

SD102

Heads of the Valleys Greenspace Provision Report

September 2007



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Contents

- 1 Background and brief**
- 2 Methodology**
- 3 Outputs**
- 4 Understanding and making best use of outputs**
- 5 Recommendations and further work**

Appendices

- A Partners and key contacts**
- B Data sets supplied**

1 Background and brief

'Greenspaces' are publicly accessible, open spaces that have a 'predominantly 'natural' character. The benefits of such places are explored in the 'Greenspace Toolkit', launched by the Countryside Council for Wales (CCW) in May 2006. The Toolkit not only outlines the environmental and wider social benefits that accrue from Greenspace, but also defines provision standards and proposes ways that these standards might be measured.

Although the Greenspace Toolkit is central to this project, it is pointless repeating in this report material that is well presented in the Toolkit document. It is recommended therefore that the Greenspace Toolkit is referred to for a fuller understanding of Greenspace concepts.

The Greenspace standards are:

- | | |
|----------|---|
| 1 | No person should live more than 400m¹ from their nearest area of Greenspace |
| 2 | There should be at least one Greenspace site of 20ha or more, within 2km of every home |
| 3 | There should be at least one Greenspace site of 100ha or more, within 5km of every home |
| 4 | There should be at least one Greenspace site of 500ha or more, within 10km of every home |
| 5 | There should be at least 2 hectares (ha) of Greenspace for every 1,000 of population |

¹ The Toolkit states 300m if simplistic 'buffer' analysis is being used, but 400m if the more sophisticated 'network analysis' is used as is the case with this project.

In July 2006 exeGesIS started a project for Blaenau Gwent County Borough Council (Blaenau Gwent CBC) to identify their Greenspaces and to determine how the current levels of Greenspace provision compared with the standards included in the Toolkit. The CCW and other neighbouring Authorities expressed an interest in extending the area of this work. In December 2006 exeGesIS was commissioned to extend the work to include those Authorities that were a part of an existing consortium around the 'Heads of the Valleys'. The participating Authorities were:

- Blaenau Gwent County Borough Council
- Caerphilly County Borough Council
- Torfaen County Borough Council
- Merthyr County Borough Council
- Rhondda Cynnon Taff County Borough Council

The consortium was coordinated by the CCW and contract administration services were provided by Blaenau Gwent CBC. A list of key contacts is provided in Appendix A

Two Authorities (Caerphilly CBC and Rhondda Cynnon Taff CBC) requested additional tasks to be undertaken, including ground truthing and assessment of Greenspaces and the inclusion of some types of public opens space that fall outside the definition of Greenspace as defined by the Toolkit.

2 Methodology

In broad terms the approach had two phases:

- 1) Collation of information to create analysis ready datasets
- 2) Analysis of data and reporting

The analysis required 4 different datasets to be prepared:

- 1) A dataset of Greenspaces across the project area
- 2) A dataset showing the 'access network' (roads, paths)
- 3) A dataset of Greenspace access points
- 4) A dataset showing population distribution

Collation and creation of Greenspace dataset

No comprehensive and consistently collected Greenspace dataset existed at the start of this project and the approach taken was to identify data from a number of sources to create a dataset of 'Candidate Greenspaces'. These were then mapped, checked and edited with input from Authority staff. The staff input was substantially made through a series of workshops and the output from this consultation process was a finalised Greenspace dataset.

The key starting point datasets were:

- Open Access (CROW land and Common land) supplied by the CCW
- Unitary Development Plan (UDP) related data supplied by local Authorities¹
- Conservation designations supplied by the CCW
- MasterMap data supplied by the Ordnance Survey (OS)

¹ *Actually some Authorities supplied several datasets, some of which related more to grounds maintenance and local planning, however for convenience all these together are referred to as UDP related in this report.*

Each datasets was acquired and audited for relevance. Those deemed to be potentially useful were then processed to a predefined data structure. The result of this stage was a set of polygons comprising **Pre-qualifying** sites and **Candidate** sites. Polygons from the Open Access datasets were labeled 'pre-qualifying', as almost by definition they met the 'Greenspace' definition criteria and didn't need to be subject to the same level of scrutiny as polygons from other sources.

Datasets were then merged and processed to remove overlapping areas where possible and adjacent areas of the same type were merged to form larger areas. When resolving overlapping polygons from different datasets it is necessary to decide on a hierarchy. The hierarchy used was as follows:

1. Open Access
2. UDP
3. Designation
4. MasterMap

Open Access areas were deemed to be most likely to count as Greenspace and so were given top priority.

Forestry Commission (FC) land was generally included as part of the Open Access dataset. Following consultation with the FC and others it was agreed that FC land with dense, unthinned planting did not meet the Greenspace criteria and these areas were therefore removed. The FC made the decision about which areas should be kept and which ones rejected.

Authority supplied UDP datasets were given the second highest priority as these sites were already identified through the local planning process (e.g. as amenity space).

Areas covered by some form of conservation designation were included but confidence in these sites was less. Of particular concern was accessibility as many of the designations relate to the conservation of natural characteristics and may not be publicly accessible.

Finally, a number of classes within the Ordnance Survey MasterMap dataset were seen as potentially informative but these were assigned the lowest level of confidence and were the first therefore to be culled when overlapping with polygons from other datasets. The MasterMap classes used are listed below and whilst they include areas of land of appropriate habitat, their public accessibility was unknown, many representing private property with no public access.

- Heath
- Inland Water
- Non-coniferous Trees
- Non-coniferous Trees (Scattered)
- Orchard
- Rough Grassland

The majority of MasterMap derived candidate sites were subsequently eliminated at the consultation / workshop stage.

Collation and creation of access network dataset

Datasets supplied were checked and processed to a defined data structure. Datasets used were as follows:

- Ordnance Survey Integrated Transport Network (ITN)
- Local Authority Public Rights of Way (PRoW)
- Forestry Commission tracks

The ITN datasets were supplied by each Authority. As such, there were multiple versions of the data and duplications of features. The data was processed to take the latest version of features and to remove duplicate features. As the ITN data is a topologically correct network, no further processing was applied.

