

## 4. Scotland's experience





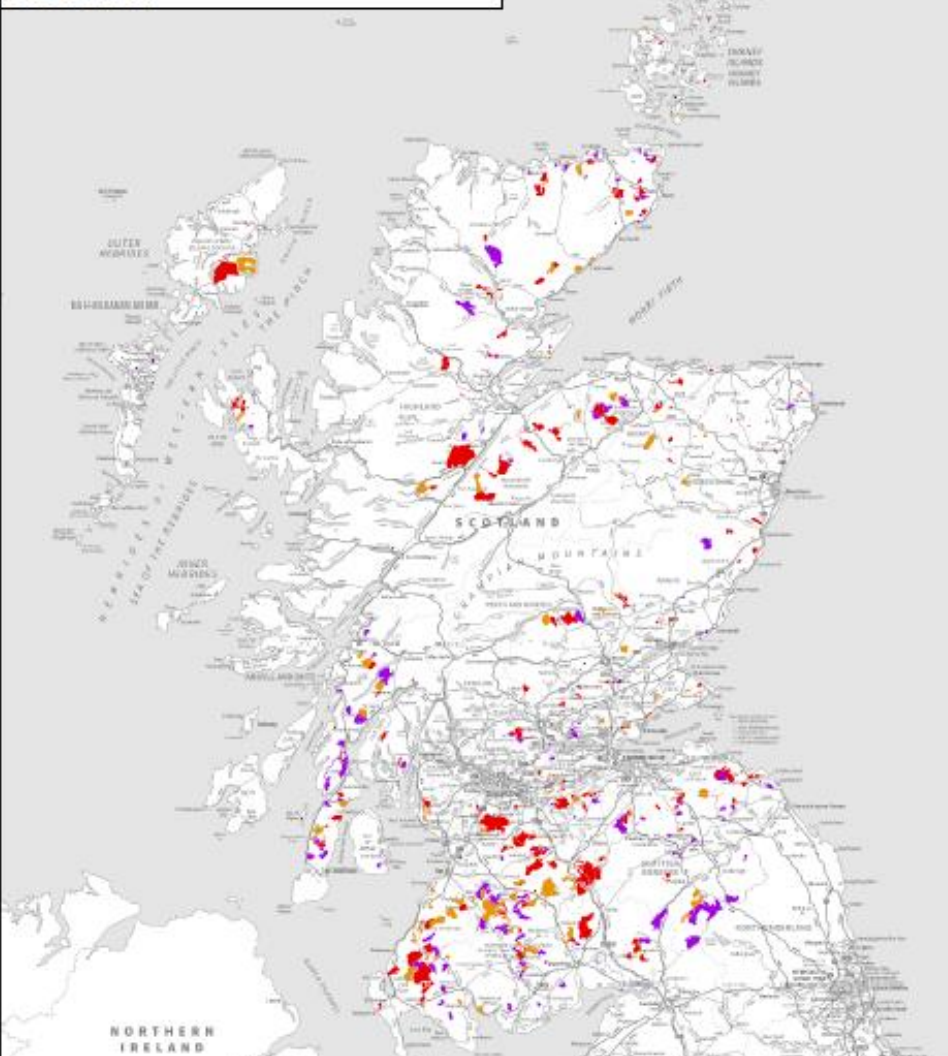
## Onshore Wind Farms in Scotland (November 2018)



Note: this is not necessarily a comprehensive dataset of all wind farm schemes in the public domain and there may be some errors in the information supplied on this map.

 Scottish Natural Heritage  
Duilchas Nàdair na h-Alba  
**nature.scot**

© SNH contains OS data © Crown copyright and database right (2018)  
Wind farm data available to download from Natural Spaces under the  
Open Government Licence. Produced by SNH Geographic Information  
Group Job ID 91013.



# Our role in wind farm development

*We are committed to supporting the Scottish Government to get the right development in the right places. We offer advice on the impact of onshore wind farms on the natural heritage at each stage of the planning process.*

***To provide as much certainty as possible, and as soon as possible, we support a plan-led approach to onshore wind farm development. This seeks to steer development to the right locations.***



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

DO YOU WANT THE  
ANGUS HILLS TO  
LOOK LIKE THIS ?



**SAY NO! TO THE  
CARSE GRAY  
LUNANHEAD  
WINDFARM**

[www.acwag.org.uk](http://www.acwag.org.uk) for more info



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**

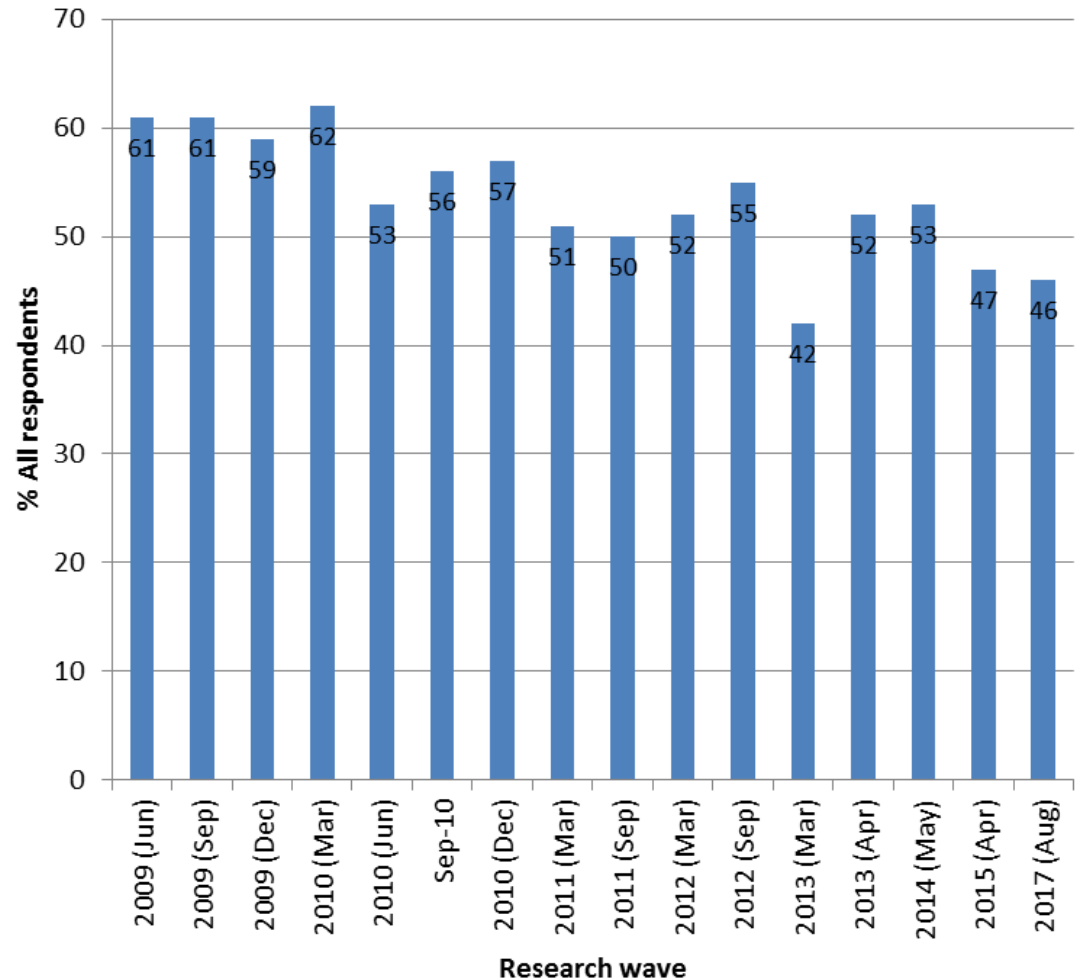


# Public attitude surveys

*Windfarms in Scotland are generally well located and designed?*



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**



# SNH 'National Interest' approach

- Objection only if national interest
- Criteria set out identifying cases
- Applications may still be refused

