

SNH's Mapping of Scotland's Wildness and Wild Land: Non-technical Description of the Methodology (June 2014)

Introduction

1. SNH identified '[Search areas for wild land](#)' in its 2002 Policy Statement [Wildness in Scotland's Countryside](#). These indicated where most of the significant and valued areas of wild land were thought to be found. However it was a preliminary map, incomplete, whose use at a detailed level throws up a number of inconsistencies. A new, more robust and transparent approach to identifying Scotland's wild landscapes has therefore been developed, applying a three stage methodology:
 - Phase I identifies relative wildness across all Scotland;
 - Phase II identifies the most extensive areas of highest wildness; and
 - Phase III selects and defines wild land areas, considered to be of most importance in a national context.
2. This analysis resulted in the publication in April 2013 of the Core Areas of Wild Land 2013 map. The methodology was subsequently refined and analysis updated and a new map of [Wild Land Areas 2014](#) was published in June 2014.

Phase I – Identifying relative wildness across Scotland

3. The Phase I methodology for identifying relative wildness was based on an earlier study, *Wildness Study in the Cairngorms National Park* (2008). This was adapted to reflect the national scale of analysis and new issues that this raised, for example the consideration of coast and off-shore islands, and the increase in data analysis required for a significantly larger area. Data analysis was undertaken at either a 25m or 50m cell resolution, and the results presented at 25m resolution. The Wild Land Areas map is based on analysis undertaken in February 2014 using the data available at that time (see Annex 1). The maps are a snap-shot of Scotland at a point in time and will not reflect changes in development or land use since the data was captured.
4. In broad terms the approach adopted takes each of the physical attributes set out in SNH's Policy Statement in turn, identifies existing datasets that can best represent these, and separately maps each of them before combining all four of them in a single map of relative wildness.

i) Perceived naturalness

5. This layer seeks to capture two physical attributes: '*a high degree of perceived naturalness in the setting, especially in its vegetation cover and wildlife, and in the natural processes affecting the land*', and '*little evidence of contemporary human use of the land*' (Annex 1 of *Wildness in Scotland's countryside policy statement*, SNH 2002). Different land classes identified in the **Land Cover Map 2007 (LCM2007)**, the **Native Woodland Survey of Scotland (NWSS)** and the **National Forest Inventory (NFI)** datasets

were analysed at 25m cell resolution. Each land class is assigned a 'naturalness score' from 1 (low perceived naturalness) to 5 (high perceived naturalness), as listed in Annex 2.

6. Heavily modified lochs and reservoirs have been identified from **SEPA's data** (inland waterbodies greater than 0.5km² classified as 'heavily modified'), and **Ordnance Survey data** (waterbodies labelled as 'reservoirs' below the 0.5km² size threshold). This may not cover all impounded waterbodies across Scotland but is the best data available.
7. Limitations with the data required two adjustments to be made.
 - a. The LCM2007 'inland rock' class, assigned the highest naturalness score of 5, includes extensively modified areas such as open cast mines, quarries, fabrication yards and industrial peat workings. Whilst unable to cross-check every occurrence of 'inland rock' across Scotland, the largest areas (over 35ha) have been assigned a naturalness value of 1 (the lowest naturalness value).
 - b. LCM2007 data does not include the islands of Fair Isle and St. Kilda, so naturalness scores have been applied using LCM2000 and Ordnance Survey MasterMap data respectively.
8. To reflect the influence that areas immediately surrounding a cell have on the perception of naturalness across an area (as an individual cell is not seen in isolation from its neighbours), the influence of cells within 250m of the target cell was taken in to account. The percentage breakdown for each of the 5 naturalness classes was calculated within 250m of the target cell. These percentages were then multiplied by their naturalness score giving a range of scores from 100 to 500. These scores were then re-scaled from 1-256 (in order that the four layers could eventually be combined) to produce a [map of perceived naturalness](#) across Scotland.