The PRoW datasets were processed to remove erroneous gaps and ensure topological correctness by inserting nodes at intersections. The PRoW dataset was then snapped to the ITN dataset to account for the way in which PRoW features are digitised to end at road edges (i.e. they do not meet the ITN road centrelines).

The FC tracks were treated in the same way as the PRoW datasets.

Collation and creation of access points dataset

Access points are locations on the perimeter of a Greenspace. Initially access points were created at intersections between Greenspaces and the access network, but it was noted that the results were highly dependent on the quality of the source data used. Also it is the case that many Greenspaces are actually accessible along most of their boundary and creating just a few access points where paths and roads crossed would have underestimated their accessibility.

The amended approach generated access points automatically along the edge of a Greenspace where a Greenspace polygon lies within 50m of a road or path. While this overestimates access to some sites, it is the best approximation given the data available and is an approach that could be consistently applied across the study area

A set of access points was created for polygons within each of the four area classes:

- Any size (over 1ha)
- Over 20ha
- Over 100ha
- Over 500ha

A dataset showing population distribution

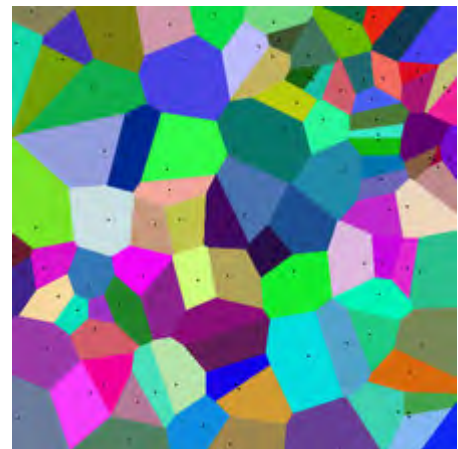
Population data is derived from the 2001 census and was sourced from the Office for National Statistics. This dataset provides a population figure for every postcode polygon in the project area.

Analysis

The task here was to measure the distance between each postcode and the nearest access point on the nearest Greenspace. Given that there are 14,000 postcodes, 12,000 Candidate Greenspaces and 12,000 kilometers of access network, then this represents a significant data processing task. As there are 4 classes of Greenspace the whole process was conducted four times.

This part of the work was undertaken using 'Routefinder' network analysis software. The inputs were the access points dataset (for the appropriate area class) and the processed access network. For each of the four area classes, the output was a seamless coverage of polygons representing distance to/from the nearest Greenspace.

This output uses a 'Voronoi Tessellation' to polygonise the study area; this is a geometric product and therefore an abstraction whereby every part of the study area is allocated to the nearest data point. In practice only those points that are actually on the access network will have their distance from the nearest Greenspace accurately calculated and points off the access network will have an estimated value. In practice the overall results are



not sensitive to this, largely because the population lives very close to the road and path network.

The result of the network analysis was combined with the Census Population data to provide a seamless coverage across the study area in which each polygon had associated population and distance to/from Greenspace values. The calculation of the population for each polygon assumed a uniform population distribution across census output areas.

Having combined the two datasets, it was possible to apply the criteria from the Greenspace Toolkit and assign pass/fail attributes to each polygon:

- 400m to Greenspace of >1ha
- 2km to Greenspace of >20ha
- 5km to Greenspace of >100ha
- 10km to Greenspace of >500ha

This pass/fail value was then used to calculate the population counts and land area passing/failing each criterion which can be expressed in terms of percentage of Authority population or Authority area.

3 Outputs

The key outputs are:

All Authorities

The datasets of Greenspace areas

The evaluation of which parts of the population met each of the 4 standards

The evaluation of each Authority to see if the overall provision of Greenspace per 1,000 populations met the required standard.

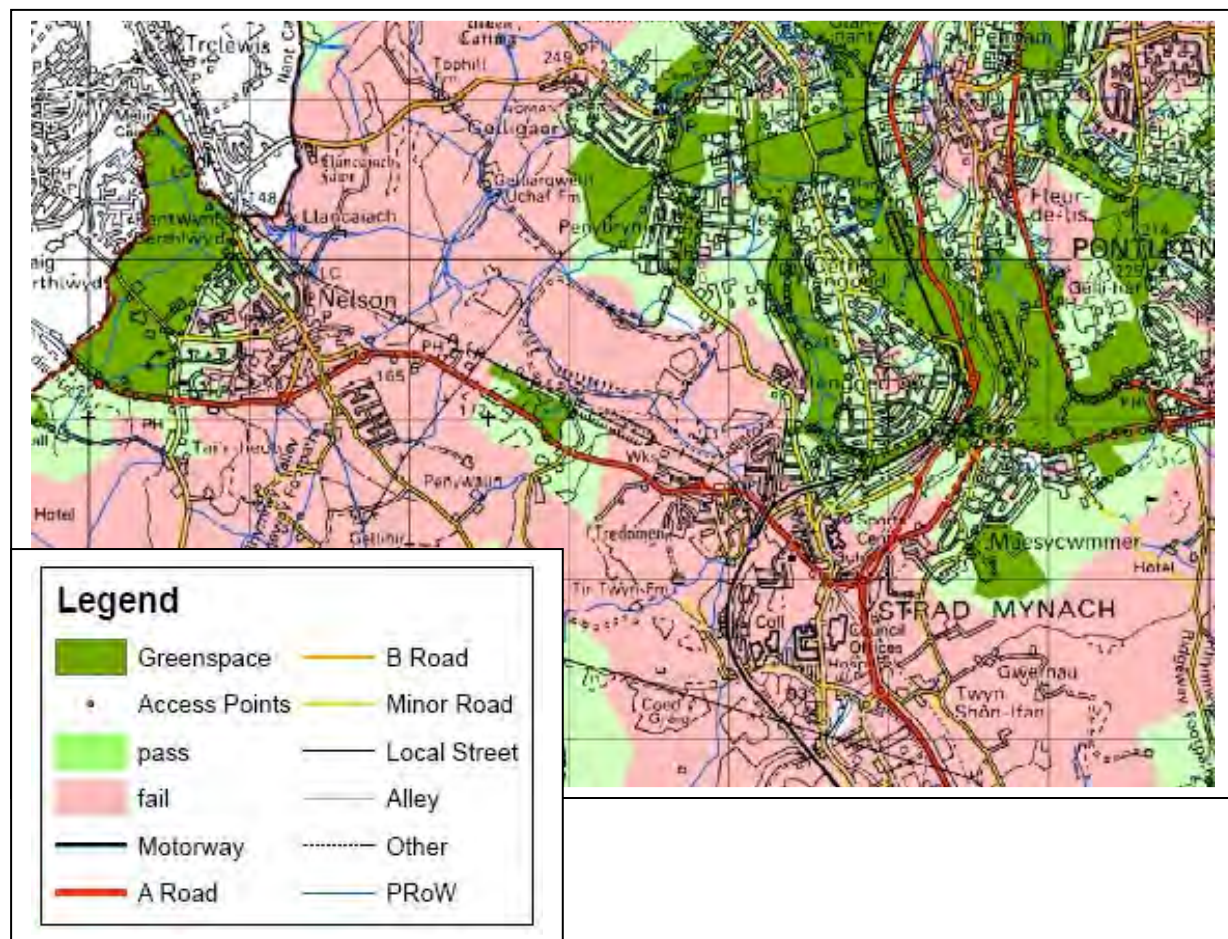
Additional analysis for Caerphilly CBC and Rhondda Cynnon Taff CBC only