Year	Outright objections
2012/13	10
2013/14	5
2014/15	8
2015/16	7
2016/17	5
2017/18	4
2018/19	4



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Birds

- Collision risk
  - model developed, requires testing and verification
  - deriving robust avoidance rates
- Habitat loss
- Displacement



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**

# Peatlands



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

*“Where peat and other carbon rich soils are present, applicants should assess the likely effects on carbon dioxide emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of CO2 to the atmosphere. Developments should aim to minimise this release.”*

SPP para 205



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**




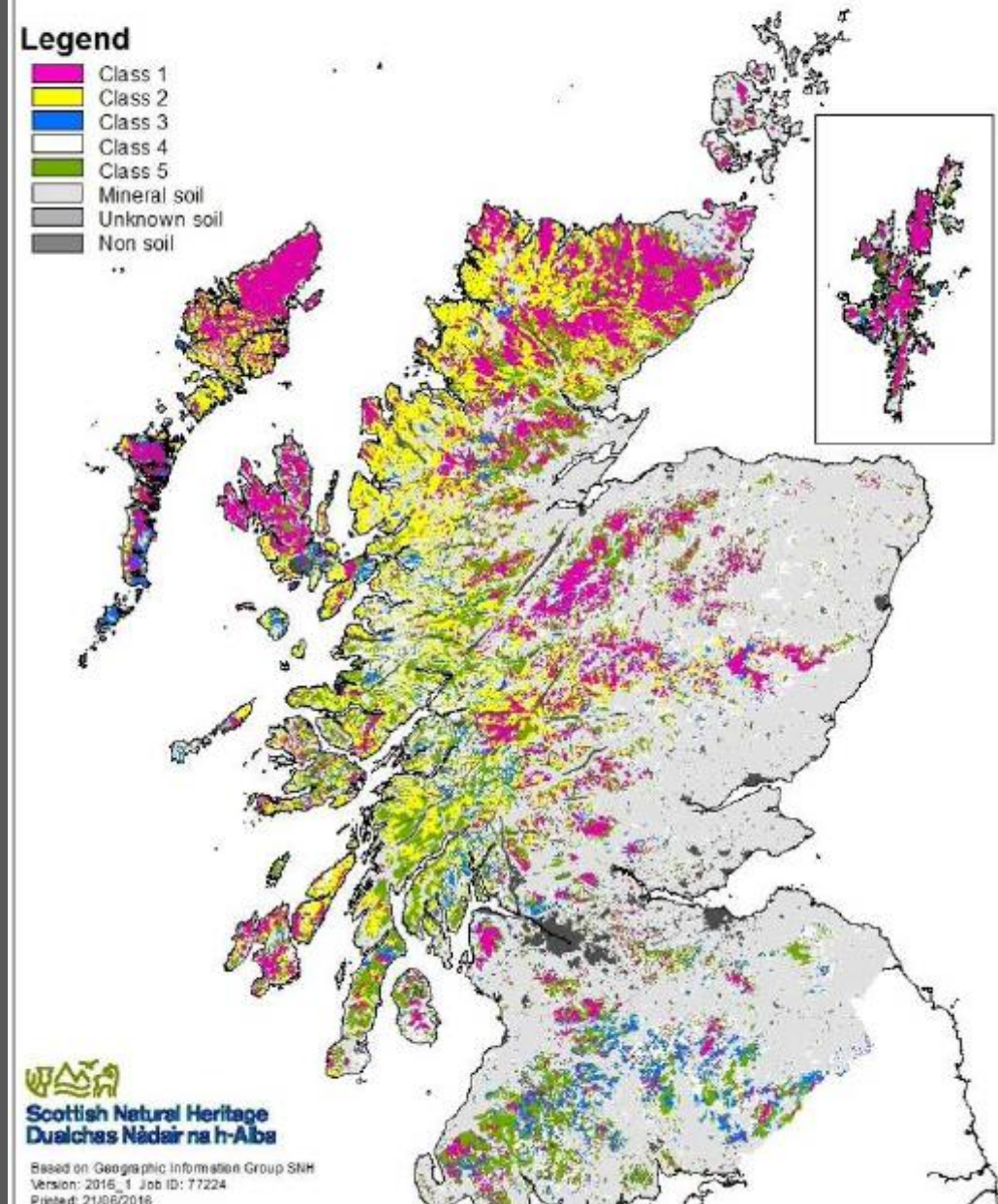
- Site selection
- Peat survey
- Design layout

## Carbon and Peatland 2016 map

This map is a consolidated spatial dataset of 'carbon rich soil, deep peat and priority peatland habitats' in Scotland derived from existing soil and vegetation data. The map is a predictive tool which provides an indication of the likely presence of peat on each individually-mapped area, at a coarse scale.

### Legend

	Class 1
	Class 2
	Class 3
	Class 4
	Class 5
	Mineral soil
	Unknown soil
	Non soil



# Landscape

- national coverage
- provides baseline information for EIA
- basis for further work e.g. capacity / sensitivity studies
- embedded in planning system