ii) Rugged or challenging terrain

9. This layer seeks to capture the physical attribute of '*landform which is rugged, or otherwise physically challenging*' (Annex 1 of *Wildness in Scotland's countryside policy statement*, SNH 2002). The slope and relative relief of the terrain across Scotland was analysed at 25m cell resolution using the **NEXTMap Digital Terrain Model (DTM)**.
10. For each cell the standard deviation of terrain curvature within a 250m radius is calculated, with a higher score signifying landform which is steep and/or rough. 250m was taken to be the area which is of greatest immediate influence when walking through a landscape. The results were re-scaled 1-256 to produce a [map of rugged or challenging terrain](#).
11. A limitation with the method is that it captures ruggedness rather than the challenging nature of terrain more generally, such as flatter but boggy ground. Climatic conditions have not been included as the data needed to compile a consistent level of information nationally required further analysis beyond the scope of this study.
12. A few small islets do not feature in the NEXTMap DTM (e.g. Boreray in St Kilda) and these will have an erroneous ruggedness value of 0.

iii) Remoteness from public mechanised access

13. This layer seeks to capture the physical attribute of '*remoteness and/or inaccessibility*' (Annex 1 of *Wildness in Scotland's countryside policy statement*, SNH 2002). The theoretical time it would take to walk or cycle, taking account of distance, relative slope, ground cover and barrier features such as open water and very steep ground, from the nearest public road, ferry landing or in one case a railway station (being the point of public mechanised access), is calculated at 25m cell resolution using the **NextMap DTM**.
14. For each cell travel time is calculated using Naismith's Rule, incorporating Langmuir's corrections. This assumes that on flat terrain one walks at 5km/hr, adding 30mins for every 300m ascent and 10mins for every 300m descent for slopes greater than 12 degrees. A bonus of 10mins is subtracted on descending slopes between 5 and 12 degrees. On roads and tracks speed of travel is increased to 10km/hr to reflect potential use of a bicycle.
15. Barriers to travel are taken to be a slope that is greater than 45 degrees, and open water. Rivers that show both a left and right bank within the **OS MasterMap** are taken as a barrier, but may be crossed with a time penalty where a ford is shown. Time delays are also added when walking through bog, marsh, heather and woodland (extracted from the **LCM2007** dataset). Private roads and tracks (using the **Integrated Transport Network (ITN)** dataset) allow a greater speed of travel.
16. A limitation with the data is that not all tracks are recorded within **OS MasterMap** or the **ITN** datasets. The methodology required four adjustments to be made.
 - a. As footbridges cannot be directly extracted from **OS Mastermap**, the water course that fell within 62m of the annotation 'FB' (based on examples) was assumed to have a footbridge across facilitating access. However inconsistencies were identified within urban areas, so any footbridges identified within naturalness class 1 cells (where accessibility is not a significant issue) were ignored.
 - b. In order to calculate the remoteness of coastal islands without a public road, public ferries were identified from 1:50,000 **Ordnance Survey maps**, and their island landing used as the point of access. Islands with neither public road nor public ferry were assumed to be 'inaccessible' and were allocated the same value as that calculated for the most remote location nationally.
 - c. Tracks running transverse across steep hillsides would occasionally be identified as a steep track (ie. incorrectly judged as running up/down the slope). The method was therefore changed to average all tracks to a speed of 10km/hr with Naismith's rule applying corrections due to height gain and loss.
 - d. Islands in lochs are not given a value by the Path Distance calculation as the loch is a barrier. These isolated features are therefore assigned the nearest value from the surrounding land, thus underestimating their remoteness.
17. The calculation of time to travel was re-scaled 1-256 to produce a [map of remoteness from public mechanised access](#).

