

## CHAPTER 6 FLORA AND FAUNA

- **Appendix 6.6 Winter Bird Survey**



**North South 400kV Interconnection Development**  
**Cavan and Monaghan Study Area (CMSA)**  
**Wintering Bird Study**  
**Survey Period 7: 2013 – 2014**

November 2014

TOBIN CONSULTING ENGINEERS



# REPORT

**PROJECT:**

**North South 400kV Interconnection Development  
Cavan and Monaghan Study Area (CMSA)  
Wintering Bird Study  
Survey Period 7: 2013 – 2014**

**CLIENT:**

**EirGrid**  
The Oval  
160 Shelbourne Road  
Ballsbridge  
Dublin 4.

**COMPANY:**

**TOBIN Consulting Engineers**  
Block 10-4  
Blanchardstown Corporate Park  
Dublin 15  
Ireland

[www.tobin.ie](http://www.tobin.ie)

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## 1 EXECUTIVE SUMMARY

This report details a seventh year (WSP 7) of winter bird surveys (2013/2014) within a study area which includes an extensive part of Counties Monaghan, Armagh and Cavan. This report updates the findings of the six previous wintering bird surveys carried out to date (November 2007 – April 2014 inclusive). This study is to inform the overall Environmental Impact Assessment (EIA) for the proposed 400kV transmission line (referred to as “preferred line route” herein) in the area of the Flagford-Louth 220kV Overhead Line (OHL) north to the border with Northern Ireland. A separate report is provided for the County Meath Study Area (MSA) section of the development.

Whooper Swans were identified at an early stage in the scoping process as a key species due to their known susceptibility to collision with powerlines. It is therefore important to identify areas used by this species and any flightlines potentially relevant to the proposed development. Following the results of the seven years of survey; this report details a number of key sensitive locations which require consideration of potential impacts and mitigation in the EIS. Previous surveys to inform this report were carried out in 2007/2008 (WSP 1), 2008/2009 (WSP 2), 2009/2010 (WSP 3), 2010/2011 (WSP 4), 2011/2012 (WSP 5) and 2012/2013 (WSP 6).

The key survey findings to date relating to the identification of Whooper Swan sites and flightlines within the zone of influence of the proposed transmission line development are summarised below.

1. Ballintra and associated Lough Toome or Crinkell are considered a County important site for Whooper Swan. At Ballintra a regular flight line was confirmed in WSP 1, 2 and 3 between this feeding area and two small lakes namely Loughs Tonyscallan and Toome or Crinkill which are located approximately 1.5km and 2km east and southeast of Ballintra respectively. Whooper Swans also graze in outlier fields in this area. This area was less active in WSP 4 and no activity was noted in WSP 5 or WSP 6. This area was again used in WSP 7 and a flightline to Lough Toome (or Crinkell) was confirmed. This flight line crosses the preferred line route A.
2. The cluster of lakes including Loughs Comertagh, Mill, Beagh (Greaghlonge) and Raferagh are considered a County important site for Whooper Swan with Whooper Swan recorded regularly at, at least, one of these lakes during all years of survey. Whooper Swans disperse between these lakes throughout the winter. In WSP 7 only, Whooper Swan were also observed on Beagh (Greaghlonge) Lough. In summary, this is a regularly used cluster of lakes bisected by the preferred line route. This indicates unconfirmed irregular flightlines are likely to occur across the preferred line route.
3. Lough Egish and Lough Morne and smaller lakes to the west are considered a County important site for Whooper Swan. Lough Morne and Egish are bisected by the preferred line route. This section of the Whooper Swan site is used very irregularly by very small numbers of Whooper Swan and flights are very irregular (one flight observed to date). Whooper Swans



concentrate to the west of Lough Morne between Loughs Crossduff, Lurgacham and Tiervaleny throughout the winter period. This is away from the preferred line route.

4. Whooper Swans disperse between Loughs Namachree, Shantonagh, Bellatrain and Lisnakkillewbane throughout the winter period. Flightlines (observed and potential unrecorded flightlines) in this area do not regularly cross the preferred line route as sites utilised all occur to the west of the corridor. This was confirmed based on regular surveys of Bocks Lough (within the corridor) where no Whooper Swans were recorded to date. In addition flightline checks of observed Whooper Swans confirmed roosting on lakes where foraging was observed during the day. In one case a flightline was observed from the northern shore of Lough Namachree north which did not cross the preferred line route.
5. Regular dusk and dawn checks were conducted at Lough Nahinch and environs. No significant Whooper Swan usage was recorded in this area to date and no flights were noted crossing the preferred line route.
6. No Whooper Swan were observed on Lough Laragh, Lackagh and Cremartin Lough during WSP 6 and 7. Flightlines and more regular observations were recorded in previous winter survey periods though observed flightlines were away from the preferred line route.

Small flocks of Golden Plover and Lapwing are regular during spring and early autumn passage period around Lough Egish. These are birds on migration and do not stay long, but use this area for foraging and resting before migrating further. No flightlines were observed relative to the preferred line route.

Mute Swan are scattered throughout a large numbers of lake sites within the study area. A key area where there may be potential impacts is between Lough Egish and Lough Morne as non breeding individual numbers can build up on these lakes in some years, and unrecorded flightlines potentially occur between these lakes which are bisected by the Preferred Line Route.

Despite extensive and multi-year surveys at other potentially sensitive locations identified, no other flightlines were confirmed nor are regular flightlines likely. The most important wintering bird sites (for species other than Whooper Swan) are well removed from the proposed development including Dromore wetlands and Moylan Lough.

## 2 INTRODUCTION

TOBIN Consulting Engineers herein referred to as TOBIN have undertaken winter bird studies within the Cavan Monaghan (Armagh) Study Area (CMSA) for the proposed North - South 400kV Interconnection Development for the winter 2013/2014 period, herein referred to as Wintering Survey Period 7 (WSP 7). The focus of this study was on Whooper Swans (*Cygnus cygnus*) but includes all potentially sensitive bird species in particular wintering wader and wildfowl species ('Target' species for survey). The winter bird surveys inform the assessment of potential impacts and proposed mitigation to be detailed, if relevant, in Volume 3C, Section 6 of the Environmental Impact Statement for the project;

Progress on the project led to the identification of the Preferred Line Route. The identification of which considered a range of criteria including landscape, settlements, archaeology and ecology/ birds.

The study area does not include any Special Protection Areas for Birds and the closest such site, Strabannan-Braganstown SPA (Site Code: IE004091), is at a distance of 24km from the preferred line route.

As detailed above the primary Target species identified for survey within the study area (based on desk review, consultation and surveys to date) is Whooper Swan. Secondary Target species surveyed for included Mute Swan, Wintering Duck (Wigeon, Mallard, Teal), Geese species (Greylag Geese), Waders (Golden Plover, Lapwing and Snipe), Cormorant, Grey Heron, Great Crested Grebe, Little Grebe and Moorhen.

Also considered are wintering Hen Harrier (*Circus cyaneus*), at potential roost sites identified.

This study updates results of previous studies conducted in 2007/2008 (WSP 1), 2008/2009 (WSP 2), 2009/2010 (WSP 3), 2010/2011 (WSP 4), 2011/2012 (WSP 5) and 2012/2013 (WSP 6).

## 2.1 STUDY AREA

The study area consists of the preferred line route in County Monaghan and relatively small area of Counties Cavan and Armagh (Northern Ireland), as indicated in Figure 1. The study area extends up to 15km east and west of the preferred line route to encompass important winter bird sites and to consider flightlines within this zone of potential influence.

## 2.2 OBJECTIVES

The objectives of this study were:

1. To determine the numbers and distribution of Whooper Swans and other wintering wildfowl and waders in a wider study area (refer to Figure 1). Also considered are other species of conservation concern potentially sensitive to the development.
2. To identify flightlines in this study area focussed on the preferred line route.
3. Based on data gathered during WSP 7 any new and/or additional information to previous survey findings is highlighted.
4. Based on all survey work to date (2007 – 2014) an evaluation of the importance of identified potentially sensitive (to the development) wintering bird sites (or complex of sites) is detailed in this report.
5. Detail sensitive locations for Whooper Swans (wildfowl) which require assessment of potential impacts and mitigation.

## 2.3 BACKGROUND TO THIS STUDY

In 2007, TOBIN were initially commissioned by EirGrid to undertake a winter bird study focusing on Whooper Swan within the study area for the winter period 2007/2008 (WSP 1). The aim of this survey was to identify any feeding or roosting sites within the study area and to record any regularly used flightlines.

TOBIN were commissioned to repeat this survey each winter since 2007. The purpose of this report is to detail the findings of WSP 7 so as to update findings from previous surveys and add data to inform the assessment of potential impacts and mitigation requirements on the Preferred Line Route.

## 2.4 LITERATURE REVIEW

Whooper Swan is the key target winter bird species identified in the study area for consideration for the proposed development. A literature review was undertaken to compile known impacts of power lines for this species and others and to aid in identifying appropriate and proven mitigation measures

Appendix 1 presents a bibliography of reviewed information sources which informed this report. In some cases footnotes are detailed with references within the report.

Whooper Swans are listed under Annex I of the EU Birds Directive (EU 79/409/EEC). EU Member States are required to maintain populations of rare and migratory bird species that are listed under Annex I by establishing designated areas – Special Protection Areas (SPA) - for the conservation of these species. Whooper Swans are further protected as they are listed under Annex II of the Berne Convention on the conservation of wildlife and natural habitats (commonly known as the Berne Convention), they are also amber listed in 'Birds of Conservation Concern in Ireland 2014 - 2019 (Colhoun & Cummins., 2013) as the numbers of Whooper Swans that winter in Ireland are internationally important.

Whooper Swans are winter migrants to Ireland; generally arriving in October and leaving to return to their breeding grounds in late March/early April. The Whooper Swans that winter in Ireland breed in Iceland. The Irish Wetland Bird Survey (I-WEBS) office and the Irish Whooper Swan Study Group completed a National Whooper Swan Survey in 2010 which revealed that the national population of Whooper Swans wintering here had increased slightly since the last national survey completed in 2005 to a population of 15,068 birds. Any site that regularly holds 1% of this figure (c.150 Whooper Swans) is considered to be of national importance for Whooper Swans. Based on an international population estimate of 29,232<sup>1</sup>, any site containing 290 birds or more is considered to be of international importance.

Wintering Whooper Swans are found mostly on lowland open farmland around inland wetlands and are regularly seen while feeding on grasslands and stubble. Whooper Swans usually feed during the daylight hours and leave the feeding sites at dusk to congregate at evening roosts (Owen *et al.* 1986 in Robinson *et al.*, 2004).

Whooper Swans are highlighted as a species potentially prone to collisions with transmission lines e.g. EirGrid Ecology Guidelines<sup>2</sup>. This is due to:

- Their relatively high wing loading resulting in less manoeuvrability in flight;
- Behavioural risks due to flying between their roosting and foraging areas (and between foraging areas); and
- Flights are often in low light levels, i.e. pre-dawn and post-dusk periods, and therefore in poor visibility. Whooper Swans, tend to fly at heights at or just below the conductor height of

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<sup>1</sup> Hall *et al.* (2012) Population size and breeding success of Icelandic Whooper Swans *Cygnus cygnus*: results of the 2010 international census. *Wildfowl* 62:73-96.