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**

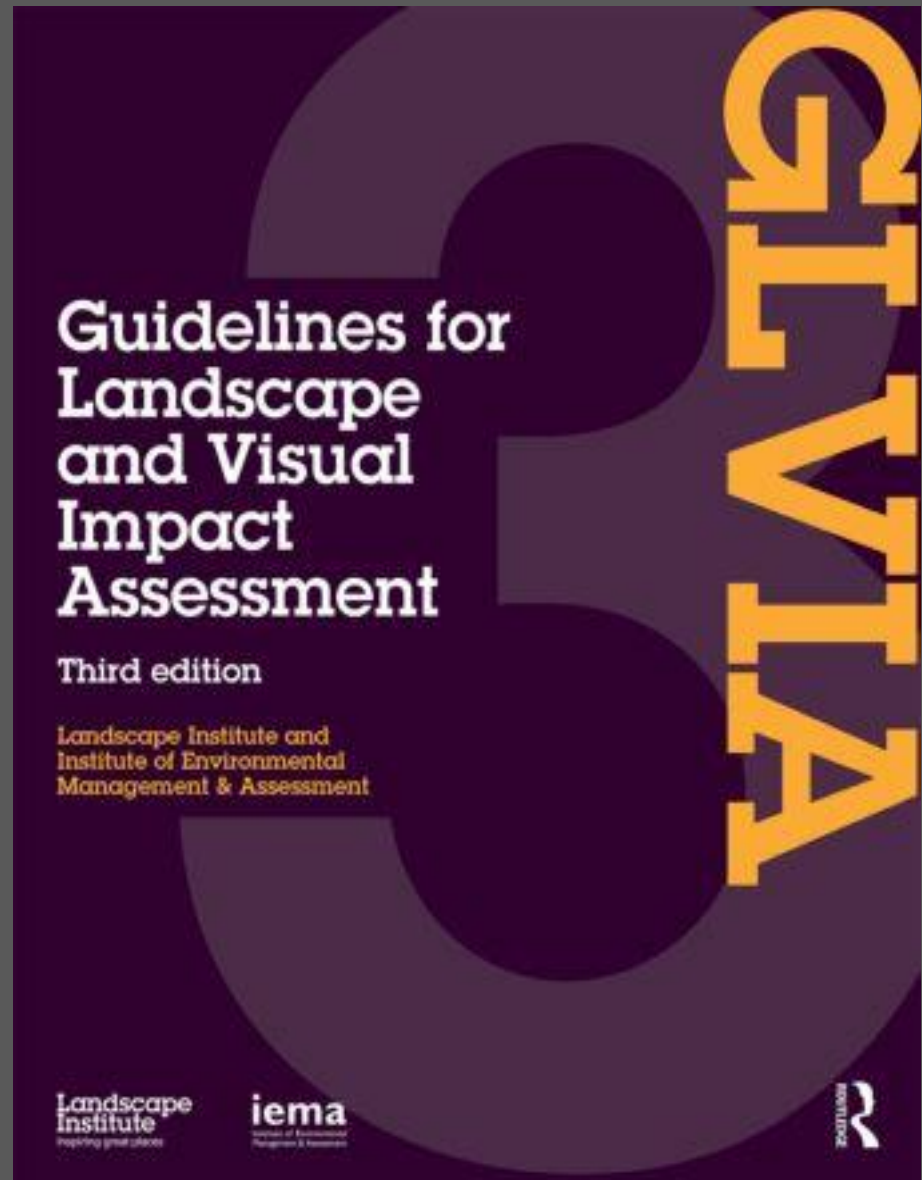


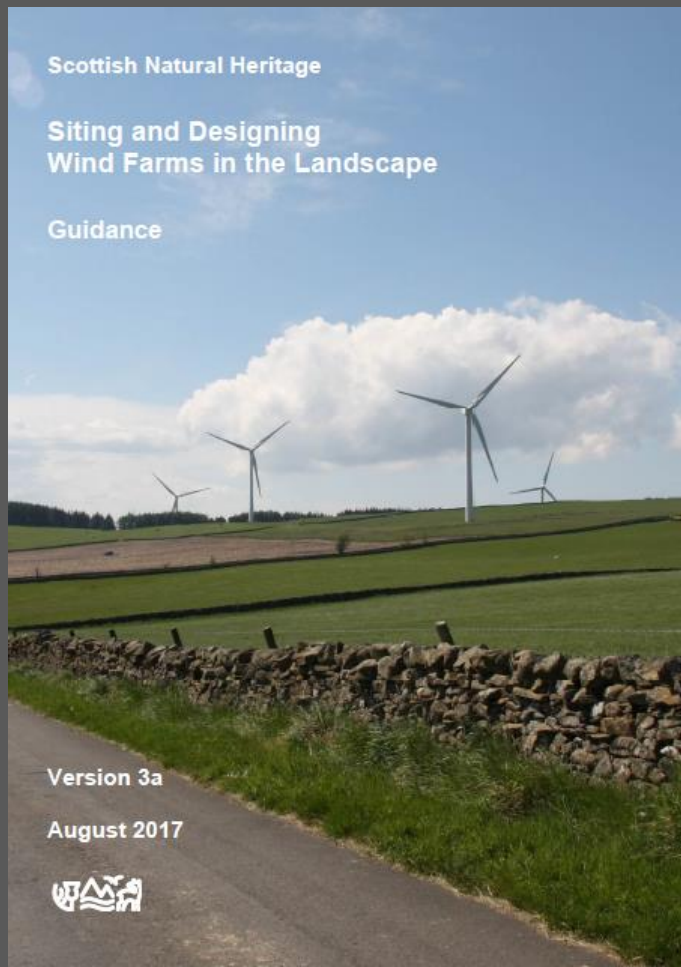
# Landscape and Visual Impact Assessment

- Standard, established methodology
- Robust and objective process
- Not about personal opinion
- Undertaken by landscape architects



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**





## Siting and designing wind farms in the landscape:

- Design principles
- Cumulative effects
- Aid to assessment process



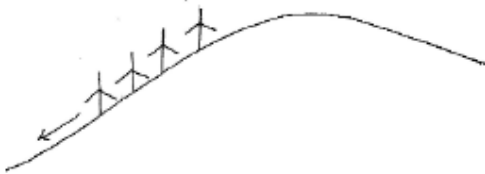
Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Landform



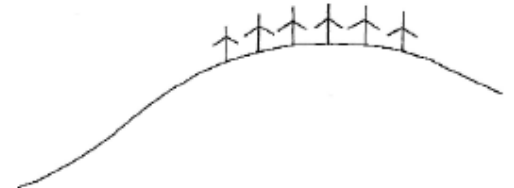
Two different views of the same windfarm. The layout appears simple from one direction, but complex from another



Wind turbines upon slope create a visually dynamic image, seeming unstable



Windfarm appears visually unbalanced upon hill



Windfarm relates to underlying landform, creating a balanced image



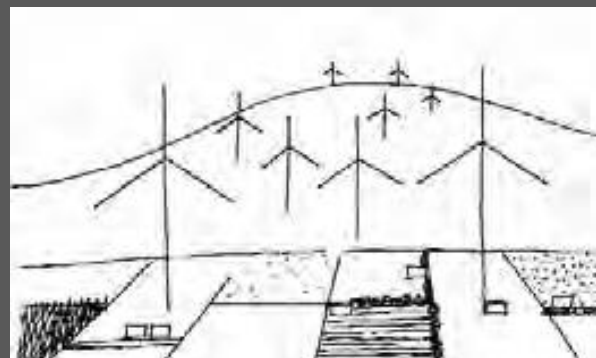
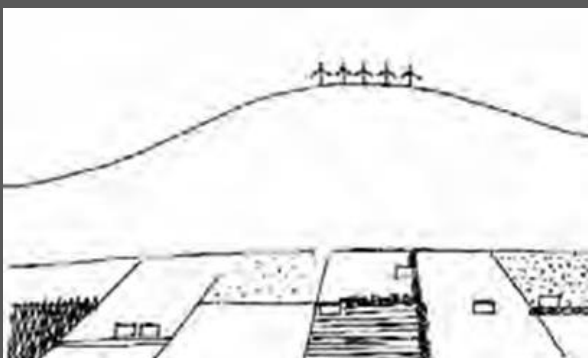
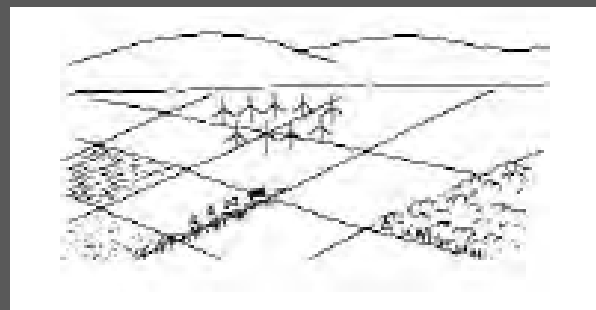
Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**

