

RPS

Birds & Wildlife Considerations

Tim Norman

RPS

Ecology

Overview

- Statutory framework
- Ecological Impact Assessment
- Potential effects on ecology
- Options for mitigation

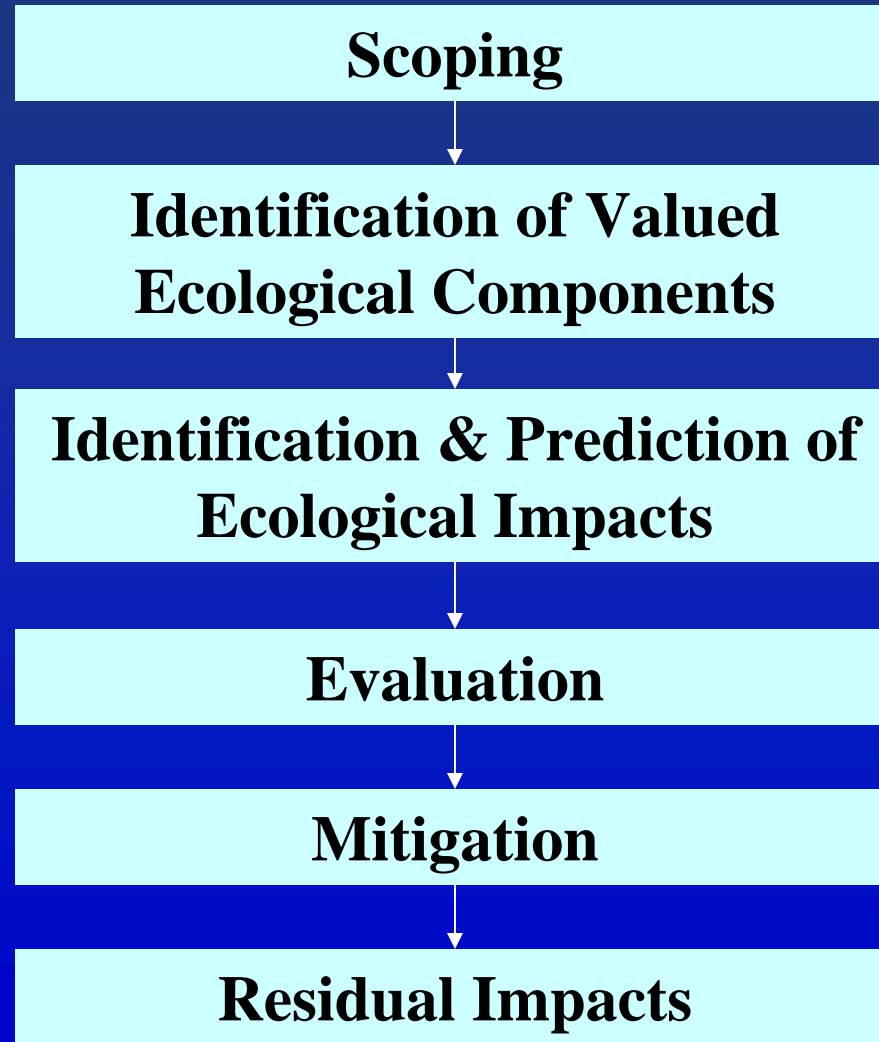
Relevant UK Legislation and Guidance

- The Wildlife & Countryside Act 1981 (as amended)
- The Environmental Protection Act 1990
- The Planning and Compensation Act 1991
- The Conservation (Natural Habitats &c.) Regulations 1994 (the “Habitats Regulations”)
- Planning Policy Guidance (particularly PPG9)