The dataset of play space and sports field outputs

Text and photographic outputs from the field survey

Spatial datasets have been provided as ArcGIS or MapInfo files as appropriate for each Authority so that further analysis and presentation work can be conducted in house. For each of the Authorities and for each Greenspace class, an A0 map (PDF format) has been provided. These maps show which parts of each Authority meet or fail to meet the various standards.

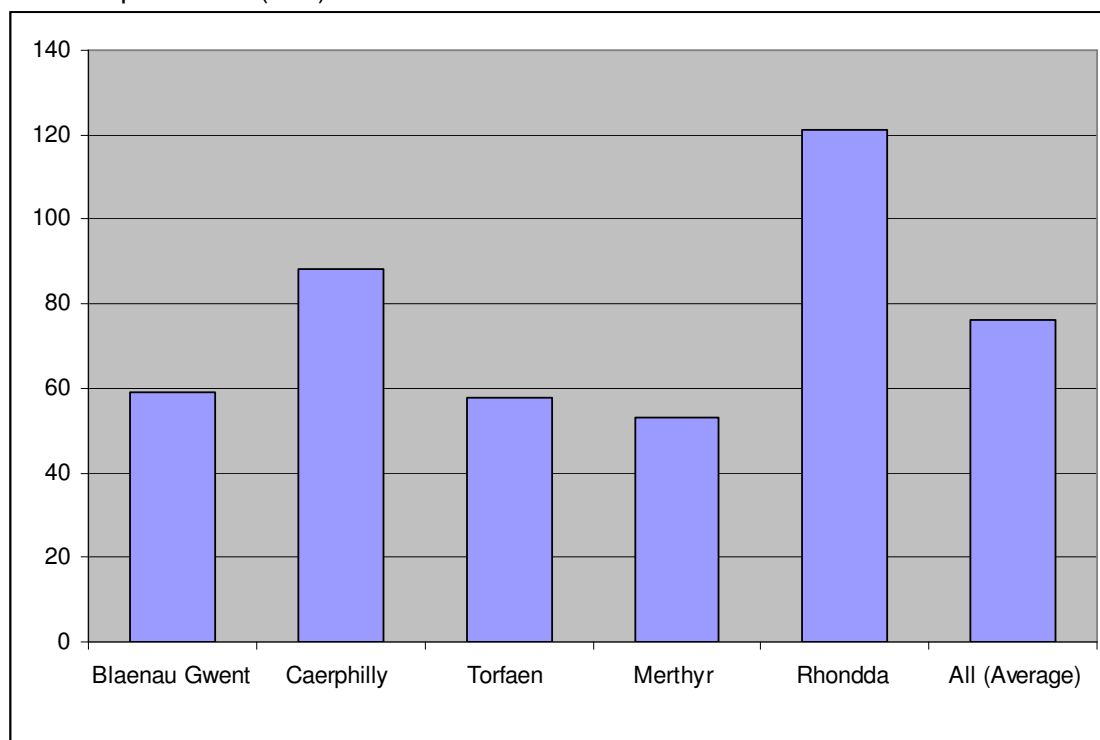
Extract of example map



Baseline statistics

	Area (km ²)	Population	No of Greenspaces	Area of Greenspaces Area (km ²)
Blaenau Gwent	109	70,084	270	59
Caerphilly	277	169,521	351	88
Torfaen	126	90,949	1,313	58
Merthyr	111	55,949	176	53
Rhondda	424	231,952	218	121
All (Total)	1048	618,445	2,328	379
All (Average)	210	123,691	466	76