# Landcover

Design relates to pattern



Design does not relate to pattern



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

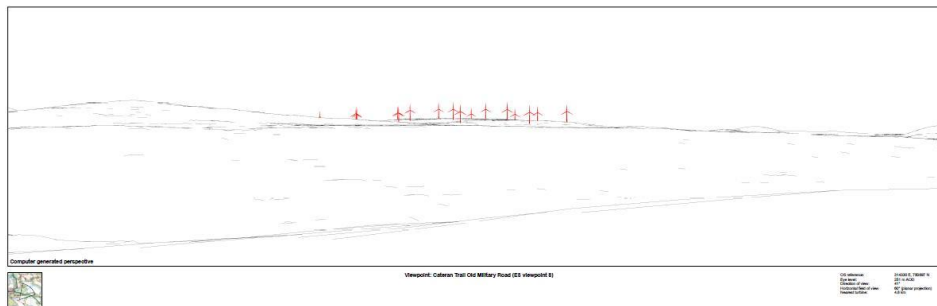
nature.scot

# Visualisation Guidance





90° to 360° baseline  
photo and cumulative  
wireline



'75mm' wireline



'75mm' photomontage

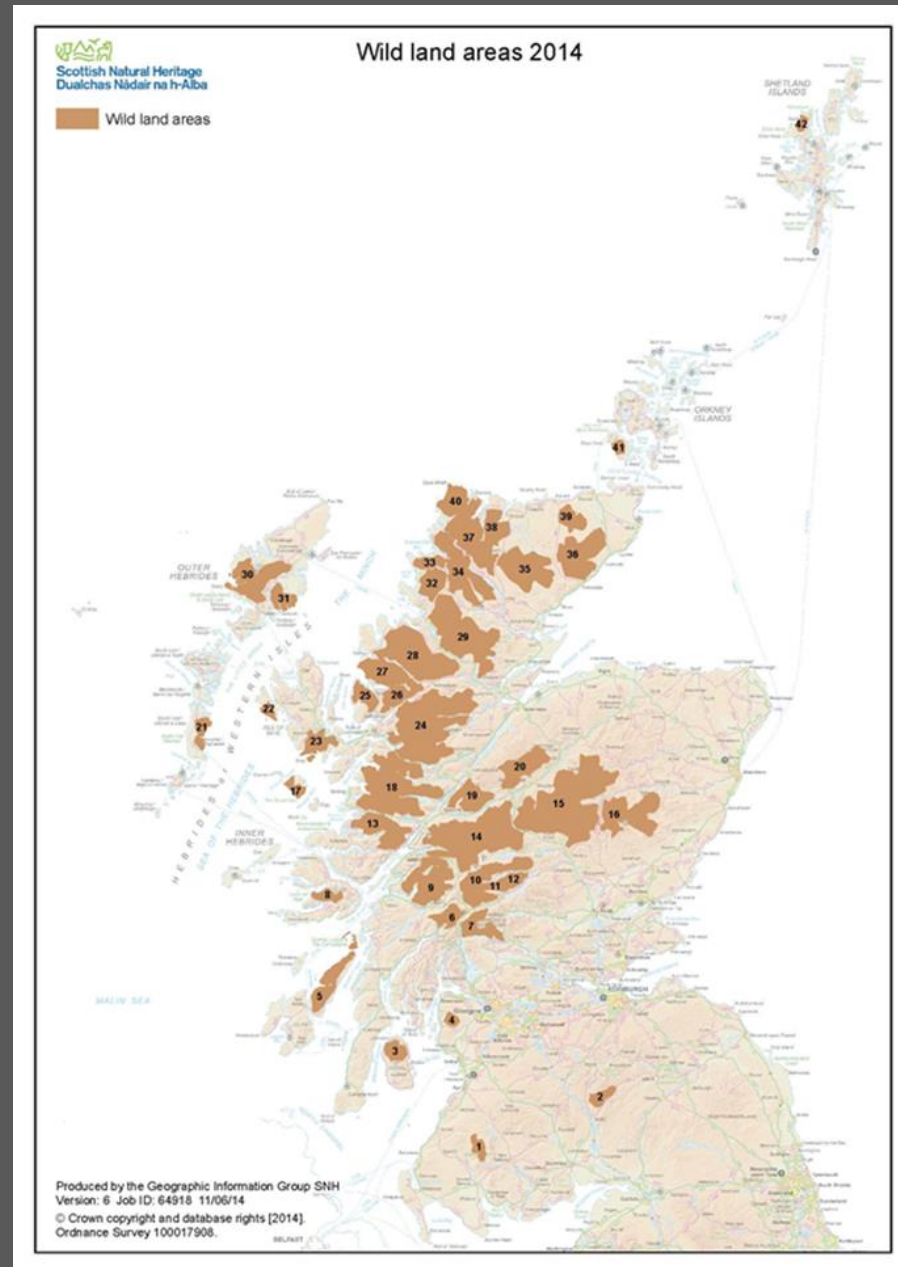


# Wild Land Areas

- Highly valued – by people, as a resource
- 42 nationally important WLAs
- Not a designation



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba  
**nature.scot**





# Wild Land Areas

*“... are very sensitive to any form of intrusive human activity and have little or no capacity to accept new development.*

*“... development may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation.”*



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

Figure 5.28b: Viewpoint 7, Five Sisters. The image shows a wide panoramic view of a landscape featuring a town, rolling hills, and a line of wind turbines under a cloudy sky. Below the image is a diagram showing the layout of wind farms (Peattie Law, Five Sisters, and others) with color-coded turbines. A map inset in the bottom left shows the location of the viewpoint. A table in the bottom right provides viewpoint parameters.