International Obligations

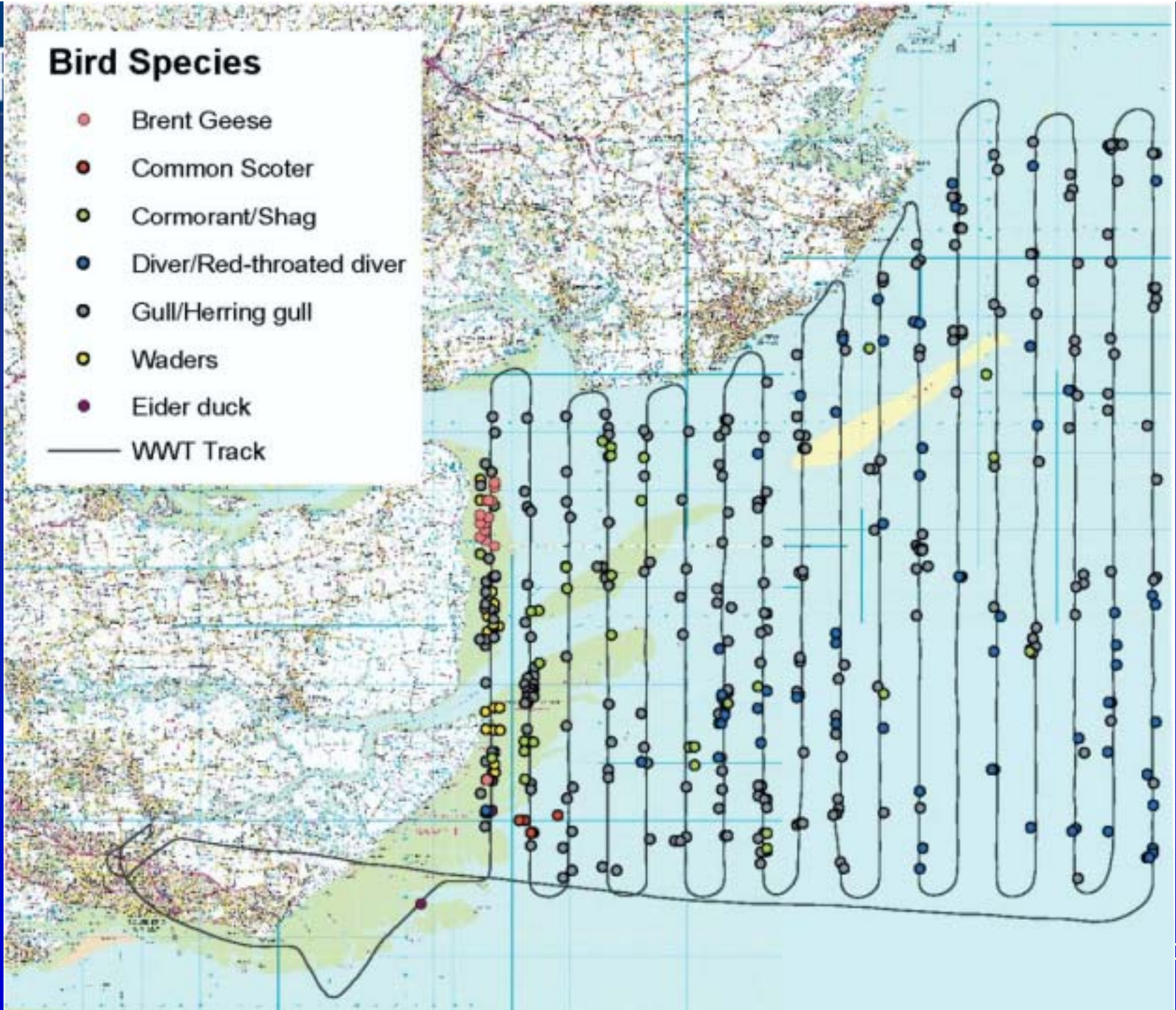
- The **Bern Convention** on the Conservation of European Wildlife and Natural Habitats
- The **Ramsar Convention** on Wetlands of International Importance
- EC Council Directive on the Conservation of Wild Birds (“**Birds Directive**”)
- EC Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (“**Habitats Directive**”)
- The **Bonn Convention** on the Conservation of Migratory Species of Wild Animals
- EC Council Directive on the Assessment of the Effects of certain Public and Private Projects on the Environment

Ecological Impact Assessment



Bird Species

- Brent Geese
- Common Scoter
- Cormorant/Shag
- Diver/Red-throated diver
- Gull/Herring gull
- Waders
- Eider duck
- WWT Track



Legend

- SSSI Sites
- Proposed boundary

Raw satellite data supplied by USGS/Infoterra Ltd copyright Ordnance Survey



Legend

- SAC Sites
- Proposed boundary

Raw satellite data supplied by USGS/Infoterra Ltd copyright Ordnance Survey



Examples of Valued Ecological Components

- Protected areas
- Important habitats eg wetlands
- Marine mammals
- Benthic invertebrate communities
- Fish – elasmobranchs
- Birds

Ornithological VECs

- Breeding birds
 - Black Grouse, Little Tern
- Raptors
 - Golden Eagle, Red Kite, Hen Harrier
- Wintering birds
 - Common Scoter, Red-throated Diver
- Migratory species
 - Geese, Swans, Waders

Potential Impacts

Construction (and Decommissioning)