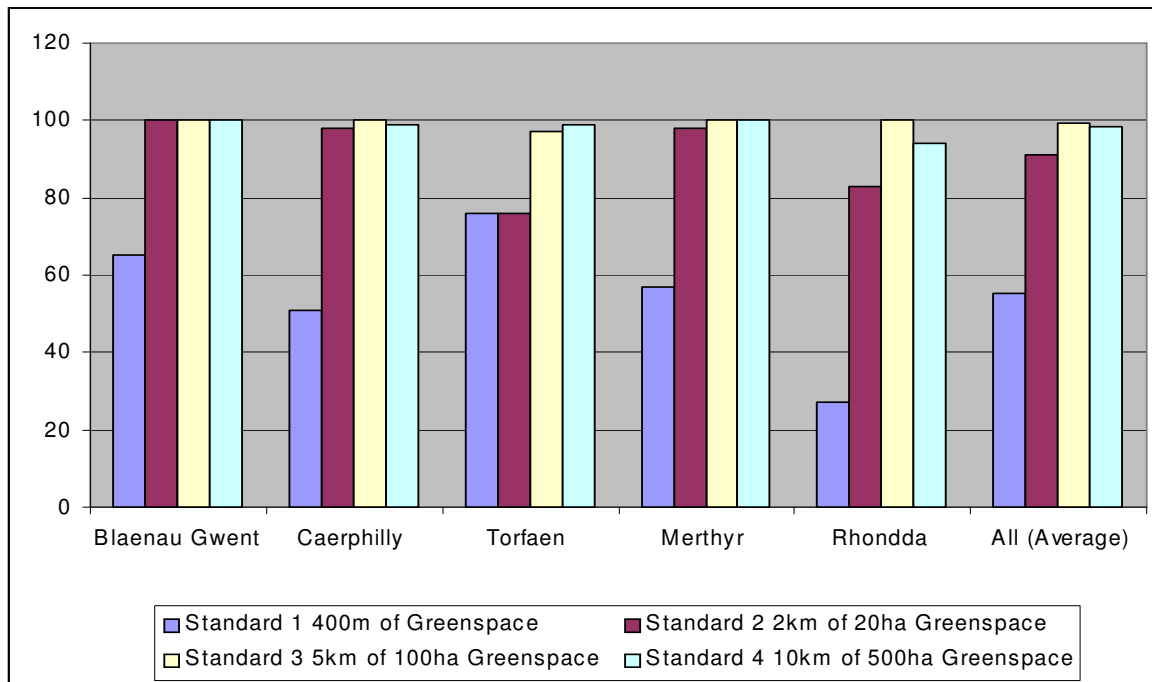
Greenspace area (km²)



Proportion of population (%) meeting standard

	Standard 1 400m of Greenspace	Standard 2 2km of 20ha Greenspace	Standard 3 5km of 100ha Greenspace	Standard 4 10km of 500ha Greenspace
Blaenau Gwent	65	100	100	100
Caerphilly	51	98	100	99
Torfaen	76	76	97	99
Merthyr	57	98	100	100
Rhondda	27	83	100	94
All (Average)				

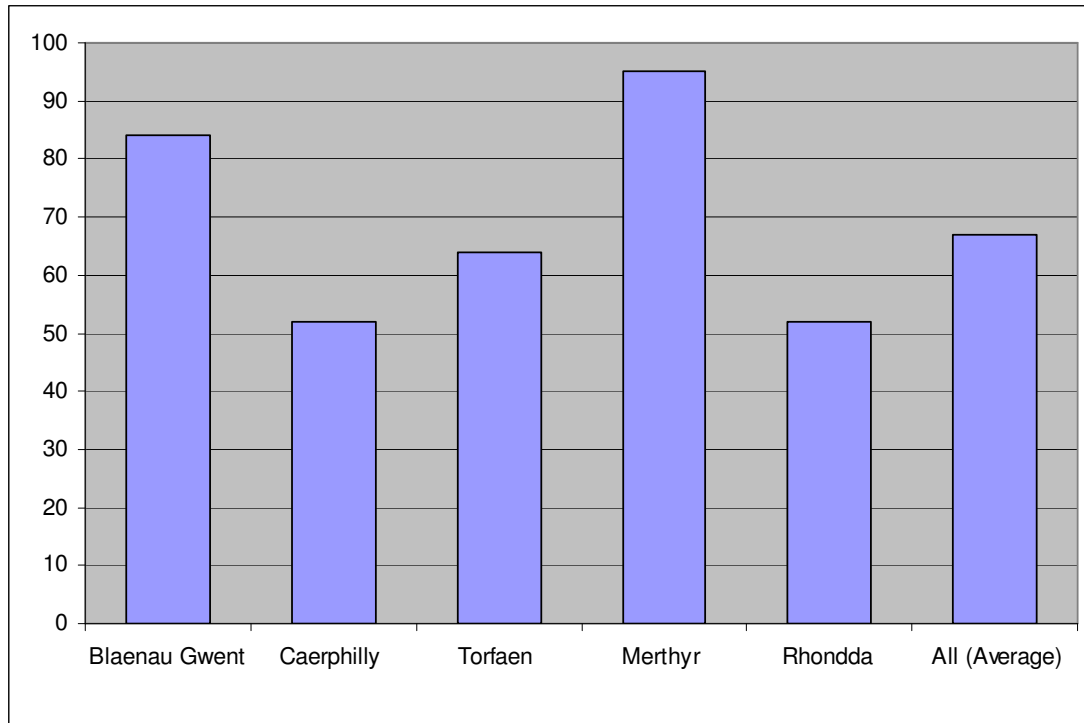
Proportion of population (%) meeting standards



Area of Greenspace per 1,000 population

	Area (ha)
Blaenau Gwent	84
Caerphilly	52
Torfaen	64
Merthyr	95
Rhondda	52
All (Average)	67

Greenspace area (hectares) per 1,000 population



4 Understanding and making best use of outputs

It is important to understand, in broad terms at least, the process used to create the data and the nature of the data that the analysis was based on. In other words to understand that the outputs can only be as good as the inputs. We believe that the quality of the input data was reasonable and that the outputs therefore reasonably describe Greenspace provision. However there is room for improvement in data quality and any improvements in data will lead to improved accuracy of the results if the analysis is repeated in the future. Specific data quality and data limitation issues to be aware of are:

The access network (a combination of PRow and other highways) was not well mapped prior to this project and certain assumptions have had to be made about the connectivity between PRow and between PRow and other highways.

As described in section 2, in the absence of reliable and consistent data, assumptions have been made about the accessibility of Greenspaces from adjacent paths and roads

The population data is 6 years old - although localised changes in population will not significantly affect the overall results at an all Authority level.

Internal boundary problems have been eliminated – but external boundaries will still be affecting the results – leading to a slight under estimate of provision most noticeably around the external project boundary

It has been assumed that all PRow are accessible – whereas some may not be (although should be)

The quality and comprehensiveness of data between Authorities is variable and this will have some effect on the reliability of comparisons

Greenspaces smaller than 1 hectare (0.01 km²) have not been included (except for the additional and separate work on play spaces and playing fields for Caerphilly CBC and Rhondda Cynnon Taff CBC).