<sup>2</sup>Eirgrid 2011. Ecology Guidelines for Electricity Transmission Projects. A Standard Approach to Ecological Impact Assessment of High Voltage Transmission Projects

transmission lines (field survey observations) typically 8 to 9m above ground level Griffen *et al.*, (2011).

Swans (including Whooper Swan, Bewick's Swan (*Cygnus columbianus*) and Mute Swan (*Cygnus olor*)) are frequently involved in powerline line collisions, including low voltage and high voltage lines (transmission lines) and this is the most commonly reported cause of swan death in the United Kingdom (MBEC 2006). The fact that swans often fly in flocks is undoubtedly also a contributory factor in determining collision rates. Higher levels of risk are associated with transmission lines that are located on main flightlines, either between roosts and feeding areas or within areas where feeding is concentrated. Whooper Swans are listed on Annex 1 of the Birds Directive The European Commission<sup>3</sup> consider that "*The greatest problems to the Whooper Swan are disturbances, deterioration of habitat, illegal hunting and pollution by lead and pesticides and collision with powerlines seems not to be a serious threat.*"

The Avian Power Line Interaction Committee (1994)<sup>4</sup> stated that most researchers agree collisions are not a biologically significant source of mortality for thriving populations of birds. Despite this, it is estimated that power lines are the second highest cause of bird collision mortality in the United States, second to buildings and windows. Other anthropogenic factors listed included automobiles, communication towers and wind turbines (Erickson *et al.*, 2005, taken from Avian Power Line Interaction Committee, 2012)<sup>5</sup>.

Internationally, the need to develop power line infrastructure in a bird-safe manner is becoming increasingly more recognised. In 2011, the United Nations Environment Programme (UNEP) for the African-Eurasian Waterbird Agreement (AEWA) and the Convention of Migratory Species (CMS) released a *Review of the Conflict between Migratory Birds and Electricity Power Grids in the African Eurasian Region* (CMS, 2011a) and the *Guidelines for Mitigating Conflict between Migratory Birds and Electricity Power Grids* (CMS 2011b). CMS (2011a) provides a summary of collision issues and hot spots in Europe, Asia, and Africa. Also in 2011, the Budapest Declaration on *Bird Protection and Power Lines* (MME, 2011) was adopted by the participants of the Budapest Conference, Power Lines and Bird Mortality in Europe. The declaration aims for all new construction of power poles to be bird-safe by 2016 and all dangerous poles to be retrofitted by 2020<sup>5</sup>. The sensitive species outlined in these reports are not relevant to the study area and the design of the proposed development means electrocution of raptors specifically will not be an issue.

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<sup>3</sup> [http://ec.europa.eu/environment/nature/conservation/wildbirds/threatened/c/cygnus\\_cygnus\\_en.htm](http://ec.europa.eu/environment/nature/conservation/wildbirds/threatened/c/cygnus_cygnus_en.htm)

<sup>4</sup> Avian Power Line Interaction Committee (APLIC) 1994. Mitigating Bird Collisions with Transmission lines: The State of the Art in 1994. Edison Electric Institute. Washington, D.C.

<sup>5</sup> Avian Power Line Interaction Committee (APLIC) 2012 Reducing Avian Collisions with Power lines: The State of the Art in 2012. Edison Electric Institute. Washington, D.C.

The Icelandic Whooper swan population (population which winters in Ireland) is considered to be at favourable conservation status (source: JNCC) and populations in Ireland have increased between 2000 and 2005 by 11% (Crowe *et al.*, 2005) and by 6% between 2005 and 2010 (Boland *et al.*, 2010). This population increase is occurring in the context of an already extensive transmission line network throughout their wintering range including in Ireland suggesting that transmission lines are not a significant cause of mortality though local site conditions require consideration.

### **Review of Line Marking Effectiveness**

Most studies highlight the earth wire as the main cause of collision for birds. This is because it is relatively more difficult to see and is located at the top of the pylon where Whooper Swans may miss it as they fly over. This is where flight diverters (e.g. Swan Flight Diverter) are installed. Diverters come in a wide range of types and specifications. Recommendations based on a comprehensive review of line markers available carried out for the Beaulieu Denny 400kV project for similar bird constraints/ species highlight that the best all round markers are Swan Flight Diverter (e.g. Dulmison or Tyco Electronics) constructed from high-impact grey PVC (UV stabilised) fitted at 10m intervals<sup>6</sup>. This or a similar product will be recommended for the proposed development.

Marking the earth wire with flight diverters (see Plate 1) has been shown in numerous studies to be a useful mitigation tool at reducing potential collision impacts with powerlines.



**Plate 1: Electricity line marked with swan flight diverters**

Marking electricity lines with flight diverters is now a standard practise by electricity utility companies throughout the world for existing and new HV electricity line projects.

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<sup>6</sup><http://webcache.googleusercontent.com/search?q=cache%3AeD7Vxxt8rNwJ%3Awww.dpea.scotland.gov.uk%2FDocuments%2FqJ2654%2FJ118922.pdf+swan+flight+diverters&hl=en&gl=ie>

Tyco electronics, manufactures of the type of diverter proposed for this project, state that studies have shown that proper installation of bird flight diverters may reduce bird collisions by “up to 90%”<sup>7</sup>.

Examples of where “swan flight diverters” have been shown to reduce collisions or where they are being installed is detailed below.

- San Luis National Wildlife Refuge Complex, Merced County, California, USA <sup>8</sup>.
- Skagit County, Washington home to the largest wintering concentration of Trumpeter Swans (similar species to Whooper Swan see plate 2 below) in the United States. The Trumpeter Swan Society in USA “welcomed” proposals to mark lines here.



**Plate 2: Trumpeter Swans**

- In Minnesota, Xcel Energy of Minneapolis planned to install nearly 3,400 swan flight diverters in Minnesota and Wisconsin. The Teton Regional Land Trust (TRLT) is working with the Fall River Rural Electric Cooperative (FRREC) on the west side of Yellowstone to add or replace at least 120 bird diverters on electricity lines in areas frequented by Trumpeter Swans. The use of flight diverters again serves to highlight that these diverters are effective and accepted by the Trumpeter Swan conservation organisation in the USA for existing electricity lines.
- Swan flight diverters in areas where conflicts occur (Trumpeter swan collision impacts) were highlighted as “effective in minimising this threat” in Mitchell (1994) taken from Slater (2006)<sup>9</sup>.
- Initial findings indicated no collision-caused mortalities of trumpeter swan at sections of transmission line following installation of swan flight diverters at a site in Montana USA (2004/2005 study)<sup>10</sup>.

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<sup>7</sup> [http://energy.tycoelectronics.com/rrg/dulm\\_rrg/232.pdf](http://energy.tycoelectronics.com/rrg/dulm_rrg/232.pdf)

<sup>8</sup> <http://www.ventanaws.org/conservation/electricitylines.htm>

<sup>9</sup> Slater, G.L. (2006, August 17). Trumpeter Swan (*Cygnus buccinator*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/trumpeterswan.pdf>

<sup>10</sup> [http://www.trumpeterswansociety.org/docs/20th\\_conf/20becker\\_and\\_lichtenberg.pdf](http://www.trumpeterswansociety.org/docs/20th_conf/20becker_and_lichtenberg.pdf)

- Mackenzie Bradshaw Environmental Consultants - MBEC (2006) cite a large number of studies where the effectiveness of flight diverters at reducing collision risks by collision prone bird species including swans has been confirmed. Various studies showed a reduction in collisions of between 57 and 89%.
- Barrientos *et al.* (2011), reviewing 21 wire marking studies, similarly conclude that wire marking reduced bird mortality by 55-94%. Line marking is the likely mitigation which will be proposed for this project.
- Jenkins *et al.* (2010) conclude that, barring some notable exceptions, “*any sufficiently large form of marker (which thickens the appearance of the line at that point by at least 20 cm, over a length of at least 10-20 cm), placed with sufficient regularity (at least every 5-10 m) on either the ground wires (preferably) or the conductors, is likely to lower general collision rates by 50-80%*”.
- Frost (2008)<sup>11</sup>, found that the installation of flight diverters on transmission lines adjacent to a sensitive lake location reduced mortalities of Mute Swan from a maximum of 21 (pre diverter installation) to one bird after markers were installed.
- Following the largest worldwide marking experiment to date, Barrientos *et al.* (2012) observed a small (9.6%) but significant decrease in the number of casualties after line marking compared to before line marking in experimental lines<sup>12</sup>.
- The Beaulieu Denny 400kV project<sup>13</sup> which was granted permission in 2010 in Scotland recommended flight diverters for stretches of line where a potential collision risk was determined. Bird flight diverters including swan flight diverters were recommended. This project passed close to or through SPA sites including South Tayside Goose Roost Ramsar and SPA (0.12km); Firth of Forth Ramsar and SPA (1.5km) and Drumochter Hills SPA (crosses). The abundance and diversity of collision prone bird species in the Scottish study area is significantly more than in the overall North South 400kV Interconnection Development study area (MSA and CMSA). For example the Goose Roost Ramsar and SPA site alone regularly supports over 20,000 waterfowl species which is greater than all larger wildfowl numbers in the MSA and CMSA. It is in the context of these high waterfowl numbers that the Scottish Government considered the line marking mitigation detailed in the EIS and consented planning.
- The Wildfowl & Wetlands Trust working with Electricity North West in West Lancashire UK (March 2014)<sup>14</sup> are currently examining various types of line diverters for sections of alignment crossed by internationally significant numbers of Whooper Swan and Geese species. The use of diverters was expressed as a very positive approach for reducing impacts to swans and Geese as collisions with unmarked powerlines were considered “a major cause of death for them”. One type of plastic diverter, clipped on the power lines, is packed with crystals that

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<sup>11</sup> Frost D (2008). The use of ‘flight diverters’ reduces mute swan *Cygnus olor* collision with electricity lines at Abberton Reservoir, Essex, England Conservation Evidence (2008) 5, 83-91

<sup>12</sup> Barrientos R, Ponce C, Palacín C, Martín CA, Martín B, *et al.* (2012) Wire Marking Results in a Small but Significant Reduction in Avian Mortality at Power Lines: A BACI Designed Study. PLoS ONE 7(3): e32569. doi:10.1371/journal.pone.0032569

<sup>13</sup> <http://webcache.googleusercontent.com/search?q=cache%3AeD7Vxt8rNwJ%3Awww.dpea.scotland.gov.uk%2FDocuments%2FqJ2654%2FJ118922.pdf+swan+flight+diverters&hl=en&gl=ie>

<sup>14</sup> <http://www.thelancashiremagazine.co.uk/news/north-west/warning-whooper-swans-from-iceland-about-lancashire-power-lines/>



absorb ultra-violet light by day to emit a purple ultraviolet light for 10 or 12 hours after nightfall. The birds can see the plastic roundels glowing violet by night. Fluorescent orange or yellow reflective materials flap in the wind to divert the birds by day. No data is yet available on the findings of this study (July 2014).