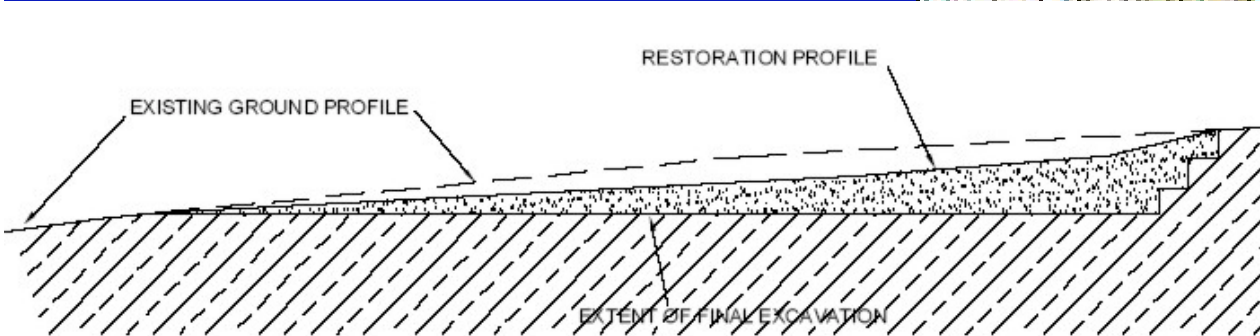
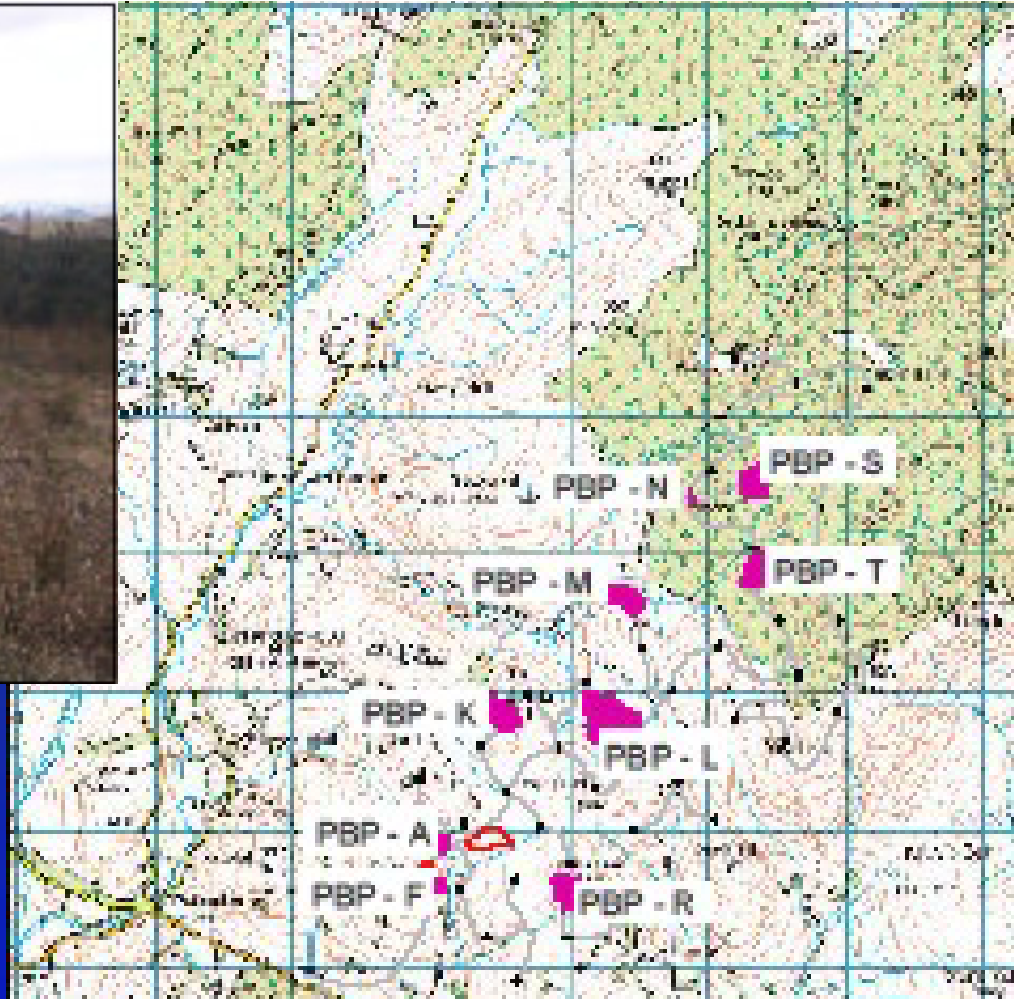
- Windfarm construction area + access and cable routes
- Direct habitat loss
 - Protected plants and animals
 - Benthic communities
- Disturbance
 - Construction activities
 - Access routes

Potential Impacts Operation

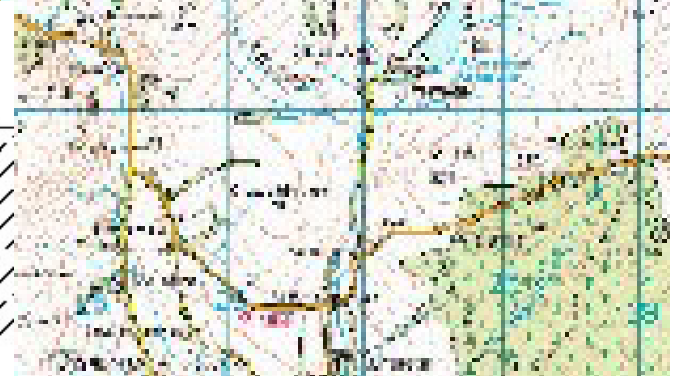
- Direct habitat loss or modification
- Disturbance
 - Noise
 - Traffic
- Collision risk
- Displacement
 - Reduced access to foraging areas
 - Obstruction of flightlines