Greenspaces include significant areas of extensively managed common land and forested areas and some of this land is typically quite steep on valley sides. Whilst this was an agreed approach and consistent with the Toolkit, there is a case for saying that steep, forested land is not physically accessible, particularly to some sections of the community. Removing this land from the Greenspace category would significantly reduce the amount of available Greenspace and reduce the 'pass' rate for the various standards.

5 Recommendations and further work

Methodology

In general the Greenspace Toolkit is a helpful document for undertaking this work. It is however really just a guide and many decisions over the detailed implementation have to be made.

The Toolkit provides a choice of using 'buffer analysis (i.e. measuring the distance between population and Greenspace as a straight line) and 'network analysis' (i.e. measuring the distance between population and Greenspace along the available path and road network). Our experience is that network analysis, although more complex, is essential. Buffer analysis was tried in a pilot area and generated clearly spurious results. It is recommended that all future work uses the network analysis approach.

The minimum distance for any size of Greenspace (larger than 1ha in this study) is 400m and the standards relating to larger Greenspace areas also have correspondingly longer minimum distances (i.e. 5km for 100 ha and 10km for 500 ha). A 400m distance might sensibly represent a 5 or 6 minute walk, but most people would probably use motorised transport of some type for the 5km or greater distances. For people without ready access to private transport these Greenspaces may effectively be inaccessible and thus the results will be overestimating the number of people that truly have access to these larger areas. It is recommended that future analysis of these larger Greenspaces is done based on public transport networks.

The Toolkit is perhaps primarily intended for analysis of Greenspace provision and accessibility within urban areas, and even then the inclusion of standards at 5km and 10km suggests it is most suited to the larger conurbations. This study applied the methodology at a county wide level and this explains to some degree why the 'pass' results for the larger Greenspaces are so high. It is recommended that consideration is given to restricting the application of the method to pre-selected urban areas. This will substantially reduce the task of creating the requisite datasets and correspondingly reduce costs.

Analysis

The inclusion of Greenspaces that are physically inaccessible to some sectors of the community (steep valley sides, some forestry areas) has a significant effect on the results and consideration should be given to repeating the analysis with these areas excluded. It is recommended that this is done for at least one Authority and the results of this exercise are used to inform any future Greenspace analysis projects.

An obvious use for this type of information is to understand the effect on the population if a Greenspace is 'lost' or the effect if a new one is 'gained'. For instance there may be a number of Greenspaces that are potentially suitable for development and determining the relative impact on the population of the 'loss' of each of these may be a valuable part of the information needed to make planning decisions. This type of 'what if' analysis can be done by removing each of the Greenspaces in question, running the analysis again and comparing the results with those previously generated. This would provide information on how many people would have to travel further to their nearest Greenspace, how many people would fail each standard that had previously passed and where these people lived.

A variation on the 'what if' analysis is to quantitatively examine the effects of introducing new Greenspaces. In practice this is most likely to be cases where there are existing public open spaces that are highly managed and therefore failed the 'naturalness' criteria required for Greenspace. By changing the management regime it may be possible to bring some of these

spaces into the Greenspace category and the quantitative analysis can help decide where this sort of action would have the greatest benefit in terms of population numbers.

It is also possible to rate or rank every Greenspace according to the numbers of people for which it serves as their nearest Greenspace. This is a way of attaching a quantitative measure of 'importance' for each Greenspace and this again might inform judgements about management and development planning decisions.

At present the analysis has not taken any account of the nature of the population in socio economic or health terms. It would be a relative straight forward task to use the index of multiple deprivation within the analysis to shed more light in this area.

Outputs

It is recommended that the spatial data supplied is imported for use in each Authoritys GIS as this is an effective way of sharing the information with colleagues and will also allow for further analysis to be carried out. Assistance with this can be provided by exeGesIS if required.

The A0 maps have been provided as PDF formal files for convenience, but are best viewed as hard copy. It is recommended that each Authority prints hardcopy maps from the PDF files. Assistance with this can be provided by exeGesIS if required.

Appendix A

Partners and key contacts

Blaenau Gwent County Borough Council

Colin Cheesman
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Countyside Council for Wales

Kerry Rogers
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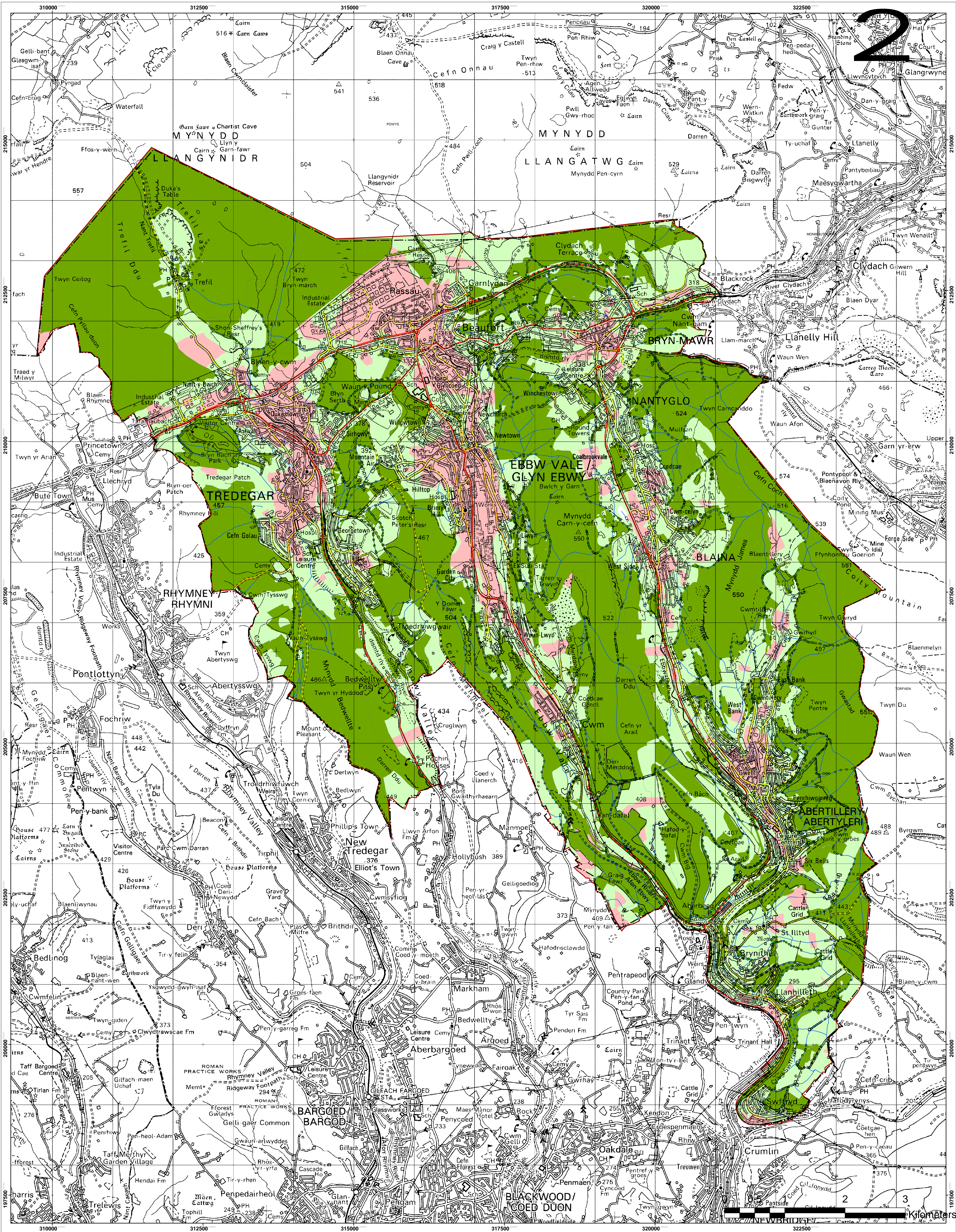
Appendix B Datasets supplied