More recent updated draft guidelines produced by Bureau Wardenberg (2011) on approaches to avoid and mitigate impacts to migratory birds have been drafted. Some key mitigation approaches outlined are detailed below.

Since bird collisions have been recorded with the guy or stay wires of pylons the construction of self-supporting pylons which do not require stay wires is preferred. This is the case for this project.

Birds are believed to collide most often with the earth or shield wire (the thinnest wire at the top of the electricity line pylon). Removing this wire or designing electricity lines from the outset without this wire is therefore a potential collision mitigation measure (Brown *et al.*, 1987; Bevanger & Brøseth, 2001).

There is room for improvement in the efficacy of line marking devices. In order to achieve this improvement we need to look more closely at bird vision. Recently, Martin & Shaw (2010) and Martin (2011) conducted the first known research into avian visual fields related to electricity line collision. Key research findings and theoretical conclusions include:

- Birds' vision differs from humans in three main ways: colour vision, acuity and field of view;
- Birds' eyes are mostly placed laterally in the skull, birds' visual fields (*i.e.* where they can see) are extensive, and differ between species;
- Relative to humans, birds have small blind spots. However, these blind spots can render a bird blind in the direction of travel, if the head or eye is moved in a certain way;
- Birds have small binocular fields, particularly the cranes and bustards. Binocular vision is important for distance perception;
- Birds' highest visual acuity and colour vision is in their lateral visual field, birds' frontal vision may be tuned for detecting movement rather than spatial detail;
- Birds in flight in open habitats may 'predict' that there are no obstacles in front of them; and
- Birds may detect obstacles such as pylons, and fly towards them with the intention of veering away at the last minute
- Colour is probably less important than contrast;
- Movement of the device is likely to be important; and
- Markers that protrude vertically both above and below the conductor are likely important; since we suspect that many collisions may occur at night, devices that are nocturnally visible (through illumination, phosphorescence, ultraviolet radiation and other means) would be advantage.

This overall information will inform flight diverter type and approach for installation as relevant for the project.

Other wintering bird species in the study area are potentially sensitive to collisions with powerlines though have been observed to regularly feed in areas close to existing transmission lines, refer to Plate 3 below. Mute Swan in particular are prone to collision with power lines. In this regard these species were also surveyed to identify potential collision hazards and line marking is proposed at these locations.

Sensitive species in the study area include:

- Mute Swan;
- Grey Heron;
- Cormorant;
- Wildfowl ducks (Moorhen, Mallard, Teal);
- Wildfowl Grebes (Great Crested Grebe and Little Grebe); and
- Waders (Golden Plover, Lapwing, Snipe).



**Plate 3: Flock of Mute Swans which regularly forage in a field beside a Transmission Line in the CMSA study area.**

## 2.5 WHOOPER SWAN- IMPACTS DUE TO TRANSMISSION LINES – UK AND IRELAND

Little information is currently available on the actual impacts of high voltage transmission lines on Whooper Swans and other collision prone species in Ireland and for that matter the UK. Any information regarding impacts are very general and anecdotal for example<sup>15</sup>, rather than scientifically based observational experiments and subsequent published reports detailing actual mortalities.

Several general observations can be highlighted which are important for determining potential impacts of a new transmission line development in the study area to wintering birds in particular Whooper Swans. These include:

1. Whooper Swans in the study area are utilising areas within an existing electricity line network. The extent of the existing wirescape across the MSA study area consists of approximately 329km of existing high voltage electricity lines (161km of 38kV, 101km of 110kV, 93km of 220kV and 4km of 400kV); refer to Figure 1, as well as thousands of kilometres of medium voltage, low voltage and telephone overhead lines. While collisions undoubtedly occur and have been recorded during surveys, no significant impacts to the overall population is likely to be arising given Whooper Swan populations show a positive trend based on I-Webs data between 2005 and 2010. In addition internationally significant numbers continue to use areas with transmission line infrastructure e.g. Toome Bridge (Northern Ireland) i.e. no displacement issue in this case (Hall *et al*, 2012).
2. Whooper Swans (swan species generally) currently exploit areas around existing low voltage (LV) and high voltage (HV) electricity lines throughout their range. Example sites include Toome Bridge Northern Ireland (HV transmission line) and two examples from County Mayo 110kV (refer to Plate 4 and 5 overleaf). Mute Swan regularly graze under electricity lines (13kV) close to Derryloobinagh Lough in Ballybay, County Monaghan (refer to Plate 3). It has been noted in 2013 that a collision occurred at the Ballybay site though only feathers were noted. The 13kV lines are clearly a local hazard for swans at this wetland site, though do not cause displacement.

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<sup>15</sup> <http://www.thelancashiremagazine.co.uk/news/north-west/warning-whooper-swans-from-iceland-about-lancashire-power-lines/>



**Plates 4 and 5: Two images of flocks of Whooper Swan in temporary flood area under an 110kV transmission line in County Mayo**

3. Line marking with flight diverters are proposed for sections of the final alignment where a potential localised risk of collision has been highlighted as part of this overall study. Line marking using bird flight diverters is standard mitigation practise internationally for example in countries including Scotland, USA, England and Norway. Flight diverters have been highlighted in various studies as an effective mitigation tool for reducing collisions by birds as detailed above.

### 3 METHODOLOGY

The methodology for WSP 7 broadly followed the methodology used during the previous six years of surveys. Given the very extensive area a number of key features and areas were identified to focus the survey work. Ongoing aerial surveys and drive round surveys determined if any additional sites required survey.

#### 3.1 DESKTOP SURVEY

An updated desk-based survey was undertaken to determine up to date information on bird interactions with powerlines, current mitigation approaches and information regarding Whooper Swan research. Additional information has been added to the previous desk study report; refer to section 2.2 and 2.3 above.

#### 3.2 CONSULTATION

NPWS and Birdwatch Ireland have been informed over the course of the study regarding the survey findings and proposed mitigation. The most recent submission was received from Birdwatch Ireland regarding the project was received on 6<sup>th</sup> November 2013. A subsequent meeting was held with Birdwatch Ireland on 11<sup>th</sup> December 2013 during which impacts on Whooper Swan populations, appropriate mitigation and monitoring were discussed.

#### 3.3 FIELD SURVEY

A total of 57 survey man days were conducted over 43 days between 6<sup>th</sup> November 2013 and 27<sup>th</sup> March 2014. Four bird surveyors conducted the surveys in the CMSA. All surveyors were fully experienced in the methodologies employed and at identifying target species in the study area.

The survey approach followed as far as possible standard methodologies suitable for identifying key concentrations of wintering wildfowl (WeBS) detailed in Gilbert *et al.*, (1998)<sup>16</sup> and in particular concentrations and flightlines relative to the preferred line route (Vantage Point Surveys – based on SNH 2014<sup>17</sup>).

Table 3-1 below summarises location of survey, survey dates, type of survey conducted on each date and weather conditions.

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<sup>16</sup> Gilbert G., Gibbons D.W., Evans J, (1998). *Bird Monitoring Methods: A manual of Techniques for Key UK Species*. RSPB, Sandy.

<sup>17</sup> Scottish Natural Heritage (2014) *Recommended bird survey methods to inform impact assessment of onshore wind farms*.

**Table 3-1: Summary of field surveys undertaken between October 2013 and April 2014 in CMSA.**

Date	Location	Weather	Webs (counts and presence at sites)	VP Watches Dawn	VP Watches Dusk	Hen Harrier Survey	Hours
06/11/13	Lough Namachree	Rain, Mild, > 10k visibility.	Yes (partial)		Yes	Yes	1.25
07/11/13	Lough Bellatrain/ Lisnakillewbane and Bocks	Dry, calm, clear > 10k Visibility.	Yes (partial)	Yes			0.5
11/11/13	Lough Egish/ Morne/ Lurgacham	Dry calm clear	Yes (partial)		Yes	Yes	2
14/11/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry calm clear	Yes (partial)		Yes	Yes	0.75
15/11/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry, calm, clear > 10k Visibility.	Yes (partial)		Yes	Yes	1
16/11/13	Drumgallon/ Drumcarn/ Mullyard Bogs	Drizzle, calm, visibility 1 – 5km			Yes	Yes	1
18/11/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry calm clear > 20k visibility.	Yes (partial)		Yes	Yes	1.5
21/11/13	North of Drumcarn Bogs (Co Armagh) outside study area	Drizzle, calm, visibility 1 – 5km				Yes	1.5
21/11/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry, calm, clear > 10k visibility.	Yes (partial)		Yes	Yes	1
26/11/13	Lough Egish/ Morne/ Lurgacham	Dry, calm, clear > 10k Visibility.	Yes (partial)		Yes	Yes	2
27/11/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry, calm, clear	Yes (partial)		Yes	Yes	1.25
28/11/13	Lough Egish/ Morne/ Lurgacham	Dry, calm, clear	Yes (partial)	Yes		Yes	1
30/11/13	Lough Egish/ Morne/ Lurgacham	Dry, calm, clear > 10k Visibility.	Yes (partial)		Yes	Yes	2
01/12/13	Drumgallon/ Drumcarn/ Bogs	Drizzle, calm, visibility 1 – 5km				Yes	1.5
08/12/13	Lough Egish/ Morne/ Lurgacham	Drizzle, calm, visibility < 10k	Yes (partial)	Yes		Yes	1.5
13/12/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry, calm, clear > 10k visibility.	Yes (partial)		Yes	Yes	1
20/12/13	All	Cold, windy, clear	Yes (partial)				
26/12/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Cold, clear	Yes (partial)		Yes	Yes	1
28/12/13	Lough Egish/ Morne/ Lurgacham	Dry, calm, clear > 10k Visibility.	Yes (partial)	Yes		Yes	1.5
28/12/13	Lough Nahinch, Drumcarn, Crossbane area (Northern Ireland)	Dry, calm, clear > 10k visibility.	Yes (partial)			Yes	1.75
31/12/13	Loughs Raferagh/ Comertagh/ Greaghlonge	Dry, calm, clear > 10k visibility.		Yes		Yes	1