Habitat loss

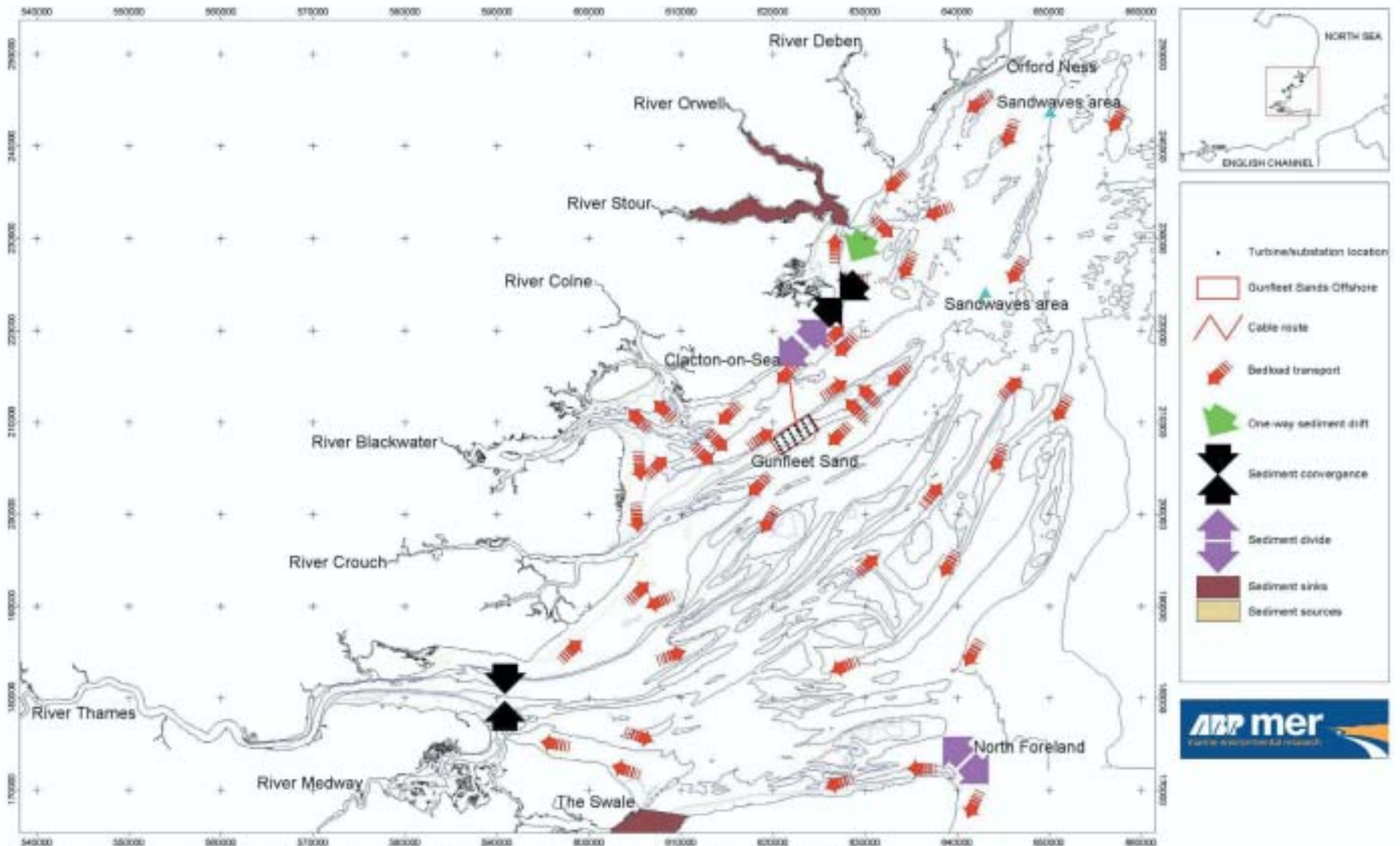
- Consider turbine foundations, construction areas, access routes and cabling
- Onshore:
 - Sensitive habitats – uplands, wetlands, coasts
 - Topography
- Offshore:
 - small footprint $<0.05\%$
 - coastal processes



BORROW PIT SECTION
SCALE - 1:1,000



RPS



Based on Admiralty Chart No. 1183 by permission of Her Majesty's Stationery Office and UK Hydrographic Office, Part of London Authority and Harwich Haven Authority. UKHO License No. HD 7202548805
 NOT TO BE USED FOR NAVIGATION

Collision Mortality

- Most sites in range 0-3 birds / turbine / year
- Birds tend to avoid windfarms
- Exceptions – migratory routes
- Uncertainty about bird behaviour during poor weather conditions

Risk of collision

Structure	Estimated annual mortality in US*
Vehicles	60 million – 80 million
Buildings & windows	98 million – 980 million
Powerlines	10,000's – 174 million
Communication towers	4 million – 50 million
Wind generation facilities	10,000 – 40,000

* National Wind Coordinating Committee (2001)

RPS

Total probability of collision with rotor

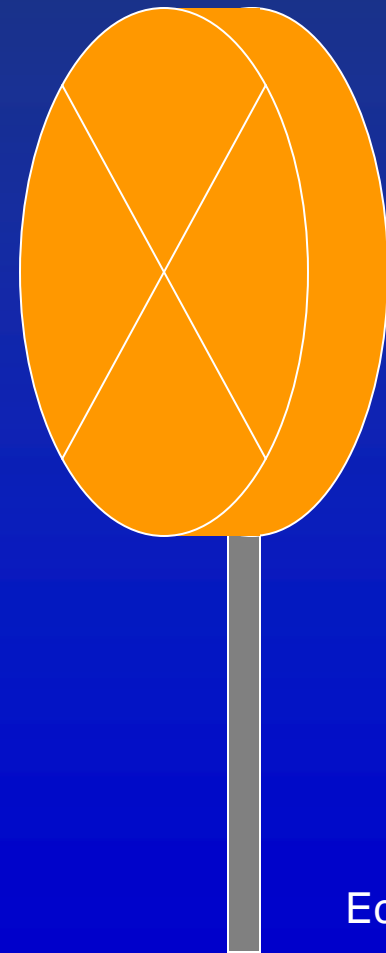
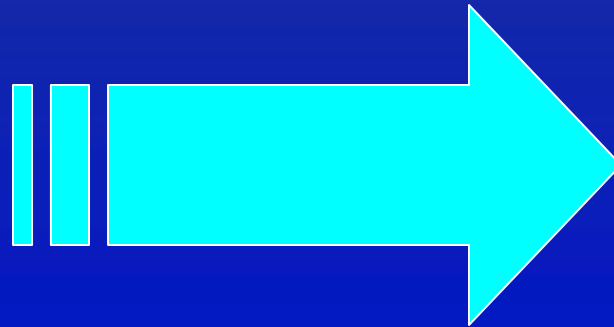
$$= (1/\pi R^2) \iint p(r, \varphi) r dr d\varphi$$

