Birds and wind farms: what are the real impacts?

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Perceptions of wind turbines: bird-mincers?

Or co-existence with birds?

Where have problems occurred?

- **Altamont Pass, California**

- **Over 7,000 turbines**
- **Old technology (small rotors, close to ground, very high rotation speed, some lattice towers)**
- **Very important raptor foraging and migration areas**

Altamont Pass, California

- **Key collision victims:**
  - **Golden eagles**
  - **Burrowing owls**
  - **Other raptors**
- **Overall collision rate (0.1-0.2 birds/ turbine/ yr) per turbine low (US average 2.2) BUT high in terms of background mortality (long-lived species)**

Vultures in Spain

Spanish problem sites – Tarifa and Navarre

- **Tarifa – southern tip of Spain**
  - **major migration route and high densities of resident vultures**
  - **Over 700 turbines, many old**
  - **Key collision victims: griffon vultures, migrant raptors and storks (0.3/t/yr)**
- **Navarre – northern Spain**
  - **studied in less detail**
  - **400 turbines**
  - **High densities of resident vultures**
  - **Key collision victims: griffon vultures (min. 0.3/t/yr)**

Main impact at both on long-lived species (large increase to existing mortality)

Other sites with non-negligible bird-turbine collision rates

- Blyth – mainly gulls, small numbers of eider (feeding frenzies and poor weather)
- Zeebrugge – mainly gulls, small numbers of terns
- Netherlands – land-bird migrants (low levels at several US sites too)
- Smøla, Norway – sea eagles (breeding colony).


PORT OF BLYTH
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Other perceived species at risk of collision with turbines: an example

- **GEESE**
  - **E.g. Gill *et al*. (1996), Langston and Pullan (2003)**
  - **Evidence: <20 goose collisions reported worldwide to date**
  - **An alternative viewpoint – Environment Canada (Kingsley and Whittam 2004) – "geese and swans very rarely victims of collisions with wind turbines"**
  - **RSPB now acknowledge low number of collisions – Bright et al. 2009**

Conclusions on Collision Risk

- Birds do collide with wind turbines
- Collision rates generally very low (typically 1 in 10,000 bird movements through wind farm)
- Important to put mortality into population context
- Impacts to date of ecological importance only when:
  - mortality has involved species with low background mortality rate
  - and where use of wind farm site high (e.g. important foraging/migration area)
  - and where species susceptible to collision (primarily birds of prey)

Collision Context
(US data after Erickson *et al*. 2001)

- **Wind farms – 10-40,000**
- **Buildings and windows – 100 million-1 billion**
- **Power lines – 130 million**
- **Vehicles - 60-80 million**
- **Communication towers – 4-50 million**
- **Pesticides – 70 million**
- **Cats – 100 million**
- **Oil spills – 300,000 (Exxon Valdez)**
- **Climate change - ??**

  - **Relatively low wind farm mortality but still important to consider proper location.**
  - **And conservation status of species at risk**

Disturbance

- Displacement from around wind turbines
- Temporary (e.g. during construction) or throughout lifetime of wind farm
- Effective habitat loss
- Importance of availability of that habitat – ecological consequences


Danish pink-footed
goose studies:
100-200m displacement
10 yrs later 40-100m


Barnacle geese
350-600m disturbance in Germany
25m in Sweden

Additional potential disturbance effects

- Construction activities
- Possible barrier effects – long lines of turbines may block flight routes – ecological consequences?

Local ecological benefits

General Conclusions

- Need for good baseline data
- Importance of understanding bird-wind farm interactions
- Avoidance of areas of bird vulnerability
  - High densities of soaring birds of prey (vultures, sea eagles) – collision risk
  - Areas of vulnerability to disturbance
- Opportunities to deliver local nature conservation gain