Date	Location	Weather	Webs (counts and presence at sites)	VP Watches Dawn	VP Watches Dusk	Hen Harrier Survey	Hours
02/01/14	All	Dry, clear > 10k Visibility.	Yes (Full)				
02/01/14	Loughs Raferagh/ Comertagh/ Greaghlonge	Windy, 5 – 10km visibility	Yes (partial)		Yes	Yes	
03/01/14	Lough Nahinch / Cashel Bog area	Windy, 5 – 10km visibility		Yes		Yes	1
03/01/14	Lough Egish/ Morne/ Lurgacham	Gale, 5 – 10km visibility		Yes		Yes	1.5
06/01/14	Loughs Raferagh/ Comertagh/ Greaghlonge	Windy, 5 – 10km visibility	Yes (partial)	Yes		Yes	1
13/01/14	Lough Moylan (Tullyvaragh)	Dry, calm, clear > 10k visibility.	Yes (partial)		Yes		1
23/01/14	Lough Moylan (Tullyvaragh)	Dry, calm, clear > 10k visibility.	Yes (partial)		Yes		1
23/01/14	Lough Greaghlonge	Dry, breezy, 5 – 10km visibility			Yes		1.25
23/01/14	Loughs Raferagh/	Dry, calm, clear > 10k visibility.	Yes (partial)		Yes	Yes	1
24/01/14	Loughs Raferagh/	Dry, calm, clear > 10k visibility.	Yes (partial)	Yes		Yes	1
24/01/14	Lough Greaghlonge	Dry, breezy, 5 – 10km visibility		Yes			1
27/01/14	Laragh Lough	Light Wind, overcast 5 – 10km visibility	Yes (partial)	Yes			1
27/01/14	Lough Egish	Light Wind, overcast 5 – 10km visibility	Yes (Full)		Yes	Yes	1
27/01/14	Lough Lurgacham	Light Wind, overcast 5 – 10km visibility			Yes		0.5
28/01/14	Lough Egish	Light Wind, overcast 5 – 10km visibility		Yes		Yes	1
28/01/14	Lough Crossduff	Light Wind, overcast 5 – 10km visibility		Yes			1
05/02/14	Lough Moylan (Tullyvaragh)	Light Wind, overcast 5 – 10km visibility	Yes (partial)		Yes		1.5
10/02/14	Lough Moylan (Tullyvaragh)	Light Wind, overcast 5 – 10km visibility	Yes (partial)		Yes		1.5
11/02/14	All	Dry, sunny, clear > 10k visibility	Yes (Full)				
24/02/14	Lough Moylan (Tullyvaragh)	Light Wind, overcast > 10km visibility	Yes (Full)		Yes		1.5
24/02/14	Lough Namachree	Windy, Rain, > 10k visibility	Yes (Full)		Yes		1.5
24/02/14	Lough Nahinch	Windy, Rain, 5 - 10k visibility			Yes	Yes	1.5

Date	Location	Weather	Webs (counts and presence at sites)	VP Watches Dawn	VP Watches Dusk	Hen Harrier Survey	Hours
25/02/14	Lough Tooncrinkell	Windy, Rain, 5 - 10k visibility		Yes			1
25/02/14	Ballintra	Dry, calm > 10k visibility		Yes			1.75
28/02/14	Lough Moylan (Tullyvaragh)	Light Wind, overcast > 10km visibility	Yes (partial)	Yes			1.5
04/03/14	Ballintra	Dry, calm > 10k visibility	Yes (partial)		Yes		1
05/03/14	Lough Nahinch	Dry, calm > 10k visibility		Yes			1
07/03/14	Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	Overcast, drizzle < 5km visibility	Yes (partial)	Yes			0.75
12/03/14	Lough Moylan (Tullyvaragh)	Clear > 5km visibility	Yes (partial)		Yes		1
13/03/14	Creeve Lough	Dry, calm > 10k visibility	Yes (Full)		Yes		1
14/03/14	Lough Egish	Fog, < 1km visibility		Yes			1
20/03/14	Lough Namachree	Dry, calm > 10k visibility	Yes (partial)		Yes		1
21/03/14	Ballintra	Dry, calm > 10k visibility		Yes			2
21/03/14	Lough Moylan (Tullyvaragh)	Breezy, showers, >2km visibility	Yes (partial)		Yes		1.5
24/03/14	Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	Breezy, showers, >2km visibility	Yes (partial)		Yes		1
27/03/14	Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	Breezy, showers, >2km visibility	Yes (partial)	Yes			1

**Note:**

1. Full count indicate that the majority of sites (at least 90%) were surveyed on that day and a full check of all potential sites within 5km of the preferred line route was conducted.
2. Partial Counts were counts recorded on the way to vantage point survey and drive round check conducted of known sites used in the vicinity of the vantage point.

Given the large extent of the study area methodologies were tailored so as to maximise information on location of Whooper Swans and likely / confirmed flightlines as relevant to the proposed development.

Three key methodologies were used which follow standard survey methods (see above) for assessing winter bird distribution and identifying flightlines.



### 3.3.1 Wetland Bird Survey (WeBS) and drive round survey

Extensive driving surveys were carried out monthly of the entire study area; refer to Table 3-2 which indicates number of times specific areas with noteworthy wintering bird concentrations were surveyed. All noteworthy wintering bird sites are indicated in Figure 1 and all surveyed at least once/ month.

Surveys were conducted of all potential wintering bird sites and sites identified through consultation and the desk study. All sites were scanned using binoculars and telescopes as appropriate, from vantage points on public roads. Likely habitats close to these sites were also checked, as were areas deemed suitable for Whooper Swans that were seen whilst driving between sites and other small ponds identified in aerial imagery. Records were taken of numbers of Whooper Swans, weather conditions and habitat type. Other species of conservation concern were also noted if seen.

**Table 3-2: Survey Effort (nos. days surveyed) for identified or potential wintering bird sites in the study area**

Site	Location Relative to preferred line route	Nos. times surveyed 2013/ 2014
Lough Avaghon	5 km - west	11
Ballintra	1km - west	33
Ballyhoe Lough / wetlands	9 – 10km east	1
Barnagrow Lough	3km west	9
Bawn Lakes	4km west	15
Beagh Lough/ Greaglone	1km west	28
Bellatrain Lough	3km west	15
Blaney Castle Lake or Muckno Lough	5km east	5
Comertagh Lough	< 1km east	26
Corliss Lough	>10km east	11
Corraghy Lough	5 – 6km east	11
Creeve lake	4 – 5km west	16
Corrawaddy Lough	1km east	3
Corvally Lough	<1km east	27
Creevekeeran	>12km east	3
Creevy Lough	8km east	14
Crossduff Lough	2km west	12
Derrygoony Lough	6km west	6
Derrynaloobinagh	4km west	29
Dromore Wetlands (Derryroosk Mullanary etc)	4km west	12
Drumgallon	< 1km east	3
Drumillard lough	10km east	17
Druminnick Lough	6km west	8
Drumlougher	12km west	2
East Laragh Lough 2	5km east	18
Fane River	> 10km east	2

Site	Location Relative to preferred line route	Nos. times surveyed 2013/ 2014
Kiltybane Lough	>13km east	2
Lackagh	3km east	10
Lantaur	3km west	5
Laragh Lough	4km east	25
Lismagurshin or Cremartin Lough	1km east	11
Lisnakillewbane Lough	3km west	16
Lough Alina	>10km east	14
Lough Egish	1km east	28
Lough Major	3km west	15
Lough Morne	<1km west	28
Lough Nagamaman	4km east	15
Lough Nahinch / Tassan/ White	<1km	15
Lough Namachree	3km west	17
Lough Patrick	>10km east	13
Lough Ross	10km east	13
Lough Sillan	3km west	11
Lough Smiley (I north)	6km east	5
Lurgacham (Lough + fields)	2km west	21
Mill Lough	1km west	24
Milltown Lough	3km west	10
Muckno Mill Lough	6km east	15
Muckno Mill Lough (Tributary)	6km east	3
Raferagh (pond)	<1km north	26
Shantonagh Lough	2km west	13
Tievaleny Lough	3km west	10
Tonyscallan Lough	1km east	18
Tooncrinkell Lough	1km east	14
Tullyvaragh / Moylan Lough	10km east	14
Tullyvaragh Lower	10km east	4

Additional small wetlands / ponds and lakes occur throughout the study area, which are not detailed in Table 3-2. These were regularly checked (at least once/ month each year of survey) and no significant usage by Target Bird Species was recorded. These include small lakes within 1km of the preferred line route including, Tassan Lough, lake (townland Coohy), small lake and ponds (townland Drumgristin), Lake (townland Cremartin), Boraghy Lough, Bocks Lough and Muff Lough.

### 3.3.2 Vantage Point Surveys

In order to determine flightlines, dawn and dusk vantage point watches were conducted at various sites along the preferred line route, refer to Table 3-3 and Figure 1 which indicates site locations. A total of 27 dawn and dusk vantage point surveys were conducted at 16 separate vantage point locations where flightlines were recorded previously. Locations for survey were determined based on observed Whooper Swan sites and associated flightlines, roost sites in the vicinity of the preferred line route and; precautionary surveys at potential flightline locations e.g. larger river crossings.

In total 63.75 hours of dawn and dusk vantage point work were conducted. In addition to this time extensive checks were conducted in the vicinity of vantage points to identify if flocks of Whooper Swan were present in the wider area.

**Table 3-3: Vantage Point survey date, location, period and effort**

Date	Location	Survey Period	Duration (hours)
25/02/2014	Ballintra	Dawn	1.75
04/03/2014	Ballintra	Dusk	1
21/03/2014	Ballintra	Dawn	2
13/03/2014	Creeve Lough	Dusk	1
16/11/2013	Drumgallon/ Drumcarn/ Mullyard Bogs	Dusk	1
01/12/2013	Drumgallon/ Drumcarn/ Mullyard Bogs	Dusk	1.5
27/01/2014	Laragh Lough	Dawn	1
07/11/2013	Lough Bellatrain/ Lisnakillewbane and Bocks	Dawn	0.5
28/01/2014	Lough Crossduff	Dawn	1
27/01/2014	Lough Egish	Dusk	1
28/01/2014	Lough Egish	Dawn	1
14/03/2014	Lough Egish	Dawn	1
11/11/2013	Lough Egish/ Morne/ Lurgacham	Dusk	2
26/11/2013	Lough Egish/ Morne/ Lurgacham	Dusk	2
28/11/2013	Lough Egish/ Morne/ Lurgacham	Dawn	1
30/11/2001	Lough Egish/ Morne/ Lurgacham	Dusk	2
08/12/2013	Lough Egish/ Morne/ Lurgacham	Dawn	1.5
28/12/2013	Lough Egish/ Morne/ Lurgacham	Dawn	1.5
03/01/2014	Lough Egish/ Morne/ Lurgacham	Dawn	1.5
23/01/2014	Lough Greaghlone	Dusk	1.25
24/01/2014	Lough Greaghlone	Dawn	1
27/01/2014	Lough Lurgacham	Dusk	0.5
13/01/2014	Lough Moylan (Tullyvaragh)	Dusk	1
23/01/2014	Lough Moylan (Tullyvaragh)	Dusk	1
05/02/2014	Lough Moylan (Tullyvaragh)	Dusk	1.5
10/02/2014	Lough Moylan (Tullyvaragh)	Dusk	1.5
24/02/2014	Lough Moylan (Tullyvaragh)	Dusk	1.5
28/02/2014	Lough Moylan (Tullyvaragh)	Dawn	1.5

Date	Location	Survey Period	Duration (hours)
12/03/2014	Lough Moylan (Tullyvaragh)	Dusk	1
21/03/2014	Lough Moylan (Tullyvaragh)	Dusk	1.5
24/02/2014	Lough Nahinch	Dusk	1.5
05/03/2014	Lough Nahinch	Dawn	1
03/01/2014	Lough Nahinch / Cashel Bog area	Dawn	1
06/11/2013	Lough Namachree	Dusk	1.25
20/03/2014	Lough Namachree	Dusk	1
25/02/2014	Lough Tooncrinkell	Dawn	1
24/01/2014	Loughs Raferagh	Dawn	1
23/01/2014	Loughs Raferagh	Dusk	1
14/11/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	0.75
15/11/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1
18/11/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1.5
21/11/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1
27/11/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1.25
13/12/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1
26/12/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1
31/12/2013	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dawn	1
02/01/2014	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	
06/01/2014	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dawn	1
07/03/2014	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dawn	0.75
24/03/2014	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dusk	1
27/03/2014	Loughs Raferagh/ Comertagh/ Mill/ Greaghlon	Dawn	1
21/11/2013	Drumcarn Bogs	Dawn	1.5

### 3.3.3 Aerial Survey

In addition to the above field surveys two aerial surveys of the CMSA were conducted during WSP 7 on the following dates:

- 4<sup>th</sup> March 2014; and
- 1<sup>st</sup> April 2014.

