov.uk/government/statistics/lsoa-estimates-of-households-not-connected-to-the-gas-network
- Heat demand estimates derived from gas consumption statistics for Cotswold District: www.gov.uk/government/statistical-data-sets/gas-sales-and-numbers-of-customers-by-region-and-local-authority

Table 2 – Future housing development in Cotswold District	
Local Plan (to 2031)	
Committed dwelling at 1st Apr 2020	3,344
Cotswold District Local Plan 2011-31 adopted 3 August 2018 as of 1st April 2019	452
Windfall Allowance	1,272
Lapse Rate	-157
Total Housing Supply	**4,911**

Table 3 – Emission factors	
Fuel	**Emission Factor [kgCO_2e/kWh]**
Grid electricity	0.136
Mains gas	0.210
Heating oil	0.298
Wood logs	0.028

Notes:

- Factor for grid electricity assumed to be that proposed for SAP10.1 (see www.bregroup.com/sap/sap10/).
- Potential CO_2 savings (tonnes/yr) calculated by multiplying the potential electricity output / Delivered heat (MWh/year) by the above emissions factors.

Table 4 – Assumptions for roof-mounted solar resource			
Solar PV Model Parameters		**Solar Cost-Benefit Model Parameters**	
Horizon search radius in metres	1000	Period (years)	25
Horizon compass slices	16	Discount rate (potential interest per year from alternative investment)	0.035
Maximum roof slope for PV	80	Cost of electricity, £/kWh	0.16
Minimum roof area m² for PV installation	10	0-10 kWp: £ per kWp for installation	1,429
Percentage of a roof plane usable for mounting panels	0.75	10-100 kWp: £ per kWp for installation	922
Minimum degree distance from North for PV	45	kWp > 100: £ per kWp for installation	714
Angle (degrees) to mount panels on flat roofs	10	0-10 kWp: fixed cost/£	0
Nominal peak power (kWp) per m² of roof	0.12	10-100 kWp: fixed cost/£	0
PV technology	Crystalline silicon	kWp > 100: fixed cost/£	0
Maximum angle of the average horizon between ESE and WSW in degrees	35	0-10 kWp: VAT rate	0.05
		10-100 kWp: VAT rate	0.2
		kWp > 100: VAT rate	0.2
Notes: Industry accepted figures and commercial quotes			

Table 5 – Woodfuel: assumptions for forestry and woodland resource

- Data from National Inventory of Woodland and Trees
- Does not include 'felled', 'shrub' or 'young trees' categories
- Due to a predominance of broadleaf woodland, the sustainable woodfuel yield is assumed to be 2 odt/yr (oven-dried tonnes/year) source: www.biomassenergycentre.org.uk
- Energy content of wood assumed to be 5,150 kWh/tonne
- Boiler efficiency assumed to be 87% (converting woodfuel to delivered heat)
- Counterfactual heating fuels assumed to be:
    - 19.7% of resource offsetting electricity (using proportional proxy of 54% of off-gas properties)
    - 12% of resource offsetting oil (using proportional proxy of 33% of off-gas properties)
    - 5.1% of resource offsetting oil (using proportional proxy of 14% of off-gas properties)
    - 63.3% of resource offsetting gas (using proportional proxy of on-gas properties)