$$= 2 \int p(r) (r/R) d(r/R)$$

where $p(r)$ now allows for the integration over φ .

Probability p of collision for a bird at a radius r from hub

$$p(r) = (b\Omega/2\pi v) \left[K \left| \pm c \sin\gamma + \alpha c \cos\gamma \right| + \frac{1}{w\alpha F} \begin{matrix} \text{for } \alpha < \beta \\ \text{for } \alpha > \beta \end{matrix} \right]$$

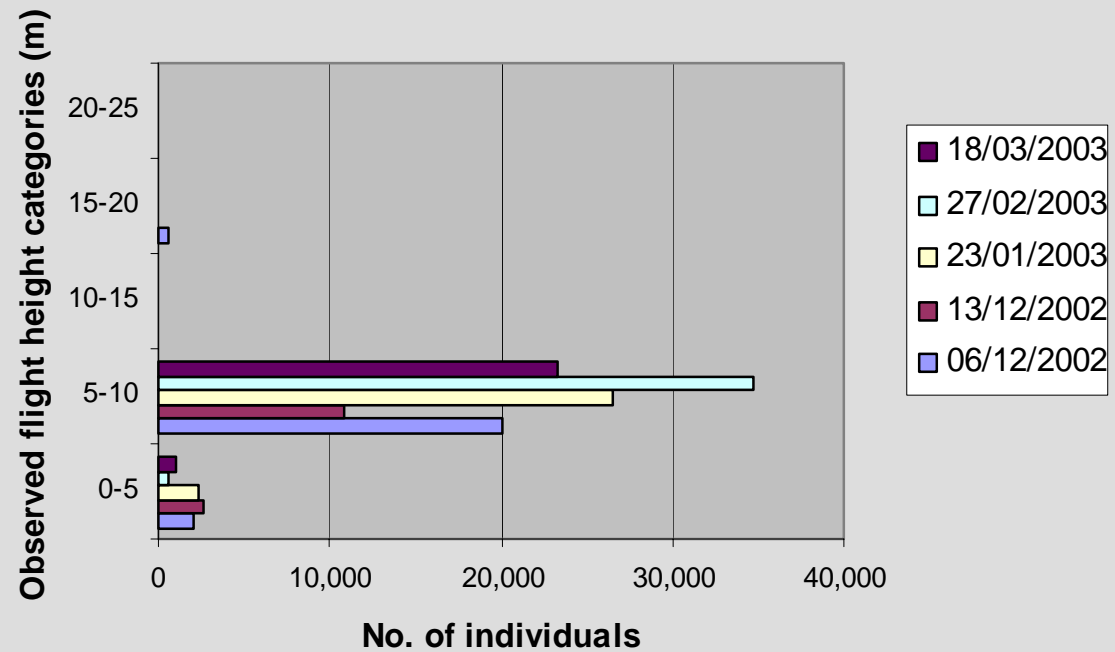


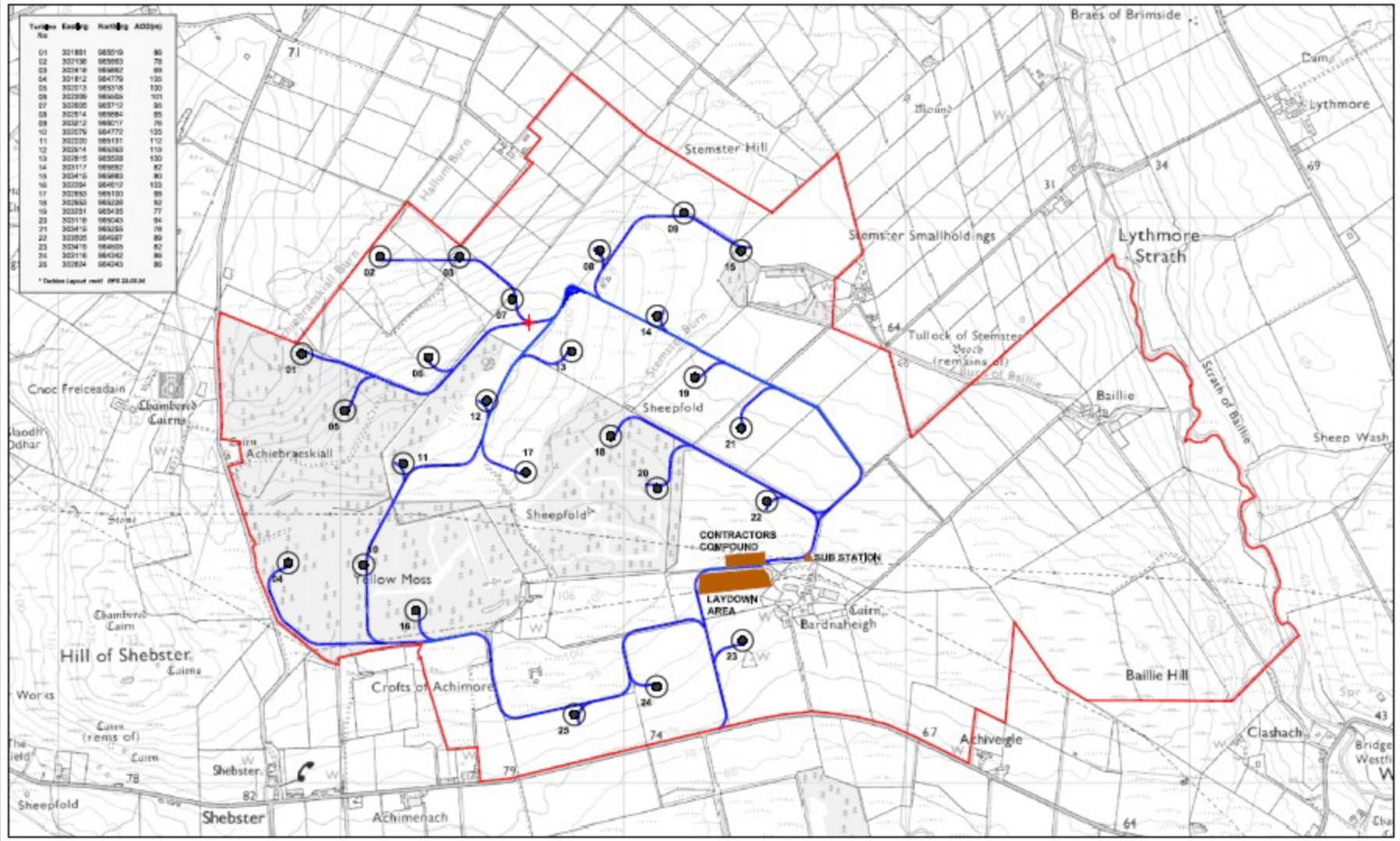
Ecology

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA

K: [1D or [3D] (0 or 1)		1		Calculation of alpha and p(collision) as a function of radius							
NoBlades		3		Upwind:			Downwind:				
MaxChord		2.431 m		r/R	c/C	α	collide	contribution	collide	contribution	
Pitch (degrees)		30		radius	chord	alpha	length	p(collision) from radius r	length	p(collision) from radius r	
BirdLength	0.82 m	0.025	0.575	9.45	24.90	1.00	0.00125	23.50	1.00	0.00125	
Wingspan	2.12 m	0.075	0.575	3.15	8.77	0.68	0.00511	7.37	0.57	0.00429	
F: Flapping (0) / gliding (+1)	1	0.125	0.702	1.89	6.20	0.48	0.00602	4.49	0.35	0.00436	