Due to very poor weather conditions it was not possible to conduct aerial surveys until later in the winter period.

These surveys allowed confirmation of total numbers of Whooper Swans and locations utilised including areas that cannot easily be surveyed during ground surveys. Hence this survey verified the accuracy of ground surveys. It also indicated any sites where more survey work was recommended regarding potential flightlines.

A four seat, single-engine light aircraft was used for the survey. The surveys were undertaken in conditions of good light and visibility, when flocks of Whooper Swans were detectable up to at least

10km either side of the aircraft. To minimise disturbance the plane avoided as much as possible flying below 1000 feet. Two experienced observers engaged in locating the Whooper Swans, counted them accurately and identified sites used by the Whooper Swans.

#### 3.3.4 *Hen Harrier Winter Roost Survey*

A number of locations were identified in the study area where particular attention was paid to recording wintering Hen Harrier Roosts. Suitable habitat (wetlands, dense heather cutover bog) is generally avoided by the preferred line route. However, potential winter roost habitat occurs at several specific locations close to the preferred line route (<2km). The vantage point surveys at Raferagh, Drumcarn and Drumgallon in particular focused on detecting this species. The methodology followed O'Donoghue (2011) in particular the required timing for detection as follows; "In the evenings, the best time to observe harriers at a winter roost is from *at least* 60 minutes before sunset until it is no longer feasible to continue observations in the dark. In the morning, observers should be stationed at the roost 40 minutes before sunrise until *at least* 60 minutes after sunrise".

#### 3.3.5 *Survey Constraints*

A number of minor constraints occurred with regard to conducting the surveys in line with standard guidance: Parts of the study area are relatively low lying with limited view sheds.

- Weather conditions and associated visibility was generally adequate with swans up to 1km away readily identifiable. Visibility in particular will influence the adequacy of survey and all dates except 14<sup>th</sup> March 2014 had adequate visibility for survey work.

It is considered that despite these issues that the survey is robust and the bird counts and flightlines are accurate. Location distribution and numbers (of Whooper Swan) are supported by the aerial survey findings.

## 4 RESULTS

### 4.1 WHOOPER SWANS

#### 4.1.1 *Site distribution*

During the course of the study to date, 57 sites have been identified within the CMSA study area as being utilised by Whooper Swans. During WSP 7, Whooper Swans were recorded at 25 of these sites. Details on Whooper Swan numbers recorded at each site on each survey date during WSP 7 are provided in Appendix 2. The distribution and location of Whooper Swan sites in CMSA is detailed in Figure 1.

The peak counts during WSP 7 for all Whooper Swan sites are summarised in Table 4-1 below. This table details all sites where Whooper Swans have been recorded in CMSA during the 7 years of survey to date, even if there is no data for WSP7. Also listed are 2 sites (Lough Major and Lough Sillan) where no Whooper Swans have been recorded in any year, though they were identified as sites used in the past by NPWS.

**Table 4-1: Peak numbers of Whooper Swan counts recorded during WSP 7 at all sites.**

Site Name	October 2013	November 2013	December 2013	January 2014	February 2014	March 2014	April 2014	PEAK NOS.
Dromore Wetlands (Derryroosk Mullanary etc)	NC	41	3	0	0	0	0	41
Lough Namachree	NC	15	17	17	32	37	0	37
Ballintra	NC		2	0	3	25	0	25
Shantonagh Lough	NC	18	0	0	0	25	0	25
Greaglone*	NC	0	0	24	11	0	0	24
Tullyvaragh Upper	NC	22	0	13	16	3	0	22
Lough Avaghon	NC	NC	NC	0	19	0	0	19
Milltown Lough	NC	17	NC	0	10	0	0	17
Corvally Lough*	NC	0	14	12	0	0	0	14
Lough Nagarnaman	NC	NC	NC	13	0	0	0	13
Comertagh Lough	NC	12	12	0	0	0	0	12
Derrynalooabinagh	NC	12	4	0	0	0	0	12
Raferagh (pond)	NC	0	0	12	0	0	0	12
Barnagrow Lough	NC	0	0	0	0	10	0	10
Bellatrain Lough	NC	10	0	5	0	0	0	10
Creeve lake	NC	8	9	9	4	9	0	9
Ballyhoe Lough / wetlands	NC	NC	NC	NC	NC	NC	8	8
Lisnakkillewbane Lough	NC	0	0	8	2	0	0	8
Lurgacham (Lough + fields)	NC	4	7	0	0	0	0	7
Mill Lough	NC	7	2	2	0	0	0	7
Lough Nahinch - area	NC	5	0	0	0	0	0	5
Lough Morne	NC	3	4	2	0	0	0	4
Corrawaddy Lough *	NC	NC	NC	3	NC	0	0	3
Crossduff Lough	NC	0	3	3	0	0	0	3
Tievaleny Lough	NC	0	0	0	1	0	0	1
Tooncrinkell Lough	NC	0	0	0	0	Roost site Ballintra birds	0	0

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Site Name	October 2013	November 2013	December 2013	January 2014	February 2014	March 2014	April 2014	PEAK NOS.
Annaghierin Lough	NC	0	0	0	0	0	0	0
Bawn Lakes	NC	0	0	0	0	0	0	0
Blaney Castle Lake or Muckno Lough	NC	0	0	0	0	0	0	0
Corliss Lough	NC	0	0	0	0	0	0	0
Corraghy Lough	NC	0	0	0	0	0	0	0
Creevekeeran	NC	0	0	0	0	0	0	0
Creevy Lough	NC	0	0	0	0	0	0	0
Derrygoony Lough	NC	0	0	0	0	0	0	0
Drumillard lough	NC	0	0	0	0	0	0	0
Druminnick Lough	NC	0	0	0	0	0	0	0
Drumlougher	NC	0	0	0	0	0	0	0
East Laragh Lough 2	NC	0	0	0	0	0	0	0
Fane River	NC	0	0	0	0	0	0	0
Kiltybane Lough	NC	0	0	0	0	0	0	0
Lackagh	NC	0	0	0	0	0	0	0
Lantaur	NC	0	0	0	0	0	0	0
Laragh Lough	NC	0	0	0	0	0	0	0
Lismagurshin or Cremartin Lough	NC	0	0	0	0	0	0	0
Lough Alina	NC	0	0	0	0	0	0	0
Lough Egish	NC	0	0	0	0	0	0	0
Lough Major**	NC	0	0	0	0	0	0	0
Lough Patrick	NC	0	0	0	0	0	0	0
Lough Ross	NC	0	0	0	0	0	0	0
Lough Sillan**	NC	0	0	0	0	0	0	0
Lough Smiley (I north)	NC	0	0	0	0	0	0	0
Muckno Mill Lough	NC	0	0	0	0	0	0	0
Muckno Mill Lough (Tributary)	NC	0	0	0	0	0	0	0



Site Name	October 2013	November 2013	December 2013	January 2014	February 2014	March 2014	April 2014	PEAK NOS.
Mullyore flood	NC	0	0	0	0	0	0	0
Tonyscallan Lough	NC	0	0	0	0	0	0	0
Tooncrinkell Lough	NC	0	0	0	0	0	0	0
Tullyvaragh Lower	NC	0	0	0	0	0	0	0

Notes:

1. \* = new site identified in 2013/ 2014 (WSP7),
2. \*\* = historical site only (no records during all surveys to date).
3. NC = Not Counted,
4. The Dromore wetlands are well removed from the development and were subject to partial count only.

During WSP 7 Whooper Swans were recorded at 25 sites in total within the CMSA, refer to Table 4-2 below. The key observations regarding the site usage and flightlines in relation to the preferred line route are detailed. The flightline data and findings are further detailed in section 4.1.2 below.

**Table 4-2: Sites where Whooper Swan recorded in 2013/2014, usage (forage and or roost), flightline recorded or probable (2007 – 2014 data) and maximum count numbers**

Site Name	Foraging (F), Roost, Foraging and roost site (F+R) <sup>1</sup>	Location Relative to preferred line route	Flightline crossing preferred line route (based on survey to date 2007 - 2014) <sup>2</sup>	Maximum Count (2013/ 2014)
Dromore Wetlands (Derryroosk Mullanary etc)	F+R	4km west	No	41
Lough Namachree	F+R	3km west	No	37
Ballintra	F	1km - west	Yes	25
Shantonagh Lough	F+R	2km west	No	25
Beagh Lough/ Greaglone*	F+R	1km west	Yes - occasional	24
Tullyvaragh / Moylan Lough	F+R	10km east	No	22
Lough Avaghon	F+R	5 km - west	No	19
Milltown Lough	F+R	3km west	No	17
Corvally Lough*	F+R	<1km east	No	14
Lough Nagarnaman	F+R	4km east	No	13
Comertagh Lough	F+R	< 1km east	Yes - occasional	12
Derrynaloboinagh	F+R	4km west	No	12
Raferagh (pond)	F+R	<1km north	Yes - occasional	12
Barnagrow Lough	F+R	3km west	No	10
Bellatrain Lough	F+R	3km west	No	10
Creeve lake	F+R	4 – 5km west	No	9
Ballyhoe Lough / wetlands	F+R	9 – 10km east	No	8
Lisnakillewbane Lough	F+R	3km west	No	8
Lurgacham (Lough + fields)	F+R	2km west	No	7
Mill Lough	F+R	1km west	No	7
Lough Nahinch - area	F+R	<1km	No - Further monitoring	5
Lough Morne	F+R	<1km west	Yes - occasional	4
Corrawaddy Lough *	F+R	1km east	No - Further monitoring	3
Crossduff Lough	F+R	2km west	No - Further monitoring	3
Tievaleny Lough	F+R	3km west	No - Further monitoring	1
Tooncrinkell Lough	F+R	1km east	Yes	0
Annaghierin Lough	F+R	4 km - west	No	0
Bawn Lakes **	F+R	4km west	No	0
Blaney Castle Lake or Muckno Lough	F+R	5km east	No	0
Corliss Lough	F+R	>10km east	No	0
Corraghy Lough	F+R	5 – 6km east	No	0
Creevekeeran	F	>12km east	No	0