Dataset	Filename	Used for Green space	used for network
<i>AddressPoint</i>	AddPnt	n/a	
<i>AerialPhotos</i>	Blaenau Gwent Central	n/a	
	Blaenau Gwent North	n/a	
	Blaenau Gwent South	n/a	
<i>ForestryCommision</i>	1191_20260_411_703	y	
	blaenaugwent_assembly_woodlands	y	
<i>Mastermap</i>	mastermap	y	
<i>ITN</i>	output ITN	n/a	y
<i>OpenAccess</i>	Blaenau_Gwent_CL	y	
	Blaenau_gwent_conc_OC	y	
<i>PROW</i>	CAMS dataset	n/a	y
	OSCAR ROADS MAP	n/a	
	row	n/a	
<i>UDP</i>	POLYGON OVERLAY	y	
<i>Woodland</i>	drysiogfarm	no	
	TPO's	no	
<i>Cemetaries</i>	cemetaries	y	
<i>CommonLand</i>	Caerphilly_common_land_region	y	
<i>CountryParks</i>	country parks	y	
<i>CountyBoundary</i>	ua_cov_region	n/a	
<i>Designations</i>	Sac_ccbc - special area of conservation	y	
<i>Golf</i>	golf	y	
<i>HLA</i>	hla_2006	y	
<i>Mastermap</i>		y	
<i>NationalPlayingFieldStandard</i>	2005 national playing field standard	y	
<i>Open access</i>	Caerphilly_conc_OC_region	y	
<i>OS10K raster</i>		n/a	
<i>PlaygroundStock</i>	playground stock	y	
<i>Postcodes</i>	postcode units	n/a	
<i>PROW</i>	prow	n/a	y
<i>Roads</i>	roads	n/a	
<i>ITN</i>		n/a	y
<i>UDP</i>		y	
<i>YouthStock</i>	youth stock	y	
<i>Population</i>	BLPU_pt_22-06-07	n/a	
<i>designations</i>	AONB region	n/a	
	Areas of Outstanding Natural Beauty_export	n/a	
	Biogenetic Reserves_export	y	
	Biogenetic_region	y	
	Biosphere_region	y	

Dataset	Filename	Used for Green space	used for network
	Biospheric Reserves_export	y	
	hercoast_polyline	n/a	
	Heritage Coast_export	n/a	
	LNR_region	y	
	Local Nature Reserves_export	y	
	Marine Nature Reserves_export	y	
	MNR_region	y	
	National Nature Reserves_export	y	
	NNR_region	y	
	Ramsar_export	y	
	Ramsar_region	y	
	SAC_region	y	
	Sites of Special Scientific Interest_export	y	
	SPA_region	y	
	Special Areas of Conservation_export	y	
	Special Protection Areas_export	y	
	SSSI_region	y	
<i>other</i>	Car_park_Picnic_and_other_recreation_100707	n/a	
	copy_of_roads_100707	n/a	y
	CYC_fire_points	n/a	
	Gateways	n/a	
	no_thin_100707	y	
	wales2000mbuffer	y	
	Wales_Ownership_28_03_07	y	
<i>AddressPoint</i>	Address Point	n/a	
<i>OS10K</i>		n/a	
<i>mastermap</i>		y	
<i>ITN</i>		n/a	y
<i>other</i>	Ancient & Ancient Semi-natural Woodland	y	
	Cemeteries	y	
	Common Land	y	
	Heads of the Valleys Greenspace MT	y	
	Open Access Land	y	
	Parks	y	
	Playing Fields	y	
	PROW	n/a	y
	Taf Fechan Nature Reserve	y	
<i>OS10K</i>		n/a	
<i>Address Point</i>	Address	n/a	
	ADDRESSP_point2	n/a	
	AddressPoint	n/a	
	ADDRESST	n/a	
<i>Aerial Photos</i>	2003	n/a	
	Aerial 2000	n/a	