iv) Lack of built modern artefacts

18. This layer seeks to capture the physical attribute of 'lack of any modern artefacts or structures' (Annex 1 of *Wildness in Scotland's countryside policy statement*, SNH 2002). The theoretical visibility of buildings and structures, such as roads, vehicle tracks, railways, pylons, masts and wind turbines, is established by a voxel viewshed analysis (developed by Leeds University), using **OS Mastermap** together with a **Digital Surface Model (DSM)**. The cell resolution was 50m.
19. Viewshed analysis for all of Scotland is a computationally costly process, but the voxel viewshed tool produces hundreds of viewpoint viewsheds per second by estimating for each cell whether the selected artefact is visible or not. The use of the DSM means that there will be a barrier effect for areas of bare land outside forestry, however visibility within forest areas will be deemed to be from the top of the canopy (the DSM) rather than from ground level (the DTM), so the barrier effect will not be taken into account. The voxel tool also assumes that each artefact detected occupies the full width of the cell or cells it falls within, regardless of its actual size. Both of these rules will overestimate the true visibility of the modern artefact layer.
20. The voxel tool created separate viewsheds for three feature layers extracted from **OS MasterMap** up to a distance of 15km. The three layers were calculated in turn: railway lines, roads and tracks; buildings and other structures; and pylons. Where more than one feature layer occurs in a cell the viewshed only takes account of the 'last' feature layer (for example buildings where a road also occurs). A fourth viewshed of **built wind turbines known to SNH** (see Annex 3), was calculated separately up to a distance of 30km. All four viewsheds were then combined, and re-scaled 1-256 to produce a [map of absence of modern built artefacts](#).
21. A limitation with the data is the lack of an accurate and complete dataset of fish farm sites and structures, so these have not been taken into account.

v) Relative wildness

22. The [map of relative wildness](#) is a combination of the four attribute maps, each standardised to present the information at a cell resolution of 25m. Each layer is equally weighted.

Phase II - Mapping of new search areas for wild land

23. Phase II identifies broad areas of Scotland that have the highest wildness of greatest extent. The analysis was based on the equally weighted combined map of relative wildness produced in Phase I, informed by the established 2002 '[Search areas for wild land](#)' to check the veracity of the approach. The analysis involved four steps.

i) Classify wildness data using Jenks Natural Breaks Optimisation

24. Jenks Natural Breaks Optimisation method was used to identify the natural breaks in the distribution of the relative wildness data. This method divides the data in to distinct classes by seeking to reduce the variance within each class and maximise the variance

between them (i.e. the differences between the classes are greater than any differences within them). Identifying natural groupings should reflect real differences in the nature of the wildness resource, rather than an arbitrary threshold (such as scores of 50, 100, 150, etc) being selected.

25. The Jenks method requires the number of distinct classes desired to be selected. Exploring the Jenks analysis for three classes through to ten classes identified breaks in the data recurring around similar values regardless of the number of classes selected. Capturing these common break points was well reflected when dividing the data in to eight classes, 'Jenks 8' becoming the basis for the subsequent analysis.

ii) Identify the wildness score to prompt consideration as wild land

26. Comparison of the 2002 search areas for wild land with the Jenks 8 analysis identified that they all included significant areas with scores falling in the two highest wildness classes (classes 8 and 7). Possible wild land areas were therefore required, as a minimum, to include class 8 and/or class 7 cells. This is not the full extent of an area of wild land, as wildness is a quality which augments progressively as you penetrate in to wild land and therefore it will encompass adjacent areas with lower classes.

iii) Identify the area of high wildness required for wild land

27. Wild land areas need to be of a size that provides an appropriate scale of setting to evoke the full experience of wildness within them. Informed by the minimum area of contiguous classes 8 and 7 found within the 2002 search areas for wild land, a guideline of 650ha+ (6.5km²) of class 8 and 7 was selected.
28. A consequence of this approach is that small areas of relatively high wildness are discounted as potential areas of wild land in their own right, but where they occur in the vicinity of the identified areas they can be swept up in the next stage of the analysis (paragraph 30 below refers).

iv) Identify encompassing area of wildness that contributes to the whole

29. Surrounding the identified areas of the highest wildness are areas of lower wildness, which are considered to be an essential contributor to the whole. The 2002 '[Search areas for wild land](#)' encompass both class 6 and class 5 scores, which may extend significantly beyond their indicative boundary. These were considered as providing the basis for further consideration in Phase III.
30. Where contiguous areas of class 5 or 6 abutted small areas of class 7 and 8 that had previously been removed from the analysis (referred to in paragraph 28), these were included in the broad areas identified.