		0.175	0.860	1.35	5.31	0.41	0.00723	3.22	0.25	0.00438	
Bird speed	13 m/sec	0.225	0.994	1.05	4.83	0.37	0.00844	2.41	0.19	0.00421	
RotorDiam	52 m	0.275	0.947	0.86	4.02	0.31	0.00860	1.72	0.13	0.00368	
RotationPeriod	2.97 sec	0.325	0.899	0.73	3.45	0.27	0.00871	1.27	0.10	0.00319	
		0.375	0.851	0.63	3.01	0.23	0.00878	0.95	0.07	0.00275	
		0.425	0.804	0.56	2.67	0.21	0.00881	0.79	0.06	0.00260	
		0.475	0.756	0.50	2.38	0.19	0.00879	0.80	0.06	0.00295	
Bird aspect ratio: β	0.39	0.525	0.708	0.45	2.14	0.17	0.00873	0.80	0.06	0.00325	
		0.575	0.660	0.41	1.93	0.15	0.00862	0.79	0.06	0.00351	
		0.625	0.613	0.38	2.05	0.16	0.00997	1.08	0.08	0.00523	
		0.675	0.565	0.35	1.92	0.15	0.01009	1.09	0.08	0.00572	
		0.725	0.517	0.33	1.80	0.14	0.01016	1.09	0.08	0.00616	
		0.775	0.470	0.30	1.69	0.13	0.01019	1.09	0.08	0.00656	
		0.825	0.422	0.29	1.59	0.12	0.01018	1.08	0.08	0.00691	
		0.875	0.374	0.27	1.49	0.12	0.01011	1.06	0.08	0.00722	
		0.925	0.327	0.26	1.39	0.11	0.01001	1.04	0.08	0.00748	
		0.975	0.279	0.24	1.30	0.10	0.00986	1.02	0.08	0.00770	
Overall p(collision) =				Upwind			17.0%		Downwind		9.3%