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
Wind turbine size	Five turbine sizes were considered: • Very large (150-200m tip height) • Large (100-150m tip height) • Medium (60-100m tip height) • Small (25-60m tip height) • Very small (<25m height) Assessment was based on notional turbine sizes, approximately intermediate within each class size i.e. • Very large: 175m tip height • Large: 125m tip height • Medium: 80m tip height • Small: 45m tip height No mapped-based assessment of 'very small' turbines was undertaken. The type of buffers applied to constraints for the assessment of other turbine size categories in many cases do not	• CSE and LUC • Research into turbine manufacturers • BEIS renewable energy planning database and other databases containing information on wind turbine applications	There are no standard categories for wind turbine sizes. The categories chosen are based on consideration of currently and historically 'typical' turbine models at various different scales. The approach is intended to be flexible in the light of uncertainty regarding future financial support for renewable energy. A review of wind turbine applications across the UK showed tip heights ranging from less than 20m up to around 200m, with larger turbine models in demand from developers following the reduction in financial support from Government. The majority of operational and planned turbines range between 80m and 175m. Due to the structure of the financial support system in the past, smaller turbines (those in the medium to small categories) have tended to be deployed as 1-2 turbine developments.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	reasonably apply to very small turbines. Equally, mapping a strategic district-wide 'resource' for very small turbines (which are generally developed singly in association with particular farm or other buildings) is not particularly meaningful. Instead, it is recommended that policy references the entire plan area as suitable for very small wind in principle (subject to site-specific assessment) with the exception of a defined list of constraints such as designated ecological sites.		
Wind Speed	Include: • All areas with mean annual average wind speed ≥5 m/s at 50m above ground level (agl)	• Global Wind Atlas/Vortex • Industry practice	The majority of Cotswold District meets and exceeds the minimum requirement of 5m/s. Wind speed requirements change with turbine scale and model. Some turbine manufacturers produce models which may operate at lower wind speeds and the configuration of certain turbine models can be altered to improve yield in lower wind speed environments.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
			Future changes in government policy and turbine technology could allow developments to be deliverable at lower wind speeds than are currently viable. A 5m/s threshold was applied to take account of such changes.

Roads	Exclude:
	• Roads with a buffer of
	  ○ the height of the turbine (to blade tip height) +50m (Large and Very Large scales)
	  ○ the height of the turbine (to blade tip) x 1.5 (Medium and Small scales).
	• Anticipated road infrastructure: A417 Missing Link
		• Ordnance Survey VectorMap District.
		• Cotswold District Council
			These buffers were applied as a safety consideration. The proposed buffer distance is based on Department for Transport/Highways Agency guidance (2013)[1] as referenced in National Planning Practice Guidance (NPPG). This guidance relates explicitly to the strategic road network, but as guidance is lacking relating to other roads, the same approach was applied to all roads for the purposes of consistency. The guidance states that different buffers should be applied based on the scale of the turbine being proposed.
			Note: Only line data for roads was available and in order to create a footprint from the road centre, it was assumed that single carriageways are 10m in width, dual carriageways 20m and motorways 30m.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/237412/dft-circular-strategic-road.pdf

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**

Railways	Exclude:
	• Railways, including protected former railway lines (Local Plan policy INF3 and SP6), with a buffer of
	  ○ the height of the turbine (to blade tip) +50m (Large and Very Large scales)
	  ○ the height of the turbine (to blade tip) x 1.5 (Medium and Small scales)
		• Ordnance Survey VectorMap District
		• Cotswold District Council
			This buffer was applied as a safety consideration, based on the same principles as used for roads. Note: In order to create a footprint from the railway centrelines data, it was assumed that railways are 15m in width.

Public Rights of Way Cycle Paths	Exclude: • Public Rights of Way, including the Lechlade to Fairford multi-use path (Local Plan policies S5 and S7), and cycle paths with a buffer of the height of the turbine (to blade tip height) i.e. topple distance	• Cotswold District Council • Sustrans	This buffer was applied as a safety consideration. There has never been any statutory requirement relating to separation distances between wind turbines and pedestrian, equestrian and cycle routes. Applying a general separation distance based on tip height ('topple distance') is considered a reasonable approach, and was cited as a suitable buffer in the Companion Guide to Planning Policy Statement 22. Note: In order to create a footprint from the Public Rights of Way and cycle path centrelines data, it was