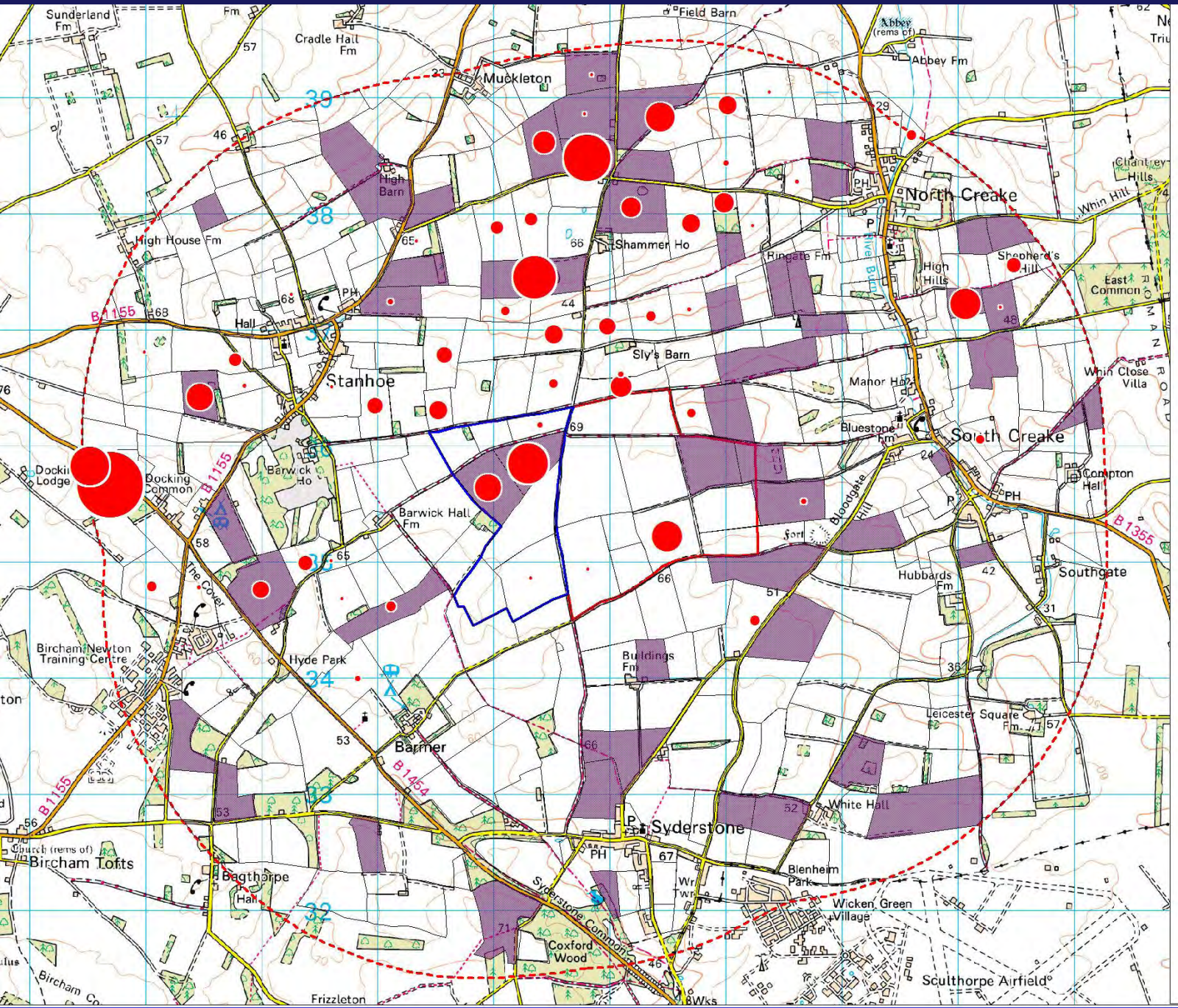
Jack's Lane

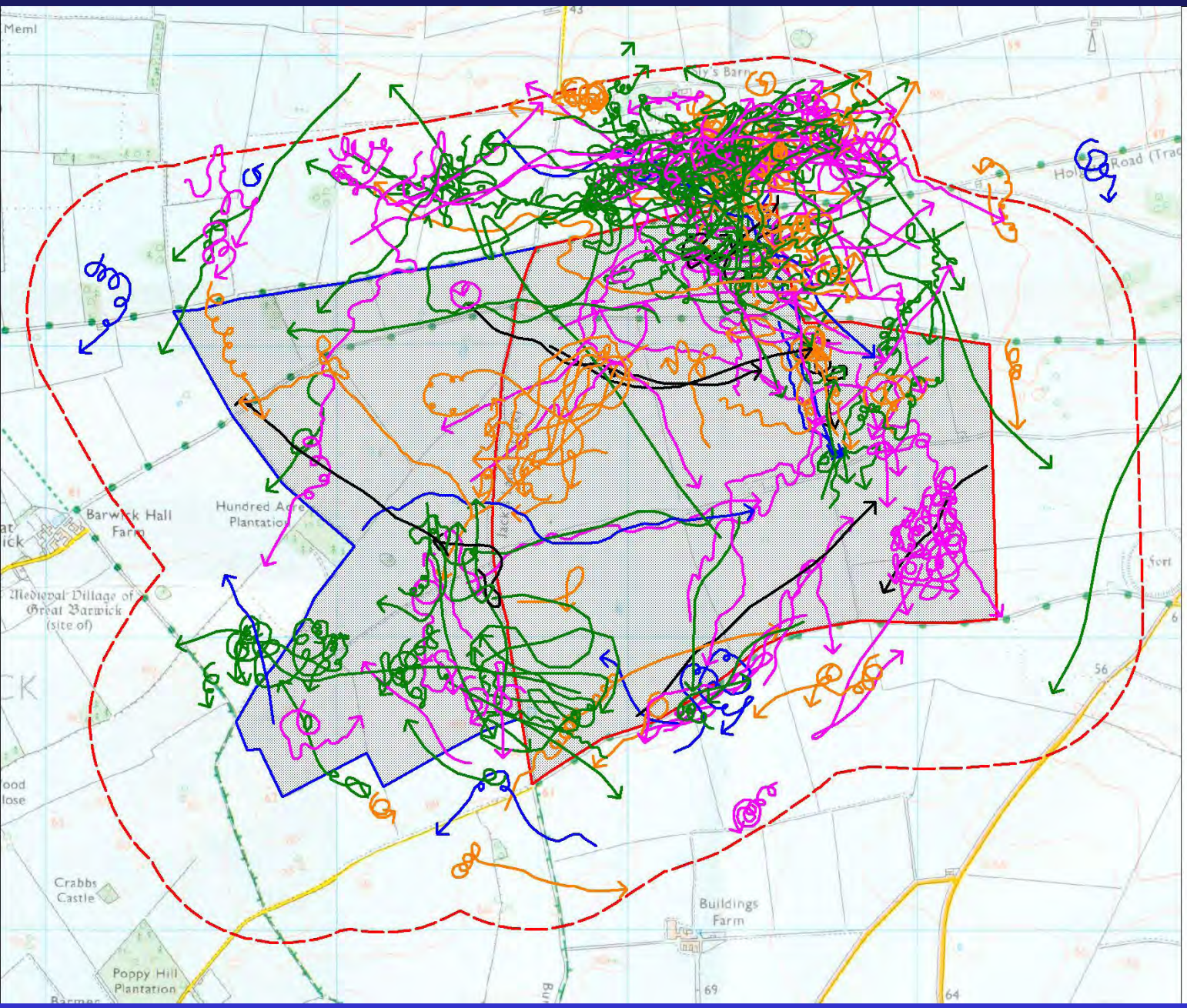
- **Baseline Data:**
  - **Surveys since 2003**
  - **Breeding birds, wintering birds, over-flying rates, species-specific work (marsh harrier, stone curlew), night surveys**
  - **Site plus wider area (up to 3km)**
  - **Comprehensive baseline**

Key Bird Issues

- **Pink-footed Geese**
  - **Up to 12,000 in wider study area, average 200 in potential disturbance zone.**
- **Marsh Harrier**
  - **Up to 5 breeding pairs.**

- **Collision risk**
- **Disturbance**


KEY: Pink-footed Goose
Field Peak Counts
8,700
4,350
870
Sugar beet fields
Other fields
Possible wind farm site
Bluestone Farm
Barwick
Wintering bird study area
Muckleton
North Creake
Stanhoe
South Creake
Barmer
Syderstone
Bircham Tofts
Docking
Sunderland Fm
Cradle Hall Fm
Field Barn
Abbey Fm
High House Fm
Shammer Ho
Ringate Fm
Sly's Barn
Manor Ho
Bluestone Fm
Barwick Ho
Barwick Hall Fm
Hyde Park
Buildings Fm
Hubbards Fm
Southgate
Compton Hall
Leicester Square Fm
White Hall
Blenheim Park
Wicken Green Village
Coxford Wood
Sculthorpe Airfield
Bagthorpe Hall
Frizzleton
Docking Common
Bircham Newton Training Centre
B1155
B1454
B1355