Viewpoint parameters:	
Grid reference	E300 856, N661 912
Elevation	230m AOD
Turbine 1 @ 4079m	Distance to nearest turbine
Turbine 1 @ 4079m	Distance to nearest visible turbine
16.1°	Direction of centre of view**
Angle of view:	30°
Viewing distance:	43.7km @ 70m image width
Number of blades visible*	6
Number of sets of blade tips visible**	6

Peattie Law Wind Farm  
Environmental Statement

Figure 5.28b  
Viewpoint 7, Five Sisters

March 2012

27844-010 is not drawn



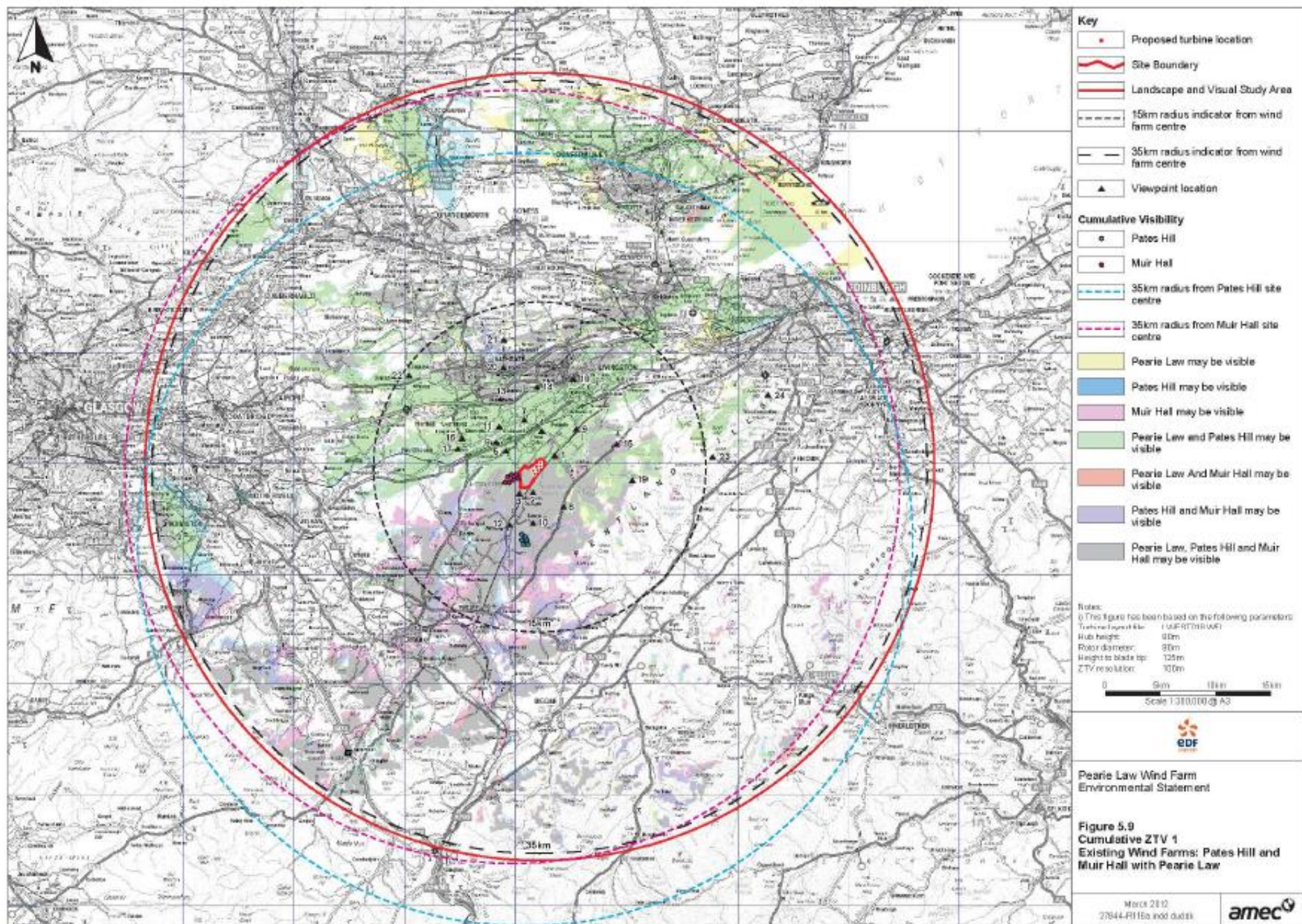
**Scottish Natural Heritage**  
**Dualchas Nàdair na h-Alba**  
**nature.scot**

- *Sequential* effects – e.g. along a road, footpath or railway
- *In combination* – two or more wind farms in the same view
- *In succession* – two or more wind farm visible from the same location, but not visible at the same time
- *Perceived* – wind farms not visible, but receptor knows of their presence