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
			assumed that Public Rights of Way, Bridleways and cycle paths are 2m in width.
Transmission lines	Exclude: • Major transmission lines with a buffer of the height of the turbine (to blade tip height) +10%.	• OS Vector Mapping	This buffer was applied as a safety consideration. It is derived from guidance by the Energy Networks Association (Engineering Recommendation L44) and National Grid (Technical Advice Note 287)
Airports and Airfields	Exclude: • operational airports and airfields	• Ordnance Survey VectorMap Local Functional Site layer with the theme 'Air Transport'	OS VectorMap Local Functional Site data with the theme Air Transport was used in the assessment
MOD Land	Exclude: • MOD land in active use	• Cotswold District Council • OS Mapping	Plan of MOD landholdings provided by Cotswold District. Landholdings were digitised and cross referenced against OS 1:25000 mapping Verification of boundaries and present use was sought from CDC.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
NATS Safeguarding Areas	Guidance includes reference to the following safeguarding areas: • 30km for aerodromes with a surveillance radar facility. • 17km for non-radar equipped aerodromes with a runway of 1,100 m or more, or 5km for those with a shorter runway. • 4km for non-radar equipped unlicensed aerodrome with a runway of more than 800m or 3km with a shorter runway. • 10km for the air-ground-air communication stations and navigation aids. • 15 nautical miles (nm) for secondary surveillance radar. These are indicative of potential constraints to wind development but cannot be used to definitively exclude land as unsuitable. They are generally presented as separate figures alongside the	• NATS	Further consultation between potential developers and NATS is required to determine if there is any impact from a proposed development. NATS safeguarding areas were therefore not excluded.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	main assessment of technical potential.		
Noise	Exclude: • Residential and commercial buffer zones based on turbine size: ○ Very large scale: 500m for residential/ other sensitive receptors[2], 250m for non-residential. ○ Large scale: 480m for residential/ other sensitive receptors, 230m for non-residential. ○ Medium scale: 400m for residential/ other sensitive receptors,	• Cotswold District Council Local Land and Property Gazetteer (LLPG) Residential and Commercial address points • OS OpenMap Local Buildings layer for buildings adjacent to the District Boundary	Wind turbines generate sound during their operation, and their noise impacts upon nearby properties must be limited to appropriate levels, defined in particular by the 'ETSU' Guidance – The Assessment and Rating of Noise from Wind Farms (1995) (as supplemented by the Institute of Acoustics). The relationship between turbine size and the separation distance from properties at which acceptable noise levels will be achieved is in practice quite complex and variable. However, the present assessment has applied specialist acoustic advice to define minimum distances below which it is generally unlikely that the required noise levels under ETSU-R-97 will be achievable. The approach taken necessarily involves applying various assumptions, including: - an assumed single turbine development in all cases (rather than multiple turbines)

[2] Sensitive receptors include schools, hospitals and care homes. These were identified via the LLPG data.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	180m for non-residential. ○ Small scale: 180m for residential/other sensitive receptors 80m for non-residential. For properties outside (but close to) the District Boundary, indicative buffers were applied to the available property/ buildings data from OS Vector Map. As this data does not distinguish commercial and residential properties, and it was not possible to verify uses by other means, residential buffers were used throughout.		- the assumption that no properties will be 'financially involved' in the wind development (financial involvement may allow higher noise levels to be accepted in individual cases). The limitations associated with such assumptions are considered preferable to avoiding the use of noise-related separation distances for the assessment, bearing in mind that noise is a key factor that influences the acceptable siting of turbines in practice. The assessment defines the *minimum* distances below which adherence to the Industry standard (ETSU-R-97) noise guidance would not be possible and it should not be inferred that the proposed distances represent acceptance of any given proposal within the areas of identified suitable potential as site based noise monitoring and assessments would still be required.
Shadow Flicker	No land excluded on this basis	• N/A	Wind turbines may in some circumstances cause 'shadow flicker' within nearby properties. However, shadow flicker effects are readily mitigated and so shadow flicker was not considered as a constraint for the purposes of this study.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**

Future developments	Exclude:
	• Site allocations from adopted Cotswold District Local Plan:
	  ○ Burial Ground Allocations
	  ○ Car Park Allocations
	  ○ Cemetery Extensions
	  ○ Employment Centres
	  ○ Housing Allocations
	  ○ Mixed Use Allocations
	  ○ Strategic Site Allocations
	  ○ Gypsy and Traveller Sites
		• Cotswold District Council	Generally unsuitable for wind turbine development, unless allocations contain relatively large undeveloped portions. Identification of suitable land for wind within specific allocation boundaries would require a separate site-specific study.