Dataset	Filename	Used for Green space	used for network
	Area 1	n/a	
	Area 2	n/a	
	Area 3	n/a	
	Area 4	n/a	
	Area 5	n/a	
	Area 6	n/a	
	Area 7	n/a	
	Area 8	n/a	
	Area 9	n/a	
	Area 10	n/a	
<i>Countryside</i>	Key_Countryside_Sites	y	
	Local Nature Reserves_export	y	
	LocalNatureReserves	y	
	Open Access	y	
	PROW	n/a	
	PRoW_RCT	n/a	
	SINC_Point	no	
	SINC_POLY	y	
	Sites of Special Scientific Interest_export	y	
	SSSI	y	
	TPOAREA	y	
	ROW_work	n/a	y
	TPOIND	no	
<i>Cynon Valley Local Plan</i>	CVLP_Green_Wedge_region	y	
	CVLP_Landscape_Area_region	y	
	CVLP_Local_Plan_Boundary_region	no	
	CVLP_Other_Open_Space_region	y	
	CVLP_Recreation_Cycle_Path_polyline		
	CVLP_Recreation_Tourism_point	no	
	CVLP_Recreation_Tourism_region	y	
	CVLP_Settlement_Limit_region	no	
<i>Taff Ely Local Plan</i>	TELP_Environment_Designated_Conservation_Areas_region	y	
	TELP_Environment_Green_Wedges_region	y	
	TELP_Environment_Historic_Parkland_region	y	
	TELP_Environment_Notified_SSSI	y	
	TELP_Environment_Registered_Commons	y	
	TELP_Environment_Settlement_Boundaries_region	n/a	
	TELP_Environment_Special_Landscape_Area_region	y	

Dataset	Filename	Used for Green space	used for network
	TELP_Environment_Urban_Open_Space_region	y	
	TELP_Infrastructure_Cyclepaths_polyline	n/a	
	TELP_Infrastructure_Pedestrian_Routes_text	n/a	
	TELP_Infrastructure_Pedestrianisation_polyline	n/a	
	TELP_Land_Use_Recreation&Tourism_region	y	
	TELP_Land_Use_Recreation&Tourism_text	n/a	
ITN		no	y
Land Terrier	Acquisitions	no	
	Disposal	no	
	Lease	no	
Mastermap Feb 2007 (post PAI)		no	
Other	BOUNDARY	n/a	
	OS Contours	n/a	
Parks	GRASS	y	
	Grounds Maintenance	y	
Address Point	AddPnt	n/a	
MM ITN		no	y
OS10k raster		no	
Other	Allotments	y	
	Areas of Important Urban Open Space	y	
	Cemeteries	y	
	Child & Youth Play Areas	y	
	Civic Space	y	
	Community Space (Amenity)	y	
	Cycle Track	n/a	
	Farmlands	no	
	Green Corridors	y	
	Leisure Centres	y	
	Newtasc	no	
	Outdoor Sports Facilities	y	
	Possible Sites	y	
	Private Gardens	no	
	Public Parks & Gardens	y	
	Rivers Canals & Lakes	y	
	Road Verges & Roundabouts	no	
	Row_work	n/a	y
	SITES TO BE INVESTIGATED	no	
	Urban Fringe Countryside	y	
	Woodlands	y	



Legend

 Greenspace	 B Road
 pass	 Minor Road
 fail	 Local Street
 Motorway	 Alley
 A Road	 Other
	 PRoW

Heads of the Valleys Accessible Natural Greenspace Assessment

Blaenau Gwent - 400m to nearest greenspace of any size

This map shows the final Greenspace dataset used for the analysis, the results of the analysis and the network used to calculate the results. The legend indicates pass/fail for each Census Output Area, red shading indicating failure and green shading pass. The greenspaces themselves are shown as darker green polygons.

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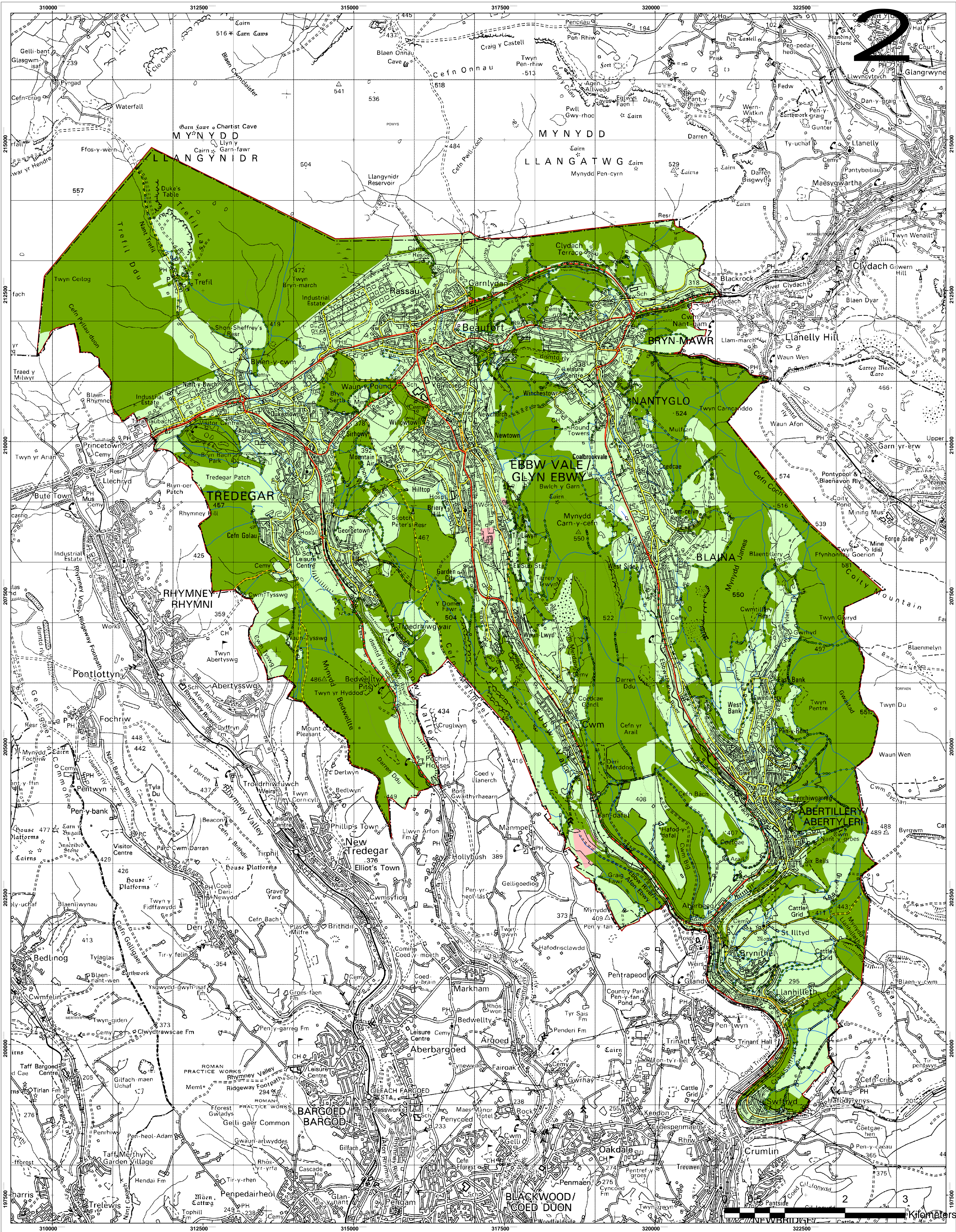
Designations datasets © Countryside Council for Wales