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

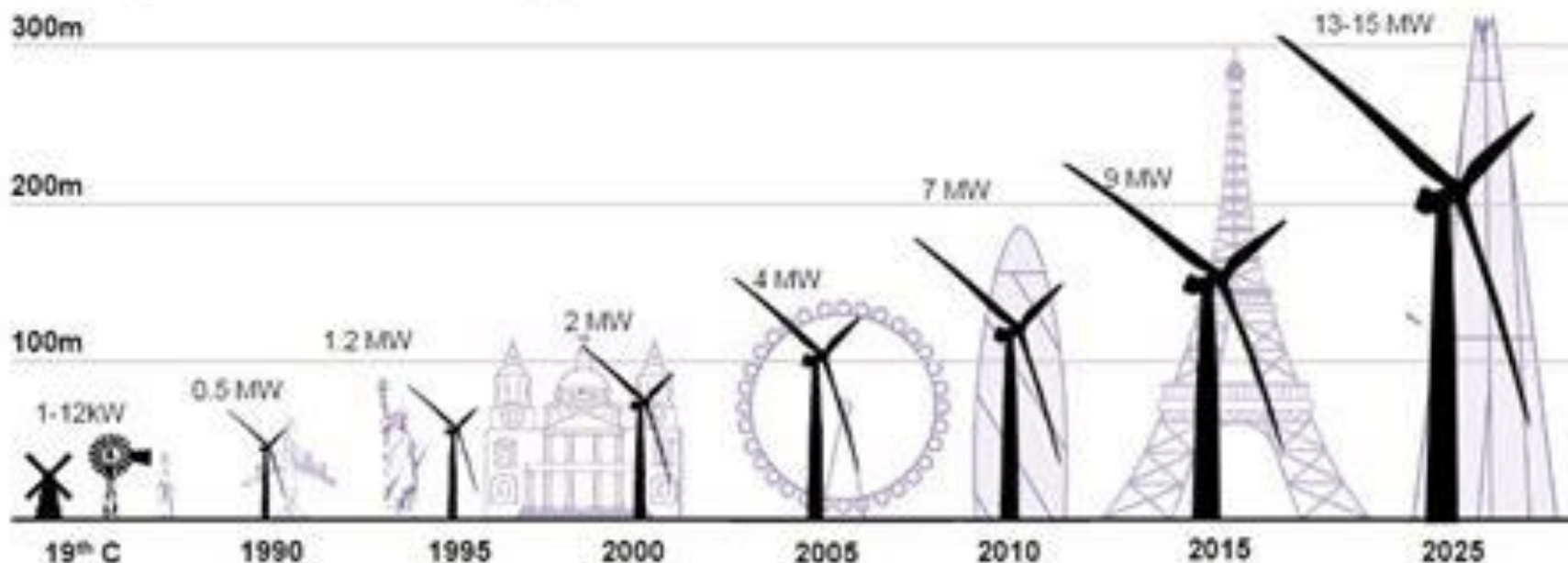
**nature.scot**



Larger turbines  
& repowering



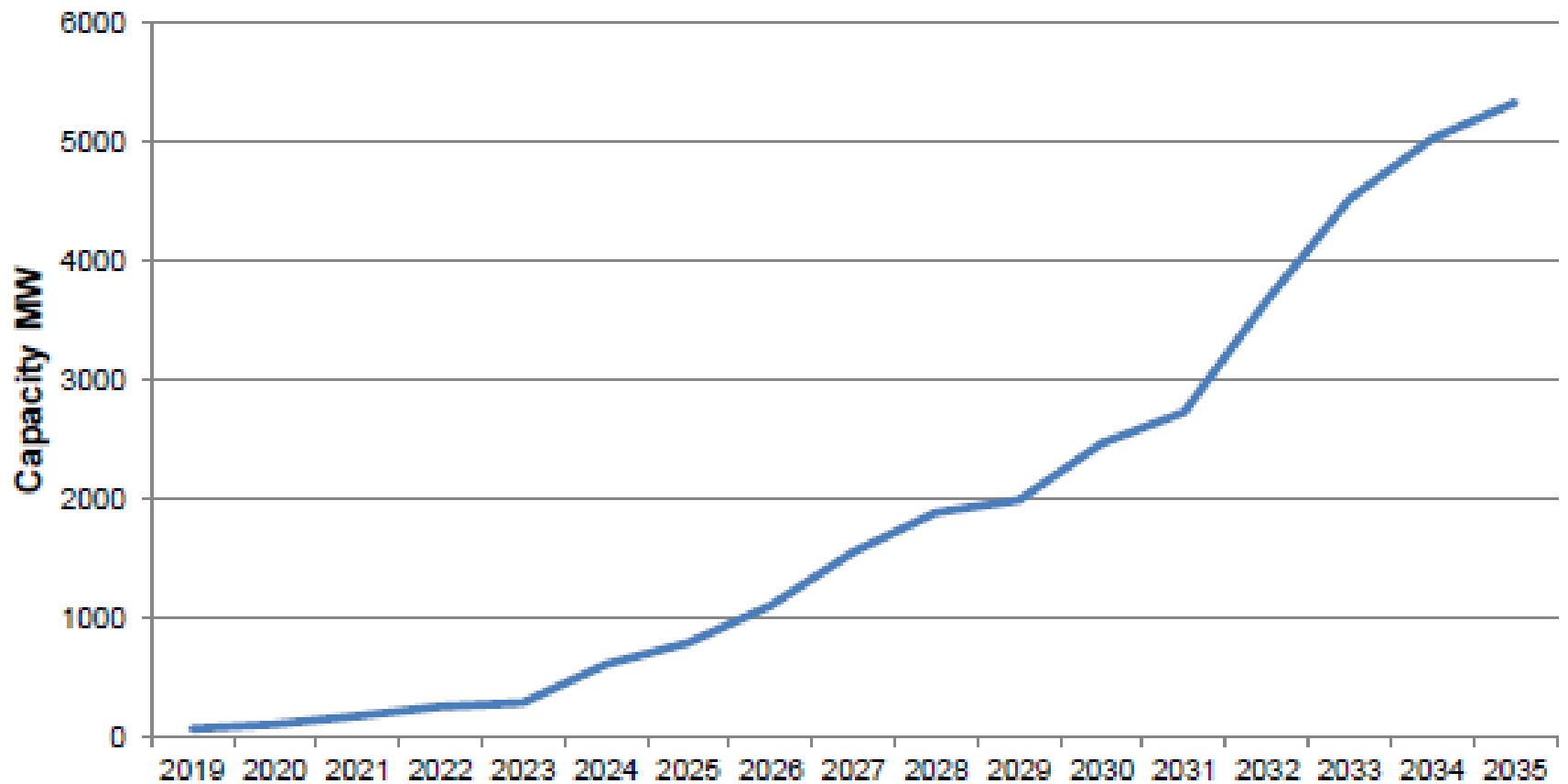
# Evolution of wind turbine heights and output