Phase III – Selecting and defining wild land areas

31. Phase III reviews the broad areas identified in Phase II and applies informed judgement to select and define wild land areas. This is a check of the rules driven GIS approach and statistical analysis, which does have limitations (such as the 'snap-shot' nature of the

data used). The very detailed level at which the analysis is presented may also indicate differences in the level of wildness that can be experienced which is more theoretical than apparent.

32. The nature of the identified blocks of land as a whole have been examined to confirm their selection as an area of wild land, informed by the following guidelines.
 - a. The areas identified contain around 650ha+ of Jenks 8 classes 8 and 7. Areas of wild land will consist of these classes, with the inclusion of class 6 and class 5 where these are part of and contribute to the wild land block as a whole, reflecting that wildness strengthens as you move into or across an area.
 - b. Account needs to be taken of changes since the baseline data underpinning the Phase I analysis was undertaken, in particular the approval and/or construction of significant developments such as wind farms.
 - c. Areas can encompass features detracting from wildness (such as isolated estate buildings), but their effect should be localised with relatively limited impact on the wider sense of wildness that can be experienced across the wild land area.
 - d. Limited areas of lower Jenks classes may be included within a wild land area where they occur as an isolated feature, interrupt simple boundaries, or fragment otherwise contiguous blocks of wild land (examples include transmission lines and railway lines). Public roads are not included.

33. Identifying the extent of a wild land area is challenging, reflecting the transitional nature of wildness. The areas have been mapped to encompass contiguous blocks with high levels of wildness indicated by the analysis. Using a 1:50,000 backdrop, boundaries have sought to use physical features recognisable on the ground that should have some relevance to people's experience of wildness (for example a physical barrier such as a loch, break of slope or ridge line defining a visual envelope). The context for an area (for example reflecting the differing nature of a main through-road in a glen in comparison with a dead-end road) has been considered. Most significant built development (such as wind farms, telecom masts and isolated dwellings) and large forestry plantations at the edge of the blocks identified have been excluded, as have consented but not constructed wind farms not considered in the Phase I analysis (only built and mapped features were captured). Boundaries simply exclude the physical footprint of these features and do not reflect consideration of the significance of their effect.

ANNEX 1 – Datasets Used In Phase I Analysis

LAYER	DATASET	DATE
Perceived naturalness	Land Cover Map 2007	2005-2007
	National Forest Inventory	January 2014
	SEPA GB Lakes	2014
	SEPA Loch waterbodies	2004 - 2014
	Native Woodland Survey of Scotland	January 2014
Rugged or challenging terrain	NEXTMap DTM	2002
Remoteness from public mechanised access	MasterMap (road network, tracks, footbridges, fords)	January 2014
	OS 1:50,000 backdrop maps (ferry routes)	2010
	Land Cover Map 2007	2005-2007
	NEXTMap DTM	2002
Lack of built modern artefacts	MasterMap Integrated Transport Network (roads, rail, tracks, buildings, structures, pylons, ski-lifts)	January 2014
	RenewablesUK	31 st December 2013
	OS Points of Interest	September 2013
	SNH data on wind farms	

ANNEX 2 - Naturalness Classes Applied In Phase I Perceived Naturalness Layer

CLASS	DEFINITION
1	No perception of naturalness such as urban and sub-urban areas
2	Low perception of naturalness may include arable and horticultural land
3	Some perception of naturalness may include broadleaf coppice and managed coniferous forestry
4	High perception of naturalness such as grass and shrub lands, may be some evidence of grazing
5	Very high perception of naturalness