Forestry datasets copyright © Forestry Commission

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All other datasets © the project partners:

Blaenau Gwent CBC; Caerphilly CBC; Merthyr Tydfil CBC; Rhondda Cynon Taff CBC; Torfaen CBC



Legend

	Greenspace		B Road
	pass		Minor Road
	fail		Local Street
	Motorway		Alley
	A Road		Other
			PRoW

Heads of the Valleys Accessible Natural Greenspace Assessment

Blaenau Gwent - 2km to nearest greenspace over 20ha

This map shows the final Greenspace dataset used for the analysis, the results of the analysis and the network used to calculate the results. The legend indicates pass/fail for each Census Output Area, red shading indicating failure and green shading pass. The greenspaces themselves are shown as darker green polygons.

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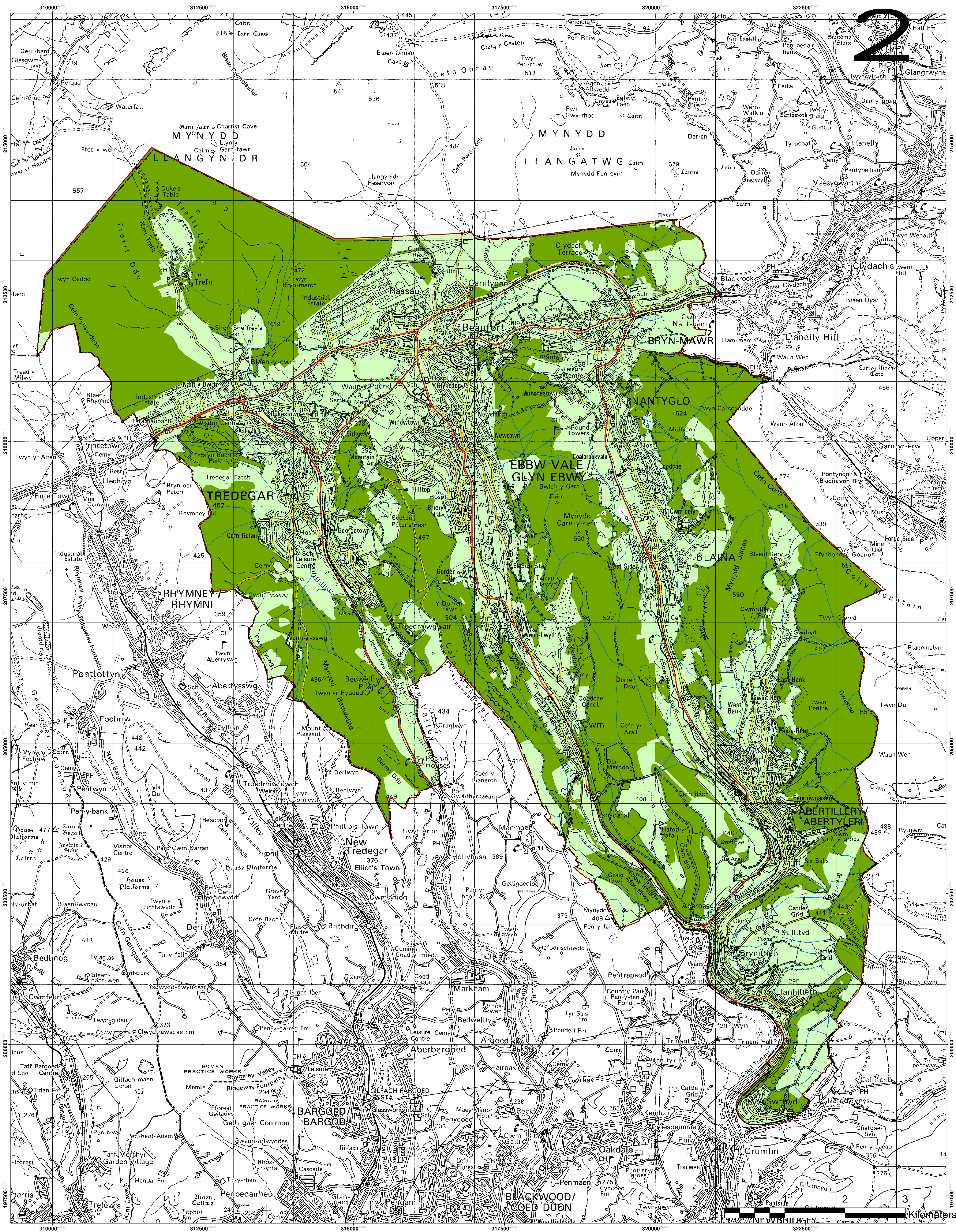
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Legend

	Greenspace		A Road
	pass		Minor Road
	fail		Local Street
	Motorway		Alley
	B Road		Other
	Access Points		PRoW

Heads of the Valleys Accessible Natural Greenspace Assessment

Blaenau Gwent - 10km to nearest greenspace over 500ha

This map shows the final Greenspace dataset used for the analysis, the results of the analysis and the network used to calculate the results. The legend indicates pass/fail for each Census Output Area, red shading indicating failure and green shading pass. The greenspaces themselves are shown as darker green polygons.

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