Site Name	Foraging (F), Roost, Foraging and roost site (F+R) <sup>1</sup>	Location Relative to preferred line route	Flightline crossing preferred line route (based on survey to date 2007 - 2014) <sup>2</sup>	Maximum Count (2013/ 2014)
Creevy Lough	F+R	8km east	No	0
Derrygoony Lough	F+R	6km west	No	0
Drumillard lough	F+R	10km east	No	0
Druminnick Lough	F+R	6km west	No	0
Drumlougher	F+R	12km west	No	0
East Laragh Lough 2	F	5km east	No	0
Fane River	F+R	> 10km east	No	0
Kiltybane Lough	F+R	>13km east	No	0
Lackagh	F	3km east	No	0
Lantaur	F	3km west	No	0
Laragh Lough	F+R	4km east	No	0
Lismagurshin or Cremartin Lough	F+R	1km east	Yes	0
Lough Alina	F+R	>10km east		0
Lough Egish	F+R	1km east	Yes - occasional	0
Lough Major**	F+R	3km west	No	0
Lough Patrick	F+R	>10km east	No	0
Lough Ross	F+R	10km east	No	0
Lough Sillan**	F+R	3km west	No	0
Lough Smiley (I north)	F+R	6km east	No	0
Muckno Mill Lough	F+R	6km east	No	0
Muckno Mill Lough (Tributary)	F+R	6km east	No	0
Tonyscallan Lough	F+R (Ballintra roost site)	1km east	Yes	0
Tooncrinkell Lough	F+R (Ballintra roost site)	1km east	Yes	0
Tullyvaragh Lower	F+R	10km east	No	0

Notes:

1. F + R lakes are locations where Whooper Swans feed on lake and adjacent grasslands generally within 300m of the lake edge based on all observations to date. F are sites where flightlines greater than 300m have been observed to grassland areas.
2. Yes = flightline observed at least in some years. No = Regular flightlines not recorded. No = Random irregular flightlines possible only.
3. Drumgallon Bog (not detailed in Table) is a potential Hen Harrier winter roost site (not indicated above) that was surveyed which is located < 1km east. No roost site was noted.

Whooper Swan sites are mainly centred on small permanent water bodies with adjacent open improved grassland. It was observed during field surveys that these sites generally offer habitats for both feeding and roosting and therefore there is no requirement for the Whooper Swans to commute extensively between separate roosting and feeding sites, with the exception of the area around Ballintra.

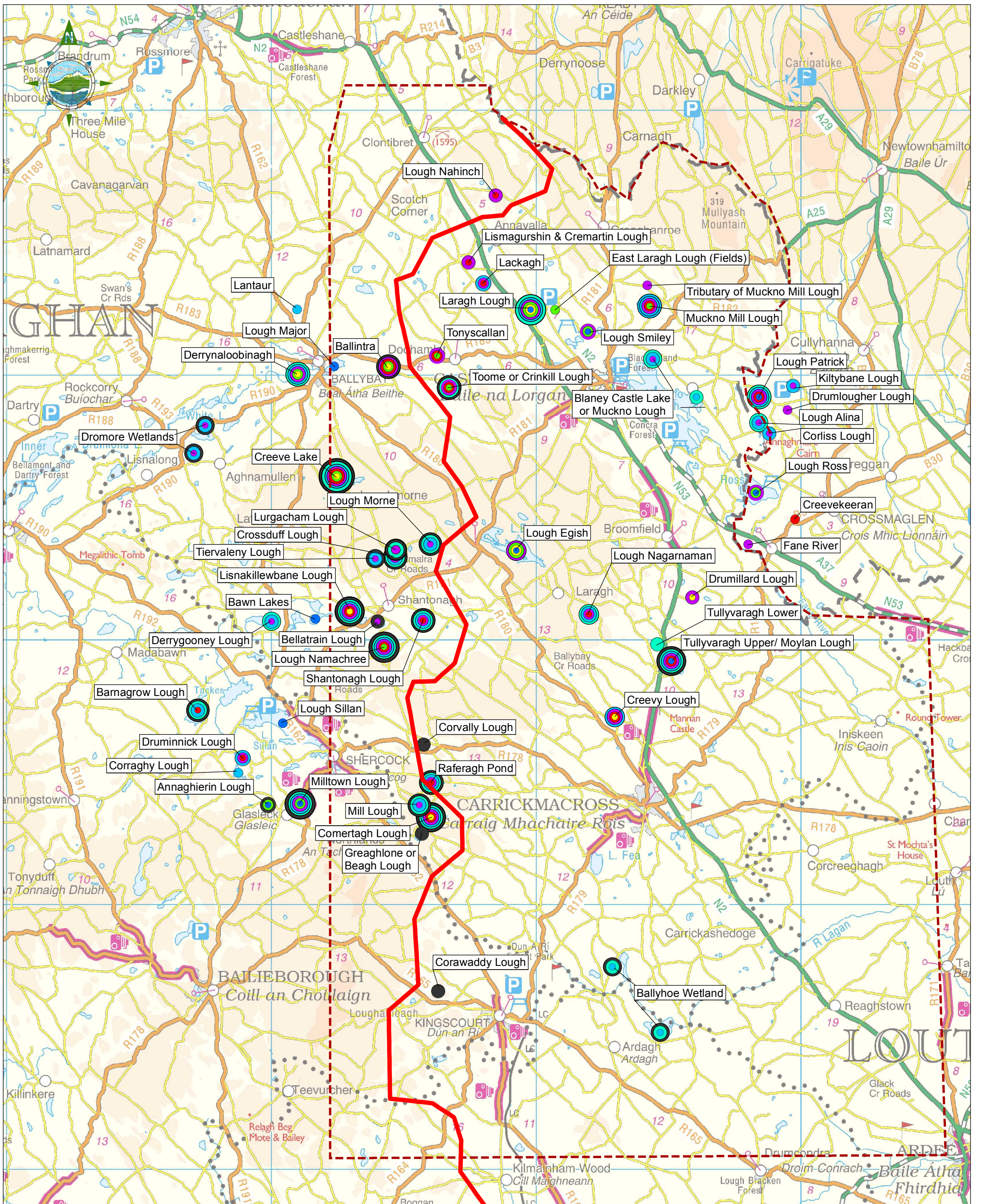
Three new sites (Beagh Lough or Greaghlone, Corawaddy Lough and Corvally Lough) were confirmed as supporting Whooper Swans during WSP7. These were all lake sites and were used for foraging (including adjacent grasslands) and roosting. It is evident that occasional flightlines occurred between a cluster of lakes near Greaghlone over the course of the winter including Comertagh, Raferagh and Corawaddy as a similar sized flock (12 birds) was noted on different lakes over the course of the winter.

The results of the two aerial surveys completed during WSP 7 to confirm Whooper Swan numbers and locations are outlined in Table 4-3 below.

**Table 4-3: Whooper Swans recorded during the Wintering Survey Period 7 Aerial Surveys**

Site Name	Grid Reference	04/03/14	01/04/14
Lough Shantonagh	H758108	25	0
Lough Namachree	H745099	37	0
Ballintra	H745203	25	0
<b>TOTAL (ALL SITES)</b>		<b>87</b>	<b>0</b>

Whooper Swans were recorded at 3 sites during the March Aerial Survey only as detailed in Table 4-3. No sites were noted which were not regularly surveyed in ground based surveys. Other swans species observed were confirmed as Mute Swans during follow up ground checks on the same days. No new sites were recorded during aerial surveys.



- Legend**
- Cavan Monaghan Study Area (CMSA)
  - Proposed Line Route
  - Historical Swan site
  - Whooper Swan sites recorded in Winter Survey Period 1: 2007/2008
  - Whooper Swan sites recorded in Winter Survey Period 2: 2008/2009
  - Whooper Swan sites recorded in Winter Survey Period 3: 2009/2010
  - Whooper Swan sites recorded in Winter Survey Period 4: 2010/2011
  - Whooper Swan sites recorded in Winter Survey Period 5: 2011/2012
  - Whooper Swan sites recorded in Winter Survey Period 6: 2012/2013
  - Whooper Swan sites recorded in Winter Survey Period 7: 2013/2014

NOTE:  
Multi-year/ period observation dots stacked.  
Thickness of Route Line not to scale. Actual Route Corridor much narrower.

Scale @ A3: 1:130,000  
0 0.5 1 2 3 4 5  
Kilometres

Issue	Date	Description	By	Chkd.
B	DEC 2014	Issued	G.F.	O.McA.
A	JAN 2014	Issued	M.S.	E.C.

**NOTES**  
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING  
2. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Client:

Project:  
NORTH-SOUTH 400 kV  
INTERCONNECTION DEVELOPMENT

Title:  
WHOOPER SWAN DISTRIBUTION

Prepared by: G.Fil  
Checked: O.McAlister  
Date: December 2014

Project Director: D.Grehan

Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers.  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland  
Tel: +353-(0)1-8030406  
Fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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#### 4.1.2 Flight Lines during WSP 7

Vantage point locations, survey date, survey time period, key observations and flightlines which crossed (or likely crossed) the preferred line route are detailed in Table 4-4 below. The summary of flightlines recorded in WSP 7 and during other years of survey is indicated in Figure 2.