Employment Sites	Exclude: • Established employment centres from adopted Cotswold District Local Plan	• Cotswold District Council	Generally unsuitable for wind turbine development, unless sites contain relatively large undeveloped portions. Identification of suitable land for wind within specific allocation boundaries would require a separate site-specific study.
Existing Renewable Energy Developments	Exclude: • Land boundaries of consented and operational renewable energy installations	• BEIS • Cotswold District Council	The quarterly BEIS Renewable Energy Planning Database was used to determine the locations of operational and consented renewable energy installations, supplemented by planning data from

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
			Cotswold District Council. This information was cross-referenced with Inspire land boundary data obtained from the Land Registry.
Terrain	Exclude: • Slopes greater than 15 degrees.	• OS Terrain 50	This is a development/ operational constraint. Developers have indicated that this is the maximum slope they would generally consider feasible for development. Although it is theoretically possible to develop on areas exceeding 15° slopes, turbine manufacturers are considered unlikely to allow turbine component delivery to sites where this is exceeded.
Water Environment	Exclude: • Watercourses and waterbodies with 50m buffer.	• Ordnance Survey Rivers • Ordnance Survey VectorMap District	A 50m buffer was applied around all rivers and waterbodies to take account of good practice such as that relating to pollution control during construction. OS Survey VectorMap District surface water data includes waterways of approximately a minimum of 2m width. OS Rivers data is line data, and so a 1m buffer was applied to approximate a footprint of smaller waterways.
Woodland	Exclude:	• Forestry Commission	All areas of woodland were excluded with a + 50m buffer to reduce risk of impact on bats.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	• Woodland as shown on the National Forest Inventory and Ancient Woodland Inventory	• Natural England	A 50m clearance distance of turbines from trees and other habitat features is standard practice and endorsed by Natural England guidance set out in 'TIN051'. A 50m horizontal buffer is a reasonable proxy clearance for the purposes of a strategic study bearing in mind unknowns concerning tree height and turbine dimensions. A 50m buffer cannot be applied to all linear habitat features and individual trees due to a lack of data for a study of this scale.
Biodiversity (International designations)	Exclude international designations[3]: • Special Areas of Conservation (SAC)	• Natural England	As protected by: • Conservation of Habitats and Species Regulations 2017 (as amended). A blade radius buffer has been applied to avoid oversail of the protected areas/assets.
Biodiversity (National designations)	Exclude national designations[4]: • Sites of Special Scientific Interest	• Natural England	As protected by: • Wildlife and Countryside Act 1981.

[3] There are no Ramsar sites, Special Protection Areas, potential Special Protection Areas or potential Special Areas of Conservation located within Cotswold District Council.

[4] There are no National Nature Reserves located within Cotswold District Council.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
			• Conservation of Habitats and Species Regulations 2017 (as amended). A blade radius buffer has been applied to avoid oversail of the protected areas/assets.

Biodiversity (Regional and local designations)	Exclude other designations[5]:
	
	• Local Nature Reserves
	• Local Sites:
	  ○ Local Wildlife Sites
	  ○ Potential Wildlife Sites
	  ○ Regionally Important Geological Sites
	  ○ Conservation road verges
		• Natural England
		• Cotswold District Council
		• Gloucestershire County Council
			Generally, would not be suitable for renewables development based on law/policy/guidance including:
			
			• National Planning Policy Framework.
			• Natural Environment and Rural Communities Act 2006.
			