	DESCRIPTION	NATURALNESS VALUE
LCM2007 CLASS	Sea	5
	Broadleaved woodland	4
	Coniferous Woodland	3
	Arable and Horticulture	2
	Improved Grassland	2
	Rough Grassland	3
	Neutral Grassland	3
	Calcareous Grassland	3
	Acid Grassland	4
	Fen, Marsh and Swamp	4
	Heather	4
	Heather grassland	4
	Bog	5
	Montane Habitats	5
	Inland Rock	5
	<i>Inland Rock > Despoiled land with area > 35 ha</i>	1
	Salt water	5
	Freshwater	5
	Supra-littoral Rock	5
	Supra-littoral Sediment	5
	Urban	1
Suburban	1	
NATIONAL FOREST INVENTORY	Conifer	3
	Broadleaved	4
	Mixed mainly conifer	3
	Mixed mainly broadleaved	4
	Coppice	4
	Coppice with standards (<i>none in Scotland</i>)	4
	Shrub	4
	Young trees	3
	Felled woodland	2
	Ground prepared for planting	2
	<i>Cloud or shadow</i>	Not used
	<i>Low density</i>	Not used
<i>Uncertain</i>	Not used	
NWSS	0 – 50% Semi-naturalness	4
	51 – 100% Semi-naturalness	5
SEPA GB Lakes	Reservoirs	3
SEPA Loch waterbodies	Heavily modified water bodies	3

ANNEX 3 – Wind Farms Included In Phase I Lack Of Built Modern Artefacts Layer

NAME OF WIND FARM	NUMBER OF TURBINES	OPERATIONAL DATE
Achairn Farm, Stirkoke	3	01/05/2009
Achany Estate	19	01/10/2010
Aikengall	16	01/05/2009
Allt Dearg Community	12	31/12/2012
An Suidhe	23	22/09/2010
Ardkinglass/Clachan Flats	9	01/06/2009
Ardrossan	12	01/02/2004
Ardrossan Extension	3	01/10/2008
Arecleoch	60	14/06/2011
Ark Hill	8	02/05/2013
Arnish Moor	3	01/08/2007
Artfield Fell	15	01/07/2005
Baile an Truseil	1	13/09/2013
Balmurrie Fell (Artfield Fell Ext)	7	01/09/2012
Balnymoon Farm	1	01/02/2009
Bankend Rig	11	27/03/2013
Bankhead Farm	2	30/11/2012
Barlockhart	4	01/08/2013
Barns of Ayre	3	18/02/2013
Baugh Cottage	1	10/04/2001
Beatrice Demonstration	2	01/07/2007
Beinn an Tuirc	46	01/12/2001
Beinn Ghlas	14	01/05/1999
Beinn Tharsuinn	17	01/09/2006
Beinn Tharsuinn extension (Beinn nan Oighrean)	2	01/07/2009
Ben Aketil (Community Share)	10	31/12/2007
Ben Aketil extension (Community Share)	2	01/10/2010
Bettyhill	2	01/01/2013
Bilbster	3	01/02/2008
Black Hill	22	01/02/2007
Black Law 1 (Construction Phase 1)	42	01/09/2005
Black Law 1 (Construction Phase 2)	12	01/09/2006
Bognie Farm	1	15/02/2013
Boulfruich	15	01/10/2005
Bowbeat	24	01/09/2002
Boyndie Airfield (Community Share)	7	01/05/2006
Boyndie Extension (Community Share)	1	25/01/2010
Braes O' Doune	36	01/02/2007
Braiden Hill	1	01/01/2007
Brockholes	3	18/02/2013