**Table 4-4: Vantage point locations, dates, key observations and flightline details**

Vantage Point Location	Date (survey period)	Key Observation	Flightline Crossed proposed preferred line route
Ballintra	25/02/2014	0 WS noted during survey, 3WS were present later in the day indicating flightline	Likely (unconfirmed)
Ballintra	04/03/2014	Dusk-25WS flew to Toome or Crinkell Lough (see map)	Yes (WS)
Ballintra	21/03/2014	14WS flew in to valley from south east (likely Toome or Crinkell Lough)	Yes (WS)
Creeve Lough	13/03/2014	9WS walked from grass to lake, roosted on lake, no flights	No
Drumgallon/ Drumcarn/ Mullyard Bogs	16/11/2013	Hen Harrier Roost survey. None noted. Ringtail Hen Harrier noted foraging over rough pasture in Crossbane Lough area.	No
Drumgallon/ Drumcarn/ Mullyard Bogs	01/12/2013	Hen Harrier Roost survey. None noted.	No
Laragh Lough	27/01/2014	No WS in wider area or flightlines observed	No
Lough Bellatrain/ Lisnakillewbane and Bocks	07/11/2013	No WS in wider area or flightlines observed	No
Lough Crossduff	28/01/2014	No WS in wider area or flightlines observed	No
Lough Egish	27/01/2014	No WS in wider area or flightlines observed	No
Lough Egish	28/01/2014	No WS in wider area or flightlines observed	No
Lough Egish	14/03/2014	4 CA flew on to lake from west	Yes (CA)
Lough Egish/ Morne/ Lurgacham	11/11/2013	8MS, 3CA, 3BH, 280GP on lake and lake shore. No flights observed	No
Lough Egish/ Morne/ Lurgacham	26/11/2013	200GP circling over island. No flightlines away from lake.	No
Lough Egish/ Morne/ Lurgacham	28/11/2013	No WS in wider area or flightlines observed	No
Lough Egish/ Morne/ Lurgacham	30/11/2001	Possible 10 WS feeding on grass then walking in to lake. No flightlines	No
Lough Egish/ Morne/ Lurgacham	08/12/2013	No WS in wider area or flightlines observed	No
Lough Egish/ Morne/ Lurgacham	28/12/2013	No WS in wider area or flightlines observed	No
Lough Egish/ Morne/ Lurgacham	03/01/2014	No WS in wider area or flightlines observed	No
Lough Greaghlone	23/01/2014	25 WS on lake. No flightlines.	No
Lough Greaghlone	24/01/2014	WS audible on lake, 0 flights. Heavy fog. No flights observed	No
Lough Lurgacham	27/01/2014	No WS in wider area or flightlines observed	
Lough Moylan (Tullyvaragh)	13/01/2014	14WS(3juv), 2MS (pair), 18WN, 22BH, 6MA, 11T flew south west to roost	No
Lough Moylan (Tullyvaragh)	23/01/2014	13WS, 160WN, 16TU, 20MA, 2MS (pair), 8L. No flightlines observed.	No
Lough Moylan (Tullyvaragh)	05/02/2014	16WS (2juv), 242WN, 16TU, 14MA, 3MS, 6BH, 8T. No flightlines observed.	No
Lough Moylan (Tullyvaragh)	10/02/2014	14WS(2juv), 2MS(pair), 4CA, 280WN, 26TU, 40MA, 44L, 28BH, 6SN. No flightlines observed.	No
Lough Moylan (Tullyvaragh)	24/02/2014	16WS(2juv), 2MS(pair), 380WN, 130TU, 12T,	No

Vantage Point Location	Date (survey period)	Key Observation	Flightline Crossed proposed preferred line route
		18MA, 6CA, 90L, 6SN. No flightlines observed.	
Lough Moylan (Tullyvaragh)	28/02/2014	16WS (2juvs), 470WN, 90TU, 70L, 6MA, 6CA, 2MS (pair), 12BH. No flightlines observed.	No
Lough Moylan (Tullyvaragh)	12/03/2014	10WS, 220WN, 59TU, 9MA, 2T, 4GN, 2GG, 2CA, 4CG, 2SU, 16L. No flightlines observed.	No
Lough Moylan (Tullyvaragh)	21/03/2014	3WS, 2SU, 28TU, 40WN, 2GG, 4MA, 1CA, 18L. No flightlines observed.	No
Lough Nahinch	24/02/2014	No WS in wider area or flightlines observed	No
Lough Nahinch	05/03/2014	No WS in wider area or flightlines observed	No
Lough Nahinch / Cashel Bog area	03/01/2014	No WS in wider area or flightlines observed	No
Lough Namachree	06/11/2013	15WS observed flying NW away from Namachree	No
Lough Namachree	20/03/2014	No WS in wider area or flightlines observed	No
Lough Tooncrinkell	25/02/2014	No WS in wider area or flightlines observed	No
Loughs Raferagh	24/01/2014	No WS in wider area or flightlines observed	No
Loughs Raferagh	23/01/2014	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	14/11/2013	2MS swans present, were present in flood to east in morning-inferred MS flightline	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	15/11/2013	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	18/11/2013	7WS on Mill Lough. No flightlines.	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	21/11/2013	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	27/11/2013	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	13/12/2013	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	26/12/2013	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	31/12/2013	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	02/01/2014	7WS on Raferagh. No flightlines.	<b>Yes</b> (change in location of similar nos. Whooper swan infer flightline)
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	06/01/2014	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	07/03/2014	No WS in wider area or flightlines observed. SN audible.	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	24/03/2014	No WS in wider area or flightlines observed	No
Loughs Raferagh/ Comertagh/ Mill/ Greaghlonge	27/03/2014	2MS + 4MA on Comertagh Lough. No WS in wider area or flightlines observed	No
Drumcarn Bogs	21/11/2013	Hen Harrier Roost survey. None noted.	No



A summary description of the key observations in WSP 7 at identified relevant locations where Whooper Swan concentrate in the study area is provided below.

### **Ballintra**

This area was used in WSP 7 and a flightline to Lough Toome (or Crinkell) was confirmed. This flight line crosses the preferred line route.

### **Loughs Comertagh, Raferagh, Mill, Corawaddy**

Unrecorded flightlines were determined as likely in the Lough Comertagh, Raferagh area based on similar counts of Whooper Swan recorded on different lakes.

### **Lough Namachree**

A flightline was observed from here north which would not have crossed an route corridor option.

### **Lough Crossduff**

A flightline was confirmed between foraging Whooper Swans in the townland of Lattacrom and a roosts site on Crossduff Lough. This did not cross the preferred line route.

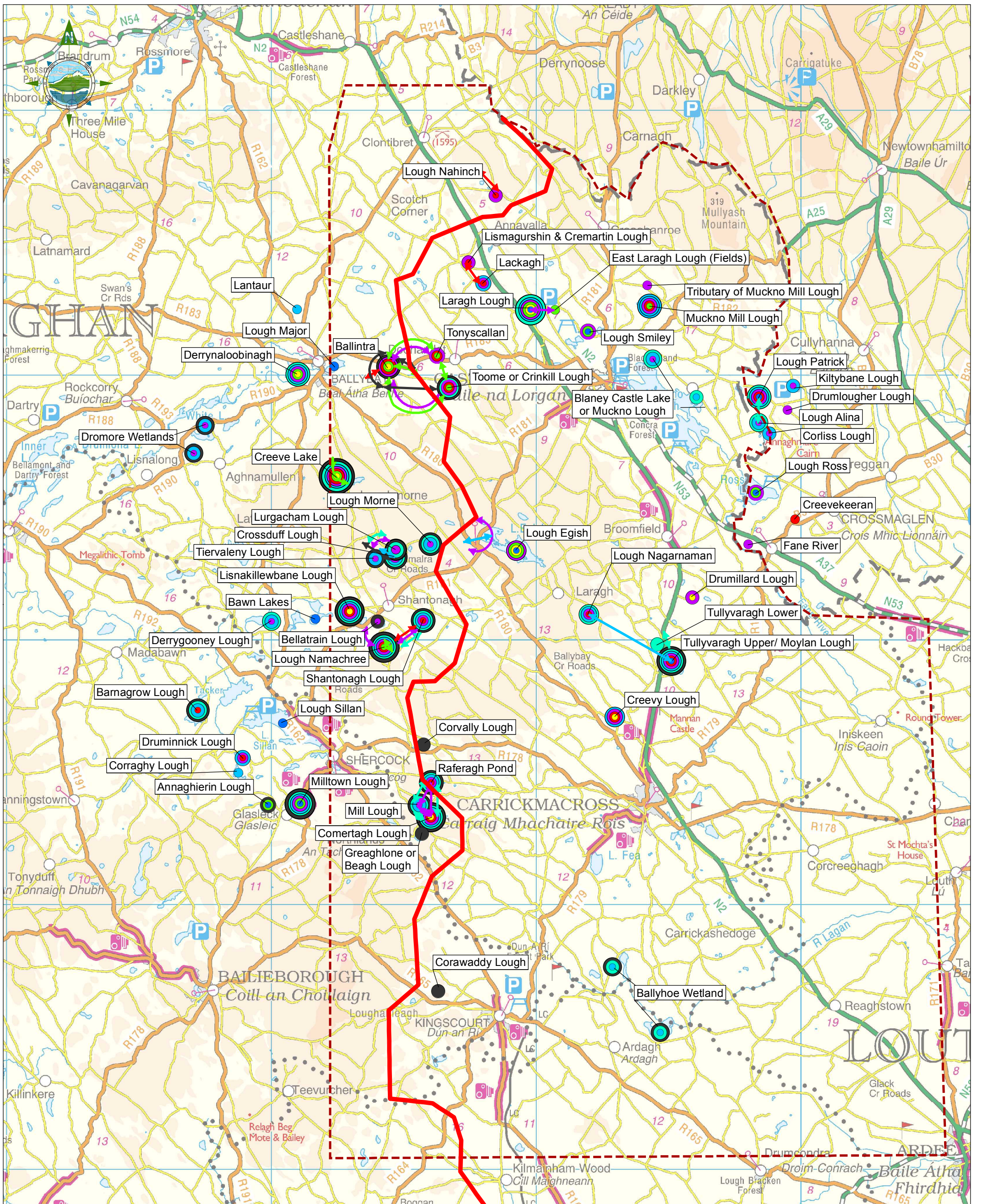
### **Summary**

In summary, flightlines across the preferred line route were recorded at the following locations all of which were highlighted in previous survey years:

1. Between Ballintra and Tooncrinkell Lough which is bisected by the preferred line route.
2. Changes in numbers indicate unobserved flightlines at Loughs Comertagh, Raferagh, Beagh/ Greaghlonge and Corvalley. These lakes are bisected by the preferred line route

No new flightlines of significance were noted which have not been recorded in previous surveys.





**Legend**

- Cavan Monaghan Study Area (CMSA)
- Proposed Line Route
- Historical Swan site
- Whooper Swan sites recorded in Winter Survey Period 1: 2007/2008
- Whooper Swan sites recorded in Winter Survey Period 2: 2008/2009
- Whooper Swan sites recorded in Winter Survey Period 3: 2009/2010
- Whooper Swan sites recorded in Winter Survey Period 4: 2010/2011
- Whooper Swan sites recorded in Winter Survey Period 5: 2011/2012
- Whooper Swan sites recorded in Winter Survey Period 6: 2012/2013
- Whooper Swan sites recorded in Winter Survey Period 7: 2013/2014
- Flight Lines 2007/2008
- Flight Lines 2008/2009
- Flight Lines 2009/2010
- Flight Lines 2010/2011
- Flight Lines 2011/2012
- Flight Lines 2012/2013
- Flight Lines 2013/2014

NOTE:  
Multi-year/ period observation dots stacked.  
Thickness of Route Line not to scale. Actual Route Corridor much narrower.