KEY: Marsh harrier flight lines 2007

- Apr
- May
- Jun
- Jul
- Aug

Possible wind farm site

- Barwick
- Bluestone

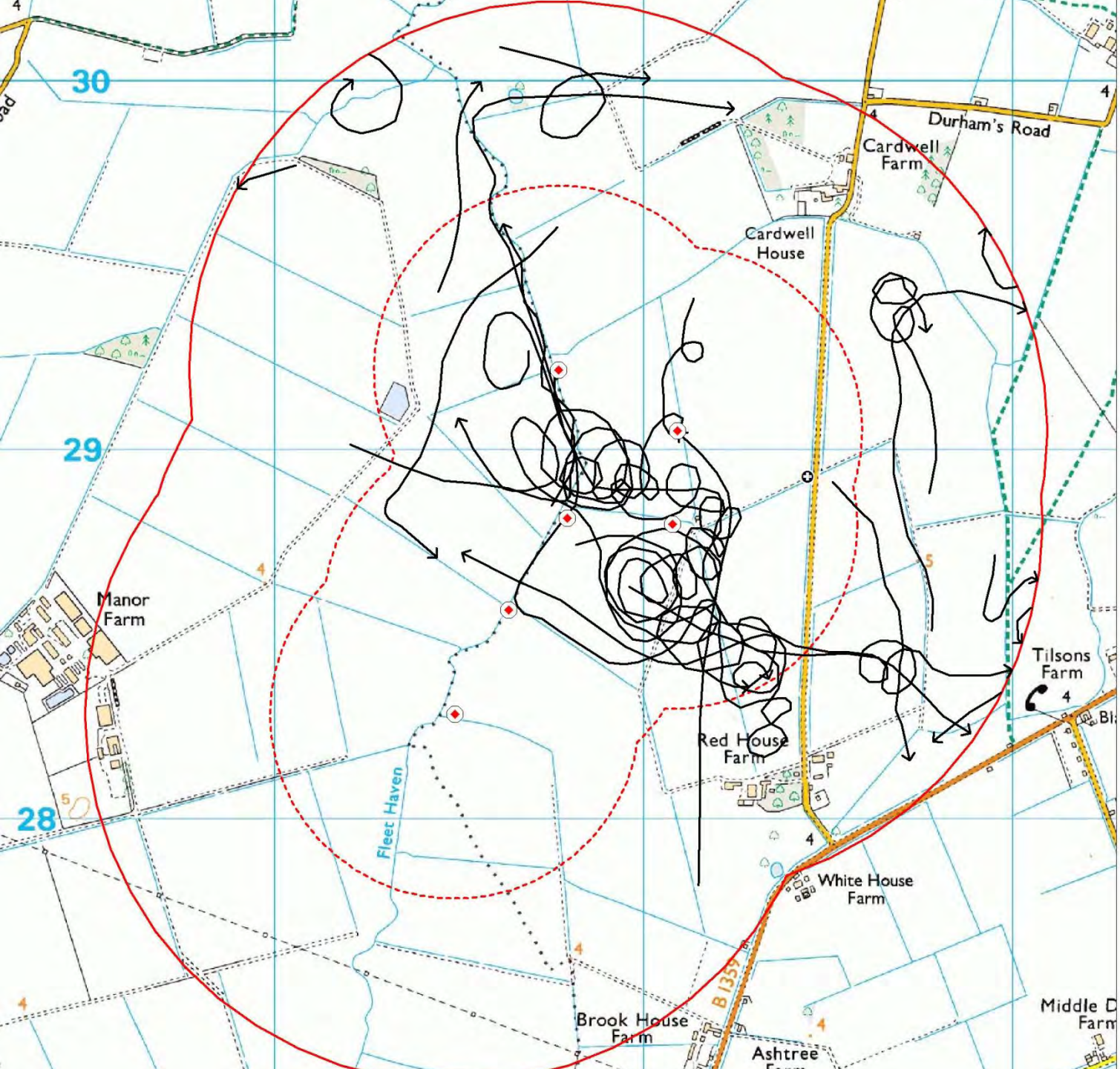
Breeding bird study area 2007

Collision Risk

- **Pink-footed Goose:**
  - **74 collisions per year – precautionary approach (0.5% increase).**
  - **5 collisions per year – empirical data from existing wind farms.**
  - **Wildfowl & Wetlands Trust – 1,000 additional annual mortality for significant impact**