Bruxiehill	2	20/10/2011
Bruxiehill (Ednie Farm)	1	01/12/2009
Bu Farm	3	01/03/2002
Burgar Hill	6	01/01/2000
Burnfoot Hill	13	01/09/2010
Burradale Phase 1	3	01/12/2000
Burradale Phase 2	2	01/01/2003
Cairnhill	3	01/03/2009
Cairnmore Farm	3	23/07/2010
Calliachar (Resubmission)	14	19/07/2013
Camas Nan Gail	2	01/08/1999
Camster	25	04/07/2013
Carcant	3	21/06/2010
Cathekin Braes	1	29/05/2013
Causeymire	21	01/11/2004
Coire na Cloiche	13	13/08/2013
Clochnahill	4	20/01/2012
Clyde South	56	01/12/2011
Clyde Wind Farm (North & Central)	96	01/10/2012
Corrimony Community	5	19/04/2013
Cowhill	1	01/12/2009
Craig	4	18/09/2007
Craigengelt Hill	8	31/03/2010
Cruach Mhor	35	06/07/2004
Crystal Rig	20	01/05/2004
Crystal Rig 1a	5	01/05/2007
Crystal Rig 2	51	06/04/2010
Crystal Rig 2a (aka Ila Project)	9	06/04/2010
Dalswinton, Pennyland Moor	15	21/10/2008
Deucheran Hill	9	01/12/2001
Drone Hill	22	01/09/2012
Drumderg	16	21/10/2008
Dummuie	7	01/04/2007
Dun Law	26	01/07/2000
Dun Law Extension	35	19/10/2009
Dykehead Farm	1	19/09/2012
Earlsburn (Community Share)	15	01/12/2007
East Kilbride	1	01/03/2001
Edinbane	18	13/12/2009
Fairburn Estate	20	28/02/2010
Fallago Rig	48	01/03/2013
Farr	40	01/05/2006
Findhorn Foundation	4	01/03/2006
FMC Technologies	1	06/12/2011

Forss	2	01/03/2003
Forss Ext	4	01/07/2007
Foula	3	not available
Gaindykehead Farm	1	31/03/2012
Gairnieston Farm	1	01/01/2011
Gallowhill	2	18/02/2013
Gallows Hill	1	18/02/2013
Gigha Community	3	01/12/2004
Girvan Community Hospital	1	01/07/2010
GlaxoSmithKline (Riverside Business Park)	3	30/06/2013
Glenkerie	11	01/02/2012
Glens of Foudland	20	23/07/2005
Gordonbush	35	12/06/2012
Gordonstown Hill	5	17/06/2013
Green Knowes	18	24/09/2008
Greendykeside	2	05/12/2007
Griffin	68	27/02/2012
Hadyard Hill	52	01/03/2006
Hagdale, Unst	2	not available
Hagshaw Hill	26	01/11/1995
Hagshaw Hill Extension	20	01/10/2008
Hallhill Healthy Living Centre	2	28/02/2005
Hammars Hill	5	30/09/2010
Hammer Farm	1	01/04/2013
Hare Hill	20	01/11/2000
Haspielaw Farm	1	01/11/2012
Hatston	1	04/10/2011
Herscha Hill	1	22/12/2011
Hill of Balquhindachy	1	01/07/2007
Hill of Balquhindachy (Extension)	2	17/07/2009
Hill of Burns	1	01/10/2009
Hill of Eastertown (Mackies)	3	01/12/2007
Hill of Fiddes	3	08/02/2010
Hill of Towie	21	01/06/2012
Hillhead	1	01/11/2012
Hillhead of Auquhirie re-submission	3	16/01/2013
Hillhead of Tullo	1	18/02/2013
Holodyke	1	01/10/2009
Horshader Community Turbine	1	15/02/2013
House O Hill	3	27/07/2010
Howe Community Turbine	1	01/10/2011
Kelburn	14	02/05/2012
Kilbraur (Strathbrora) (Community Share)	19	01/08/2008
Kilbraur extension (Community Share)	8	01/09/2011