			A blade radius buffer has been applied to avoid oversail of the protected areas/assets.

Cultural heritage	Exclude[6]: • Registered Parks and Gardens • Registered Battlefields • Scheduled Monuments	• Historic England • Cotswold District Council	As protected by: • National Planning Policy Framework. • The Convention Concerning the Protection of the World Cultural and Natural Heritage. • National Heritage Act 1983.

[5] There are no RSPB Reserves located within Cotswold District Council.

[6] There are no World Heritage Sites located within Cotswold District Council.

Table 6 – Wind resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	• Listed Buildings • Conservation Areas		• Ancient Monuments and Archaeological Areas Act of 1979. • Planning (Listed Buildings and Conservation Areas) Act 1990. A blade radius buffer has been applied to avoid oversail of the protected areas/assets. Note: Due to potential inaccuracies in Listed Building polygon data, polygons were only used where polygon and point data align. Otherwise, point data was used. Point data was buffered 5m to estimate building footprint. The polygon data provides building footprint data and therefore did not need to be buffered.

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
Solar Irradiance	• Preliminary estimate, as displayed in Figure x, shows an average annual generation exceeding 1000kWh/kWp for a south facing, 38° tilted	• Global Solar Atlas	All of Cotswold District Council considered theoretically suitable for solar development.

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	system. No shading taken into account.		
Roads	Exclude: • Roads • Anticipated road infrastructure	• Ordnance Survey VectorMap District.	Physical features preventing the development of solar PV were excluded. There is no requirement for safety buffers in relation to these with respect to solar PV. Note: Only line data for roads was available and in order to create a footprint from the road centre, it was assumed that single carriageways are 10m in width, dual carriageways 20m and motorways 30m.
Railways	Exclude • Railways, including protected former railway lines (Local Plan policy INF3 and SP6)	• Ordnance Survey VectorMap District.	Physical features preventing the development of solar PV were excluded. There is no requirement for safety buffers in relation to these with respect to solar PV. In order to create a footprint from the railway centrelines data, it was assumed that railways were 15m in width.
Public Rights of Way Cycle Paths	Exclude • Public Rights of Way, including the Lechlade to Fairford multi-use path (Local	• Cotswold District Council • SusTrans	Physical features preventing the development of solar PV were excluded. There is no requirement for safety buffers in relation to these with respect to solar PV. In order to create a footprint from the Public Rights of Way and cycle path centrelines data, it was assumed

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	Plan policies S5 and S7), and cycle paths		that Public Rights of Way and Bridleways are 2m in width.

Planning/land use other	Exclude:
	• Common Land
	• Local public green/open space, including:
	  ○ Playing Fields
	  ○ Formal Parks
	  ○ Cemeteries and Churchyards
	  ○ Allotments
		• Natural England (Common Land)
		• OS Green Space: 'Cemetery' and 'Religious Grounds' data categories
		• Cotswold District Council (Local Plan policy EN3)
			Due to land take requirements, these land uses/types were considered generally to constrain solar development, particularly at larger scales, although in some circumstances they may offer opportunities for smaller scale development collocated with their other facilities. They were excluded from the resource assessment but may be subject to bespoke policies with the Local Plan allowing development to take place in principle subject to defined criteria being satisfied.

Transmission lines	Exclude • Line data buffered by 1m, forming a 2m exclusion footprint	• OS Vector Mapping	Physical features preventing the development of solar PV were excluded. There is no requirement for safety buffers in relation to these with respect to solar PV. This exclusion was applied to account for shading and impacts on solar output.