Collision Risk

- **Marsh Harrier:**
  - **0.16 collisions per year – precautionary approach (0.7% increase).**
  - **<0.01 collisions per year – empirical data from existing wind farms.**

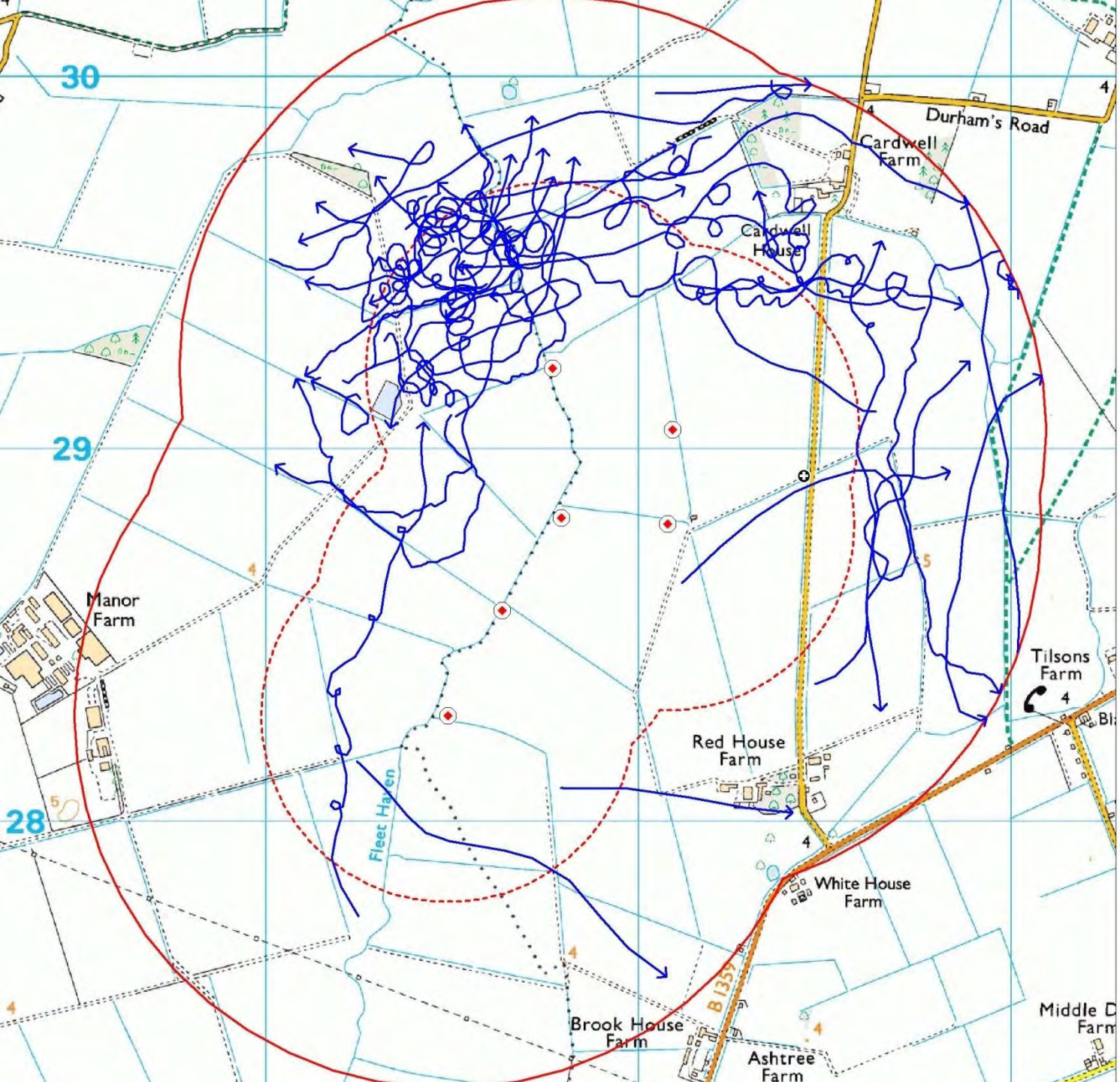


KEY:

- Marsh harrier flight line
- Wind turbine
- Vantage point
- Turbine 1km buffer
- Turbine 500m buffer