Kildrummy	8	22/07/2013
Kingarly Community Turbine	1	01/10/2011
Knocknain Farm	1	12/02/2013
Lairg	3	04/01/2012
Liniclate	1	31/12/2008
Little Raith	9	29/11/2012
Lochcarnan Community	3	16/06/2013
Lochelbank	12	09/05/2011
Lochhead Farm	3	17/07/2009
Lochhead Farm 2	2	03/11/2009
Long Park	19	01/11/2009
Mains of Bogfechel	1	10/10/2010
Mains of Hatton	3	20/03/2012
Mark Hill	28	14/06/2011
Meikle Carewe (Resubmission)	12	01/07/2013
Methil Docks	1	11/09/2010
Methlick Farmers Wind Energy Project	4	21/12/2011
Michelin Tyre Factory	2	01/05/2006
Middleton	6	04/09/2013
Middleton of Rora	1	01/06/2012
Millennium (Glenmoriston)	16	21/10/2008
Millennium (Glenmoriston) Extension	4	01/12/2008
Millennium (Glenmoriston) Extension 2	6	26/04/2011
Millour Hill	6	31/05/2012
Minsca Farm	16	01/05/2008
Mornflake	1	18/02/2012
Muirake	2	01/01/2012
Muirhall (Resubmission)	6	01/03/2011
Myres Hill	2	01/12/2001
Myreton Crossroads	2	05/07/2013
Neilston Community	4	13/05/2013
Newstead	1	01/12/2009
North Mains of Cononsyth Farm	1	08/11/2012
North Redbog	2	01/07/2008
North Rhins	11	01/01/2010
Northfield wind turbines (Burray)	1	01/02/2005
Novar	34	01/10/1997
Novar Extension	16	01/03/2012
Nutberry Hill	6	01/09/2013
Old Maud	1	30/09/2011
Ore Brae Community Turbine	1	21/10/2011
Overside & Greenwellhead Farms	4	01/11/2013
Pates Hill	7	01/01/2010
Paul's Hill	28	01/05/2006

Pentland Road (incorporating Beinn Mholach)	6	03/06/2013
Pressmains Farm	1	01/06/2012
Robin Rigg	60	16/04/2010
Rosehall	19	30/01/2013
Rosti Factory	1	18/02/2013
Rothes (Cairn Uish)	22	10/05/2005
Rothes II (Resubmission)	18	04/09/2013
Rothiesholm Head (Community Turbine)	1	17/11/2011
RubberAtkins Plant	1	16/04/2012
Ruchlaw Mains	1	30/04/2012
Shielburn Farm	3	30/03/2013
Sigurd	1	01/11/2000
Skelmonae	4	01/12/2009
Spurness Repowering	3	01/12/2012
St Fergus Moss	3	18/12/2012
St John's Hill	9	16/08/2013
St John's Wells	3	05/07/2009
Strath of Brydock	2	01/06/2009
Strath of Brydock ext	1	01/12/2009
Sumardale Croft	1	04/11/2013
Tangy	15	01/12/2002
Tangy Extension	7	17/06/2011
Tiree Community	1	27/03/2010
Toddleburn	12	01/06/2010
Tullo	7	29/09/2010
Udny Community	1	01/08/2011
Upper Ardgrain	3	15/10/2010
Wardlaw Wood (Dalry Community)	6	01/06/2006
Wathegar	5	16/09/2013
West Adamston Farm	1	08/07/2011
West Cockmuir	1	01/07/2010
West Hill	1	25/07/2012
West Knock Farm	3	04/11/2010
Wester Hassockrigg	1	14/11/2012
Westfield	5	01/03/2013
Westhall	1	01/01/2013
Westray Community	1	01/10/2009
Wether Hill	14	01/05/2007
Whitelee Phase I extension	36	31/10/2012
Whitelee Phase II extension	39	15/01/2013
Whitelee, Eaglesham Moor (Part 1)	140	01/05/2009
Windy Standard	36	01/09/1996

ANNEX 4 – Consented Wind Farms Not Included In Phase I Analysis But Considered In Phase III

WIND FARM	NUMBER OF TURBINES	CONSENTED DATE
Bad a Cheo	13	09/05/2014
Corriegarth	20	19/01/2010
Corriemoillie	19	23/03/2011
Dunmaglass	33	29/12/2010
Lochluichart	17	22/12/2008
Lochluichart Extension	6	02/10/2012
Stronelaig	67	06/06/2014