Sources: Various, Bloomberg New Energy Finance



Figure 1. Scottish onshore wind capacity reaching 20 year operation



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**



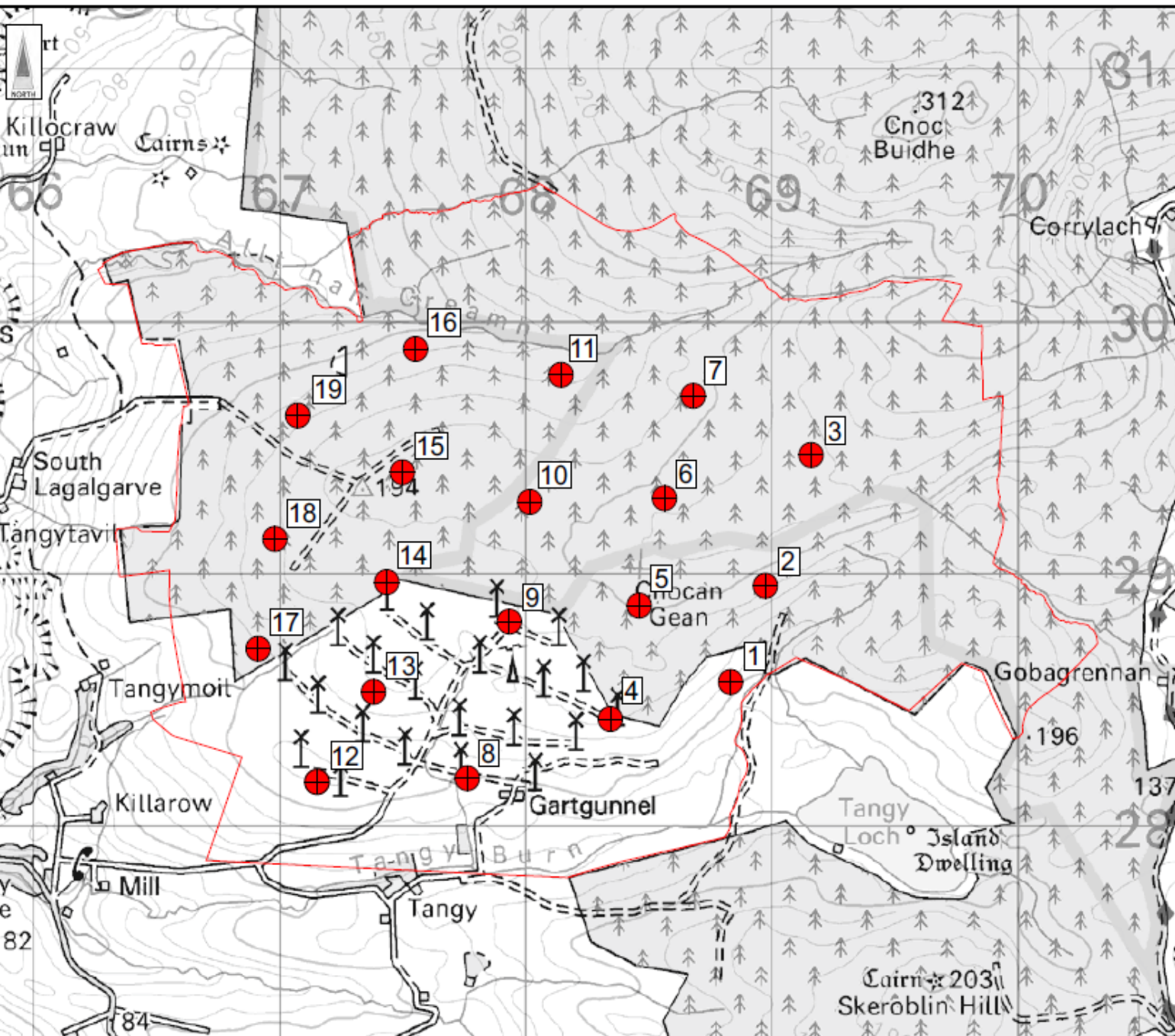


FIGURE B



Legend

- Site boundary
- Proposed Turbine
- Theoretical Turbine Visibility  
130m Tip - 101m Diameter - 79.5m Hub

Client			
Status	DRAFT		
Project	Tangy III Wind Farm		
Title	Post Sourcing Layout Plan 130m Tip 101m Diameter 79.5m Hub		
Job No.	E-40000		
Drawing No.	000000	Revision	
Date	15/06/2013	Drawn	06/2013
Drawn	TW	Checked	GP
Copyright reserved All rights reserved 21 Grafton Street, Glasgow, G1 1PS			
			ash

# Onshore wind policy statement 2017

## Larger turbines

- *“fully supports the delivery of large wind turbines in landscapes judged to be capable of accommodating them without significant adverse impacts.”*
- *“larger turbines may present challenges when identifying landscapes with the capacity to accommodate larger scale development, as not all will be suitable.”*
- fewer but larger turbines may improve landscapes



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Coal Clough (England)



**Before  
Repowering**



**After  
Repowering**



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Larger turbines when?

- New wind farm
- Adjacent to existing / Extensions
- Older wind farms - repowering applications trickling in
  - Schemes may be repowered well within lifetime of consent
- Consented wind farms – repowering application prior to build



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# How dealing with repowering?

- Repowering applications still require normal planning and EIA
  - what is baseline?
- Development clusters often cross local authority boundaries
- Build on existing pattern - strategic wind farm areas?



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Lighting



- Aviation requirement – international standards
- Structures >150m must be lit
  - lights on some turbines < 150m
- Wind turbines can be lit on nacelle
- Steady red, 2000 candela intensity light
- On before dusk and after dawn



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Impacts on birds?

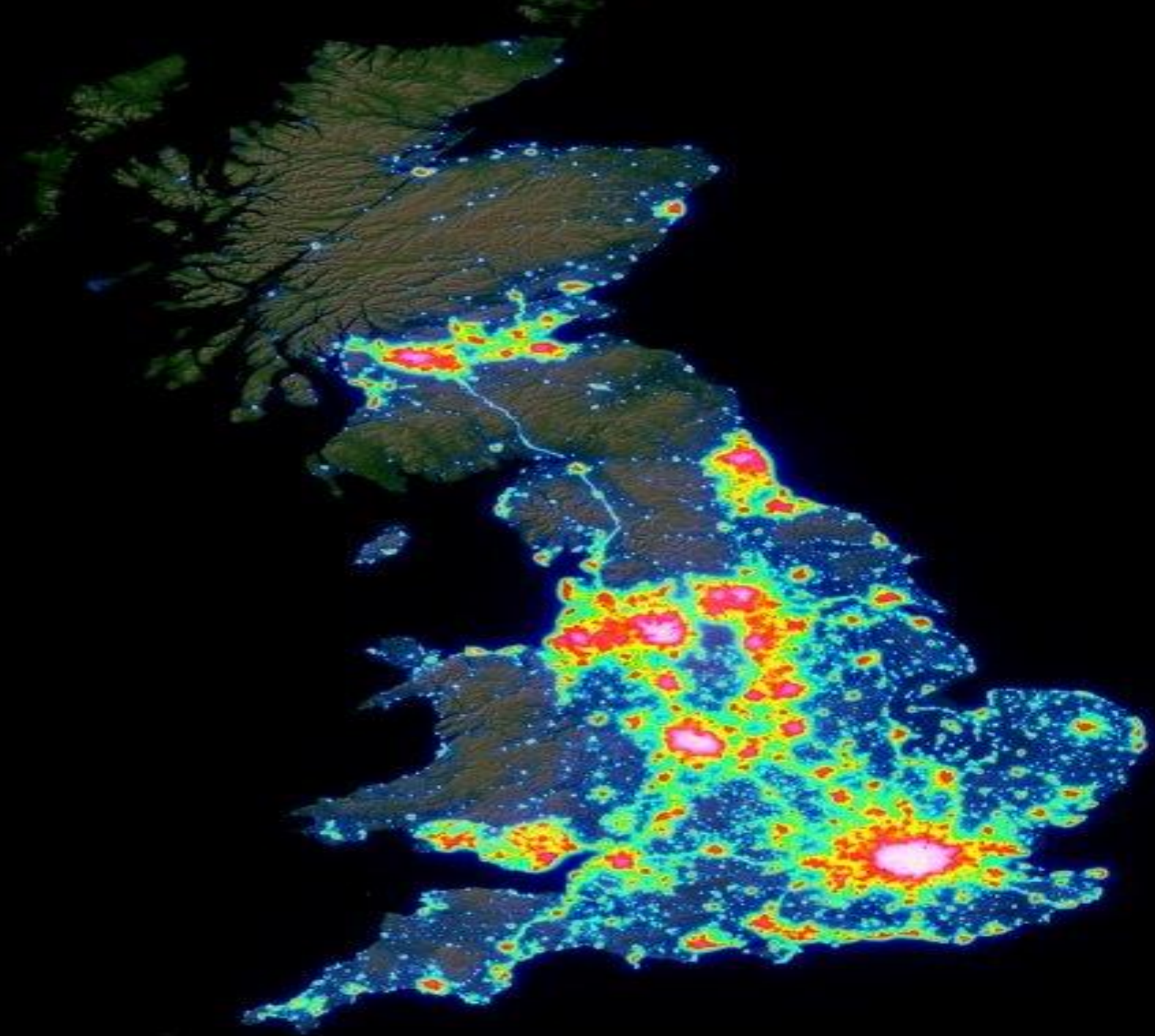
- **Limited evidence**
- **Particular risk to migratory species**
- **White lights better than red**
- **Reduced number of lights reduces fatalities**
- **Need more research**