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
Buildings	Exclude: • All buildings with a 20m buffer	• OSOpenMap Local data	Buildings were buffered by 20m to account for shading and impacts on solar output.
Minerals Sites	Exclude: • All operational minerals sites • Allocated minerals sites A 250m buffer is to be applied to both of the above	• Gloucestershire County Council	Operational and allocated mineral sites were buffered to account for dust emissions which will affect the generation output. The IAQM 2016 Guidance on the Assessment of Mineral Dust Impacts for Planning indicates that adverse dust impacts from sand and gravel sites are uncommon beyond 250m and beyond 400m from hard rock quarries measured from the nearest dust generating activities.
Waste Sites	Exclude: • All operational waste sites • Allocated waste sites	• Gloucestershire County Council	Waste sites will frequently be quite highly constrained with respect to solar development (e.g. areas of active landfill) but equally may present opportunities in some circumstances, particularly when they are to be decommissioned/ restored during a plan period. Waste sites were excluded from the mapped solar resource but potentially subject to bespoke policy wording in the local plan.
Airfields and Airports	Exclude:	• Ordnance Survey	OS VectorMap Local Functional Site data with the theme Air Transport was used in the assessment

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	• Operational airports and airfields	VectorMap Local Functional Site layer with the theme 'Air Transport'	
MOD Land	Exclude: • MOD land	• Cotswold District Council • OS Mapping	Plan of MOD landholdings provided by Cotswold District. Landholdings were digitised and cross referenced against OS 1:25000 mapping. Verification of boundaries and present use provided by CDC.

Future developments	Exclude:
	• Site allocations from adopted Cotswold District Local Plan
	  ○ Burial Ground Allocations
	  ○ Car Park Allocations
	  ○ Cemetery Extensions
	  ○ Employment Centres
	  ○ Housing Allocations
	  ○ Mixed Use Allocations
		• Cotswold District Council	Generally these will be unsuitable for ground-mounted solar, although there may be some potential for installations on undeveloped land/open space within these areas. Identification of this potential would require a separate, site-specific study.

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	○ Strategic Site Allocations ○ Gypsy and Traveller Sites		
Employment Sites	Exclude: • Established employment centres from adopted Cotswold District Local Plan	• Cotswold District Council	Generally unsuitable for wind turbine development, unless sites contain relatively large undeveloped portions. Identification of suitable land for wind within specific allocation boundaries would require a separate site-specific study.
Existing Renewable Energy Developments	Exclude: • Consented and operational solar energy installations, defined by their land boundaries	• BEIS • Cotswold District Council	The BEIS quarterly renewable energy database was used to determine the locations of operational and consented renewable energy installations. This data was subject to review and addition/modification (if required) by Cotswold District Council. It was then cross-referenced with Inspire Land boundary data obtained from the Land Registry. Colocation with wind developments was considered as an opportunity.
Terrain	Exclude: • Areas with north-east to north-west aspect and inclinations greater than 3 degrees	• OS Terrain 50	Although it is possible to develop Solar PV installations on slopes facing north-east to north-west, it would generally not be economically viable to do so. However, slopes that are north-east to north-west facing and below 3° are considered potentially

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	• All areas with inclinations greater than 10 degrees		suitable, as generation output will not be significantly affected.
Agricultural Land Use	Exclude: • Agricultural land use classifications grades 1 and 2	• Natural England	Agricultural Land Use is a consideration, with grades 1 and 2 land having higher value for food production. Further investigation would be required of grade 3 land to determine whether it is grade 3a or b, as available data does not distinguish these. Ground Mounted Solar PV projects, over 50kWp, should ideally utilise previously developed land, brownfield land, contaminated land, industrial land or agricultural land preferably of classification 3b, 4, and 5.
Water Environment	Exclude: • Watercourses and waterbodies.	• Ordnance Survey Rivers • Ordnance Survey VectorMap District	Physical features preventing the development of solar PV were excluded. There is no requirement for safety buffers in relation to these with respect to solar PV. OS Survey VectorMap District surface water data includes waterways of approximately a minimum of 2m width. OS Rivers data is line data, and so a 1m buffer was applied to approximate a footprint of smaller waterways.
Woodland	Exclude:	• Forestry Commission	Forested areas were buffered by 20m to account for shading and impacts on solar output.