N

0 0.25 0.5
kilometres



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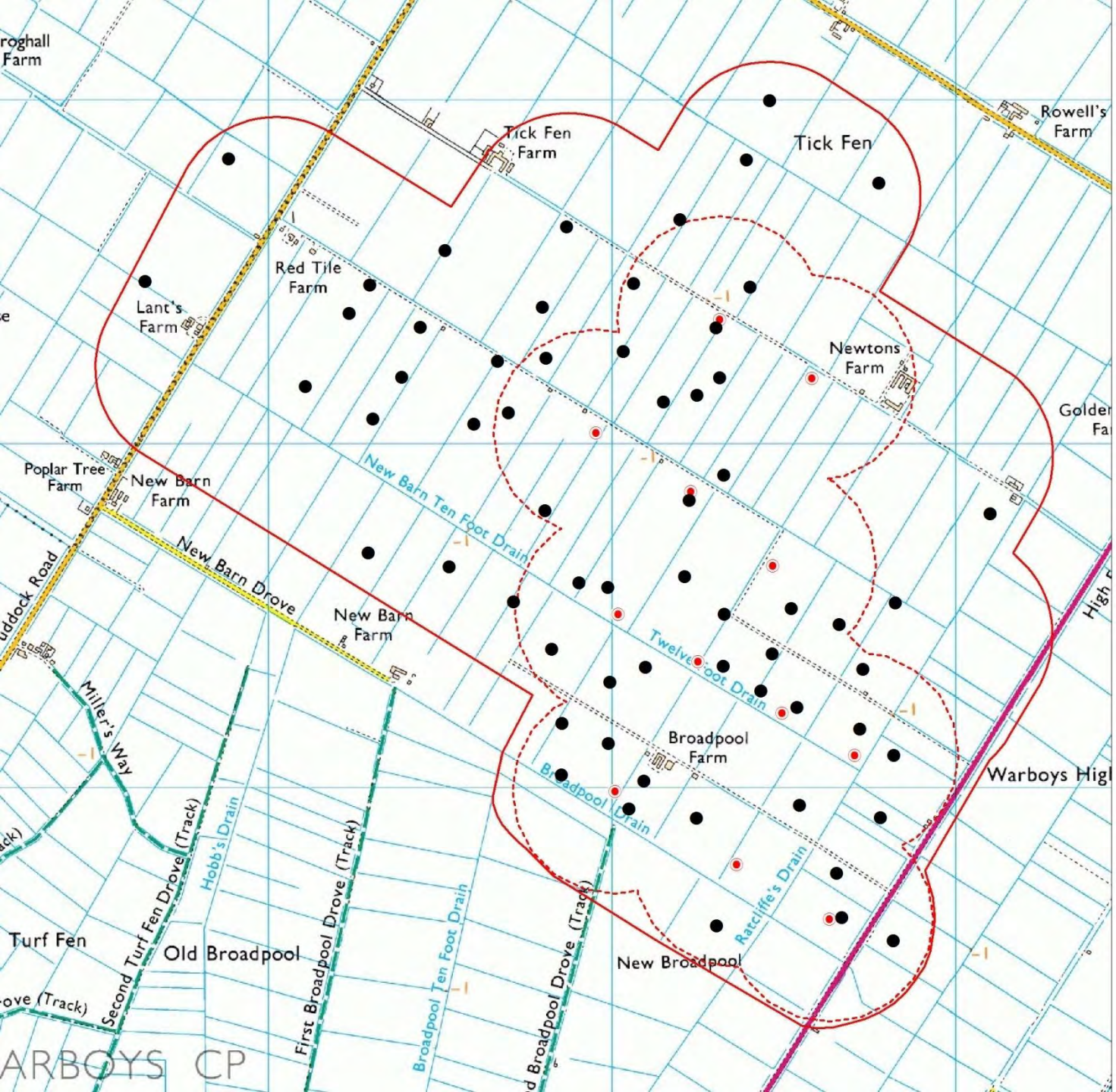
Disturbance

- Three key factors for impact assessment:
  - Numbers in potential disturbance zone
  - Importance of resources in that zone
  - Availability of alternative resources
- Likely to be small-scale displacement
- Habitat not limiting – alternatives nearby and would be increased through environmental enhancement



KEY:

- Breeding bird location (Number = multiple pairs at single location)
- Wind turbine
- Breeding bird study area
- Turbine 300m buffer

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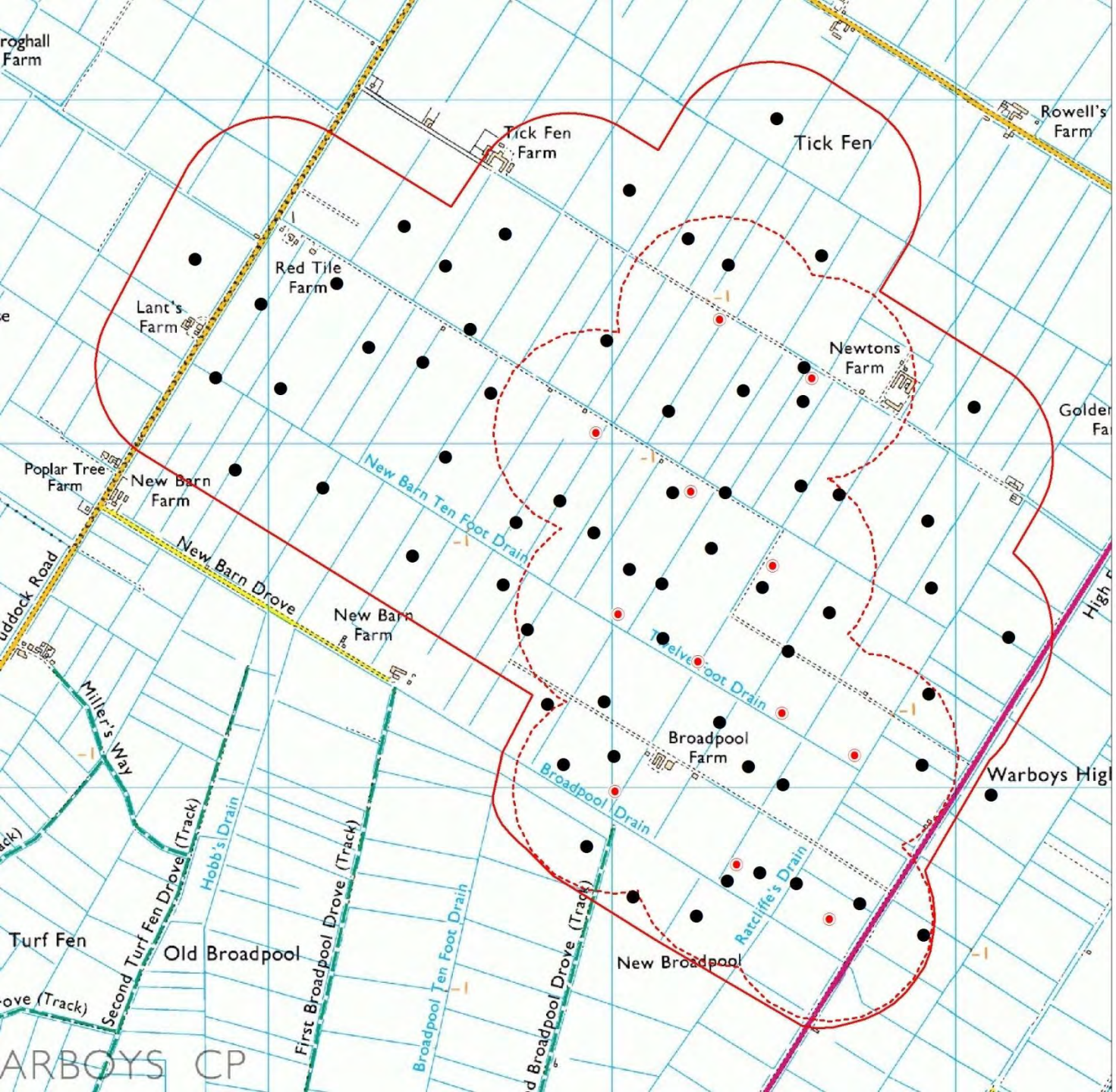
kilometres



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Conclusions

- **Collision and disturbance risk to geese and harriers but not of sufficient magnitude to be significant**
- **Environmental enhancement will deliver a net benefit:**
  - **reduce use of wind farm site and hence collision risk**
  - **increase resource availability elsewhere**