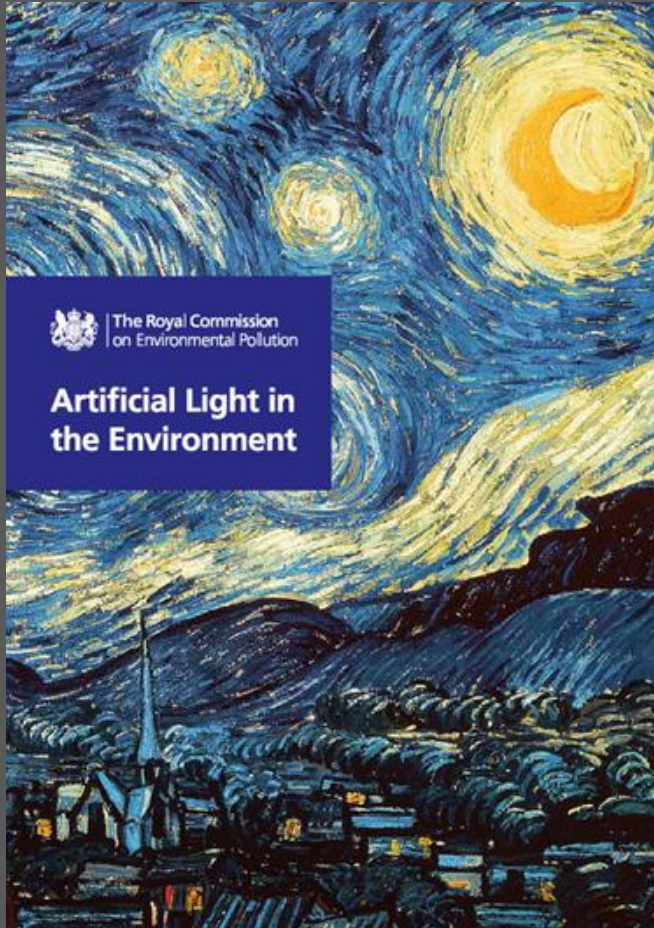


Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**







“We believe that access to the natural beauty of the night sky is every bit as important as the preservation of other aspects of natural beauty which society routinely seeks to protect for the enjoyment of its citizens and for posterity.”



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

**nature.scot**

# Cairngorms becomes world's most northerly dark sky park to attract wave of winter tourists



by [David Mackay](#)

🕒 November 30, 2018, 6:06 am



© Myrddin Irwin

Northern lights are visible on clear nights in the Cairngorms.

- Shielding - limited in effect
- Reduced intensity - offers limited benefit
- Radar activated lighting

# Mitigation?

12' Compact Antenna

SCANTER 5202 Radar  
in 10' ISO Shelter

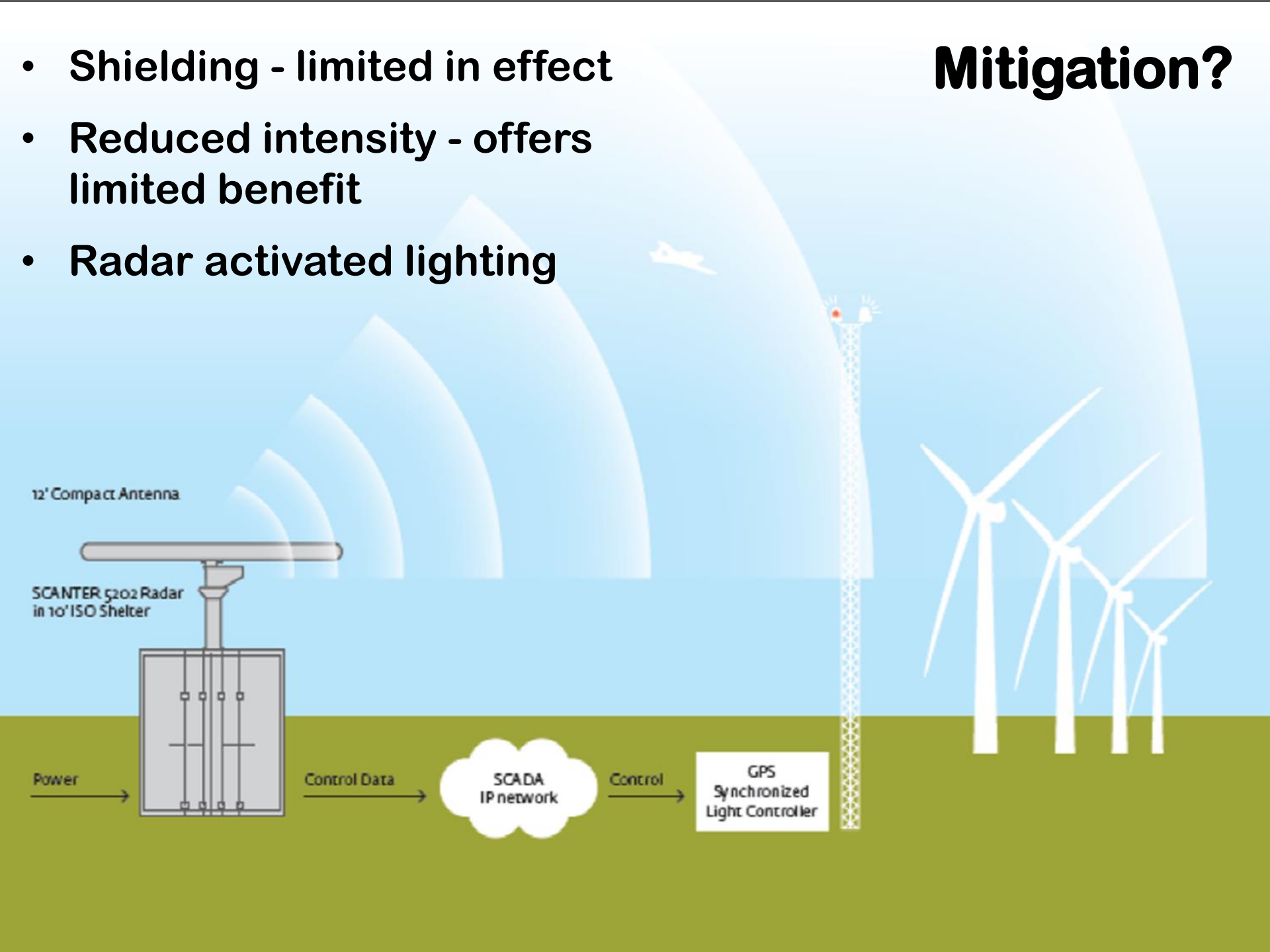
Power

Control Data


SCADA  
IP network

Control

GPS  
Synchronized  
Light Controller



# Some key lessons

- 
- Plan led approach - location, location, location
  - Guidance – provide certainty, clarity & consistency
  - Early engagement – takes time
  - Robust & established assessment processes
  - Good design makes a difference
  - Key risks are during construction
  - Good progress towards targets, choice in system

# Questions?



**Scottish Natural Heritage**  
**Dualchas Nàdair na h-Alba**

**nature.scot**

[www.nature.scot/professional-advice/planning-and-development/](http://www.nature.scot/professional-advice/planning-and-development/)