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
	• Woodland as shown on the National Forest Inventory and Ancient Woodland Inventory	• Natural England	
Biodiversity (International designations)	Exclude international designations[7]: • Special Areas of Conservation	• Natural England	As protected by: • Conservation of Habitats and Species Regulations 2017 (as amended).
Biodiversity (National designations)	Exclude national designations[8]: • Sites of Special Scientific Interest	• Natural England	As protected by: • Wildlife and Countryside Act 1981. • Conservation of Habitats and Species Regulations 2017 (as amended).
Biodiversity (Regional and local designations)	Exclude other designations[9]:: • Local Nature Reserves • Local Sites	• Natural England • Cotswold District Council	Generally, would not be suitable for renewables development based on law/policy/guidance including: • National Planning Policy Framework.

[7] There are no Ramsar sites, Special Protection Areas, potential Special Protection Areas or potential Special Areas of Conservation located within Cotswold District Council.

[8] There are no National Nature Reserves located within Cotswold District Council.

[9] There are no RSPB Reserves located within Cotswold District Council.

Table 7 – Ground mounted solar resource assessment parameters			
Parameter	**Assumption**	**Data source**	**Justification and notes**
		• Gloucestershire County Council	• Natural Environment and Rural Communities Act 2006.
Cultural heritage	Exclude[10]: • Registered parks and gardens • Registered Battlefields • Scheduled monuments • Listed buildings • Conservation Areas	• Historic England • Cotswold District Council	As protected by: • National Planning Policy Framework. • The Convention Concerning the Protection of the World Cultural and Natural Heritage. • National Heritage Act 1983. • Ancient Monuments and Archaeological Areas Act of 1979. • Planning (Listed Buildings and Conservation Areas) Act 1990. Note: Due to potential inaccuracies in Listed Building polygon data, polygons were only used where polygon and point data align. Otherwise, point data was used. Point data was buffered 5m to estimate building footprint. The polygon data provides building footprint data and therefore did not need to be buffered.

[10] There are no World Heritage Sites located within Cotswold District.

Approach to Landscape Sensitivity Assessment

Assessment of only land outside of the AONB and structured on the Landscape Character Types within the Gloucestershire Landscape Character Assessment: https://www.gloucestershire.gov.uk/media/6800/glca_report_severn___other_vales_text_2006-51673.pdf

Wind Typology (for Resource Assessment and Landscape Sensitivity Assessment)

Table 8 – Wind Typology (for Resource Assessment and Landscape Sensitivity Assessment)

Type	Size range (tip) (m)	Candidate for assessment (tip) (m)	Candidate for assessment (RD) (m)	Candidate capacity	Notes
Very Small	<25	N/A	N/A	N/A	Not to be included in GIS tool or resource calculations.
Small	25-60	45	20	50kw	Various 50-100kw machines have been deployed at around this spec in the past including Endurance 50kw.
Medium	60-100	80	55	0.5MW	Rough specification of the old 'standard' EWT 500kw turbine.
Large	100-150	125	90	2.5MW	Standard height and RD during ROCs.
Very large	150-200	175	130	4MW	This was becoming a rough standard for post-subsidy projects as of 2018-19, although capacities, tip heights and rotor diameters are

					continually increasing.

Solar Typology (for Landscape Sensitivity Assessment)

- Very small solar PV installation: <1 hectares
- Small solar PV installation: 1-5 hectares
- Medium solar PV installation: (5-20 hectares)
- Large solar PV installation: (20-50 hectares)
- Very large solar PV installation (50-120 hectares)

Assumed solar density (for resource assessment calculations): 1.2 hectares/MW based on the Department for Energy Security and Net Zero National Policy Statement for renewable energy infrastructure (EN-3).This states that *"along with associated infrastructure, a solar farm requires between 2 to 4 acres for each MW of output"*. This equates to 0.8-1.6ha per MW, and the average of this is 1.2ha per MW.