Flight Height





Baillie Wind Farm Ltd

RPS Planning, Transport and Environment

Key

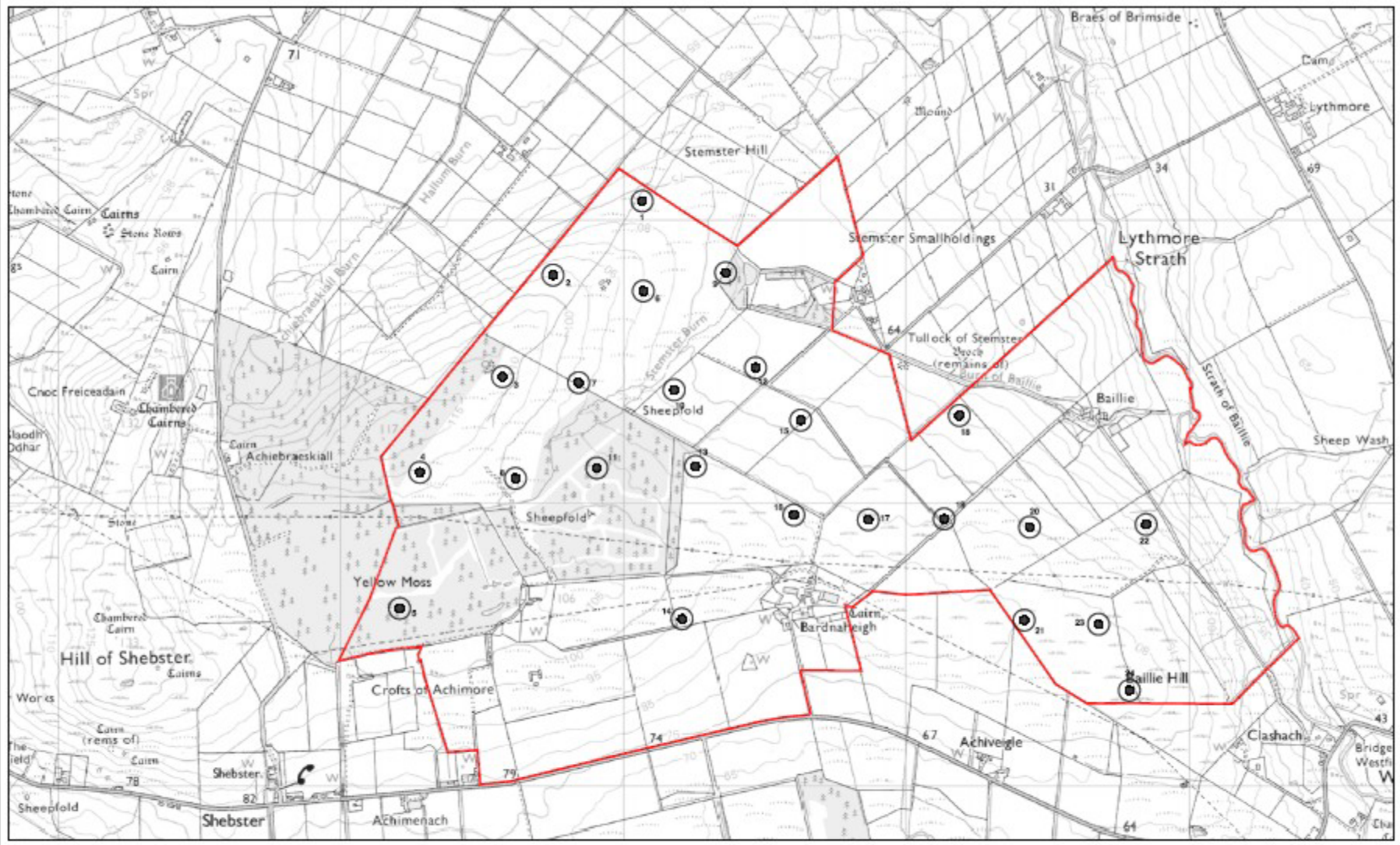
- Planning Application Boundary
- Turbine Locations
- Access track
- Sub Station, Laydown Area & Contractors Compound
- Meteorological Mast (proposed)

draft status: 02.07.04
 (Turbine Layout rev H RPS 23.06.04)

Scale: 1:12,500 @ A3

Application Boundary & Proposed Site Layout
 Figure No. 1.2

Baillie Wind Farm Environmental Statement



Baillie Wind Farm Ltd



Key

- Site Boundary (as per Scoping)
- 1 Turbine Locations at Scoping

Based upon RPS Scoping Drawings 03/04/2012 rev A for the locations as at 17.06.05



Turbine Layout at Scoping
Figure No. 3.1

Baillie Wind Farm
Environmental Statement

Displacement

- If birds avoid windfarms then they may be displaced from foraging or breeding areas
- Extension of migratory routes
- Species exhibit differential responses – some are more sensitive than others
- Seasonal variations in abundance, distribution and sensitivity of birds

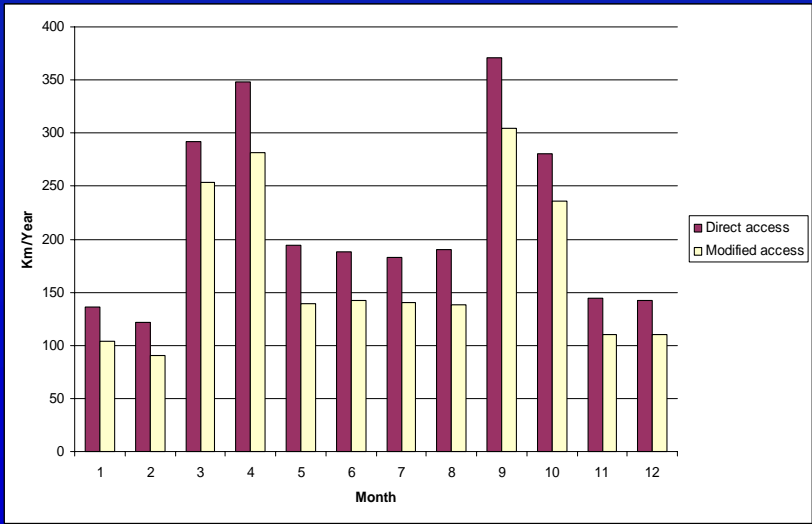
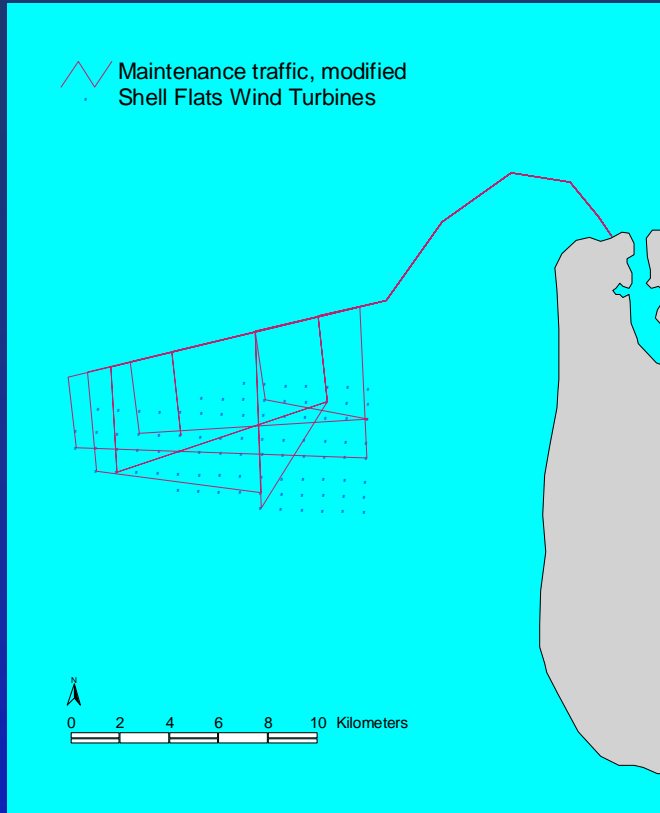
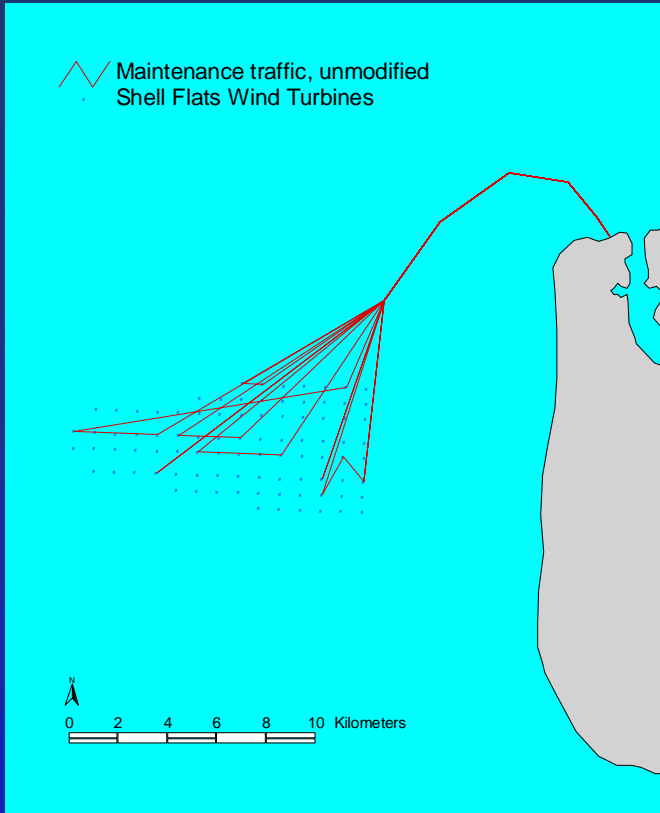
Disturbance

- Potential sources of disturbance
 - Mechanical noise
 - Visual?
 - Construction and maintenance vehicles
 - Trucks, Boats, Helicopters
- Construction (decommissioning)
 - Timing of works, staged construction
- Operation
 - Avoidance of sensitive areas

Relative sensitivity to disturbance



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wintering period	■		■							■	■	■
Moulting period							■	■	■	■		
Relative sensitivity	4	4	4	3	1	1	3	5	5	4	4	4



Conclusions

- Impacts can be avoided through:
 - Location of site
 - Siting of turbines and infrastructure
 - Density of turbines
- Impacts can be minimised by managing:
 - Careful planning of construction activities – timing, work programme
 - Maintenance plans that take account of sensitive species
 - Incorporation of specific design features – eg lighting



www.rpsplc.co.uk