Scale @ A3: 1:130,000

Issue	Date	Description	By	Chkd.
B	DEC 2014	Issued	G.F.	O.M.G.A.
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**NOTES**  
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2. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Client:

Project:  
NORTH-SOUTH 400 kV  
INTERCONNECTION DEVELOPMENT

Title:  
WHOOPER SWAN DISTRIBUTION  
FLIGHT LINES

Prepared by: G.Fil  
Checked: O.McAlister  
Date: December 2014

Project Director: D.Grehan

Patrick J. Tobin & Co. Ltd.  
Consulting, Civil and Structural Engineers,  
Block 10-4, Blanchardstown Corporate Park,  
Dublin 15, Ireland. Tel: +353-(0)1-8030406  
Fax: +353-(0)1-8030409  
e-mail: info@tobin.ie  
www.tobin.ie

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#### 4.1.3 Summary of Key Observations made during WSP 7

During WSP 7, no site, or dispersed clusters of sites, contained internationally or nationally significant concentrations of Whooper Swan. The total counts of all sites on all dates never exceeded nationally significant levels<sup>18</sup> (maximum = 87). Dromore Wetland is considered the only nationally important site in the study area (including Derryloobinagh). This site is removed from the preferred line route and no flightlines linked to this site have been observed to date (WSP1 – WSP7).

The largest flocks of Whooper Swans identified during WSP 7 were recorded at Dromore Wetlands (41), Lough Namachree (max. 37 birds), Tullyvaragh Upper/ Moylan Lough (22 birds) and Ballintra (25 birds). All these sites are at least 4km from the preferred line route, except Ballintra (< 1km). Whooper Swans were relatively scarce and scattered outside these areas.

The key noteworthy observation as relevant to the preferred line route in WSP 7 was the use of 2 new sites near the regularly used cluster of sites at Lough Comertagh, Raferagh and Mill Lough. These consisted of Lough Beagh/ Greaghlone and a temporary flooded area close to Lough Corvalley.

At Ballintra a flight line was confirmed in WSP 7 with a flightline to Lough Toome (or Crinkell) confirmed. This flight line crosses the preferred line route.

Whooper Swans dispersed between Loughs Comertagh, Mill Beagh (Greaghlone) and Raferagh throughout the winter. In WSP 7 only Whooper Swan were also observed on Beagh (Greaghlone) Lough. Whooper Swan grazed on fields adjacent to the lake and walked into the Lake to roost. In addition it is likely that a flock which temporarily used a flood area near Corvalley Lough moved to Raferagh between December and January which would be an irregular flightline within the route corridor. Both Beagh (Greaghlone) and Corvalley Lough are new sites very close (<1km) to Loughs Comertagh, Mill Beagh (Greaghlone) and Raferagh. In summary during WSP 7 numbers varied on these cluster of lakes bisected by Route Corridor A. This indicates unconfirmed relatively irregular flightlines across the preferred line route.

Very small numbers (max = 4) of Whooper Swan were observed on Lough Morne during November, December and January. These birds did not move far and no flights were observed relevant to the preferred line route.

Whooper Swans disperse west of Lough Morne between Loughs Crossduff, Lurgacham and Tiervaleny throughout the winter period. No flightlines were recorded in WSP7.

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<sup>18</sup> Boland *et al.*, (2010)

Whooper Swans disperse between Loughs Namachree, Shantonagh, Bellatrain and Lisnakillewbane throughout the winter period. In one case a flightline was observed from the northern shore of Lough Namachree north which did not cross the preferred line route >2km away. The main concentration of Whooper Swans occurs west of the preferred line route in this area, and no flights were observed across the preferred line route despite regular surveys.

Regular dusk and dawn surveys were conducted at Lough Nahinch and environs. No significant Whooper Swan usage of this area was noted and hence no flights were noted crossing the preferred line route.

#### 4.1.4 Key observations to date (WSP 1 – WSP 7)

##### 4.1.4.1 Whooper Swan Sites

A summary of the most important individual Whooper Swan sites identified based on average count values for the survey period are summarised in Figure 3 below.

Most of the sites where Whooper Swan were located form part of larger defined areas where Whooper Swan concentrate in the overall study area. Many of these sites are well removed from the proposed development e.g. Ballyhoe Lough/ wetlands, Tullyvaragh etc. Those sites considered relevant to the proposed development are summarised into identifiable key areas to assist in defining key locations along the preferred line route where a potential collision impact is determined i.e. “risk areas”.

These Whooper Swan key sites are identified based on likely connectivity (via observed or likely flightlines) and locations where a clustered distribution of Whooper Swan was identified e.g. concentration of small lakes close to (within 5km) of the proposed development. Table 4-5 details the names of sites associated with key areas (areas close to the proposed development).

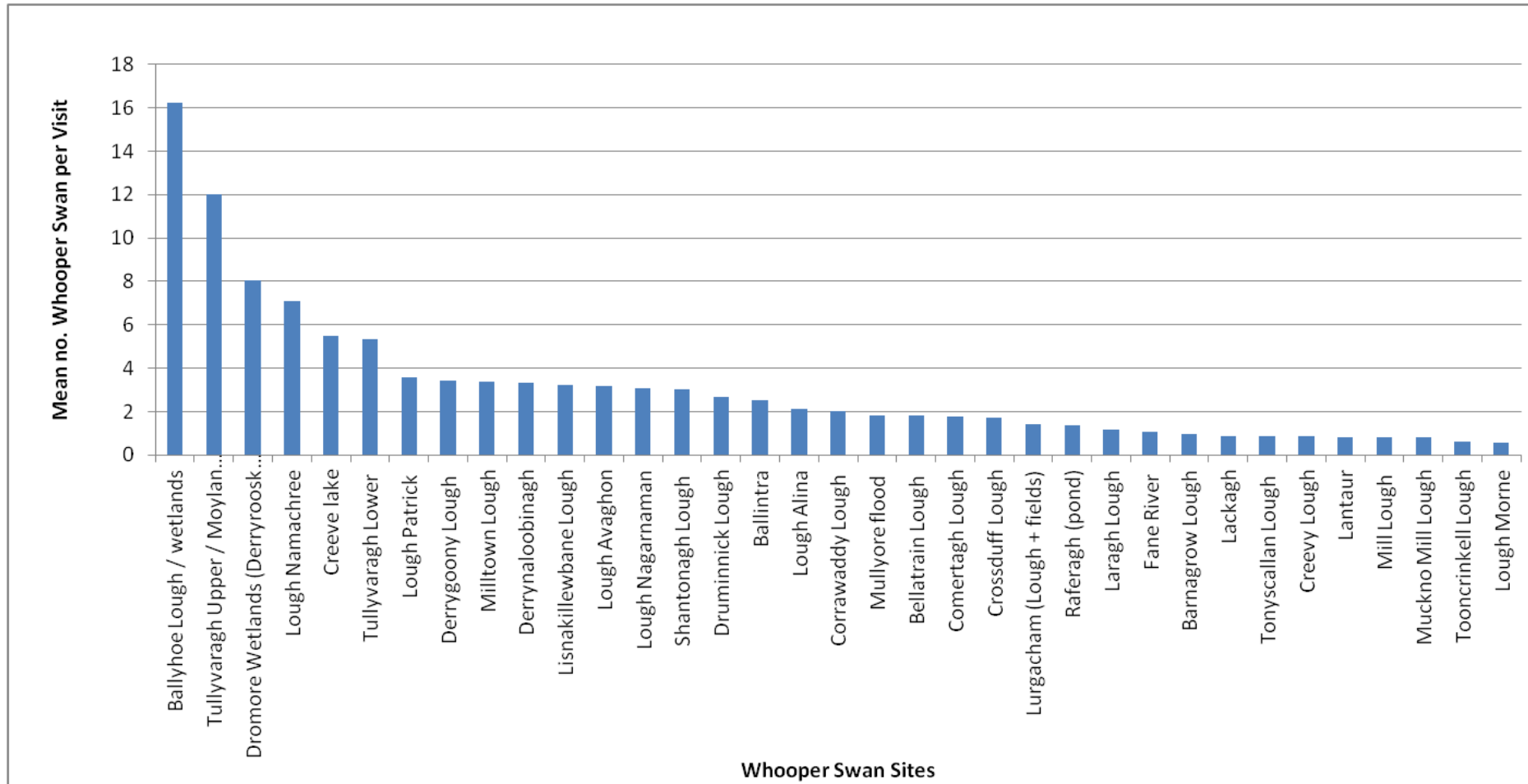


Figure 3: Key sites ranked based on highest to lowest average counts during the survey period



**Table 4-5: Key sites and associated sub-sites identified during survey**

Key Area	Site
Ballintra	Tonyscallan Lough
Ballintra	Toome/Crinkell Lough
Ballintra	Ballintra
Bocks	Lough Namachree
Bocks	Shantonagh
Bocks	Lisnakillewbane
Bocks	Bocks
Bocks	Bellatrain
Comertagh	Raferagh
Comertagh	Comertagh
Comertagh	Beagh Lough/ Greaghlone
Cremartin	Cremartin
Egish	Lurgacham
Egish	Egish
Egish	Crossduff
Egish	Tievaleny
Egish	Boraghy
Egish	Morne
Lough Nahinch	Lough Nahinch
Lough Nahinch	Nahinch
Lough Nahinch	White Lough
Muff	Muff

#### 4.1.4.2 Flightlines

Detail on flightline surveys for all sites identified including effort (number of surveys), number of surveys that flightlines crossed the alignment, maximum numbers of birds crossing the alignment and other comments based on the last 4 years (2010 – 2014) are summarised below in Table 4-6. No additional flightlines locations were observed between 2007 and early 2010 and the findings then are consistent with survey findings since 2010.

**Table 4-6: Summary flightline data for all key Whooper Swan locations identified relevant to the proposed development. Data presented includes survey effort, numbers of flightlines across the alignment and maximum numbers of birds recorded.**

Area	Sub - site	Year	No. Surveys	Flightlines across alignment	% flights across alignment	Max. Nos Birds crossing alignment	Comment
Ballintra	Tonyscallan Lough	WSP4	2	1	50		
Ballintra	Toome/Crinkell Lough	WSP4	1	0			
Ballintra	Ballintra	WSP4	3	1	50	12	
Ballintra	Ballintra	WSP5	2	0			
Ballintra	Tonyscallan Lough	WSP5	1	0			
Ballintra	Toome crinkell Lough	WSP5	1	0			
Ballintra	Ballintra	WSP6	3	0			
Ballintra	Tonyscallan Lough	WSP6	1	0			
Ballintra	Toome crinkell Lough	WSP6	1	0			
Ballintra	Ballintra	WSP7	4	2		25	
Ballintra	Toome crinkell Lough	WSP7	1	0			
<b>Subtotal Ballintra Area</b>			<b>20</b>	<b>4</b>	<b>20</b>	<b>25</b>	
Bocks	Lough Namachree	WSP4	4	0			
Bocks	Shantonagh	WSP4	3	0			Three local flights observed; two beside lake and one to Lough Namachree
Bocks	Lisnakkillewbane	WSP4	6	0			
Bocks	Bocks	WSP5	1	0			
Bocks	Lough Namachree	WSP5	4	0			
Bocks	Shantonagh	WSP5	4	0			
Bocks	Bocks	WSP6	1	0			
Bocks	Shantonagh	WSP6	2	0			
Bocks	Bellatrain	WSP7	1	0			
Bocks	Lisnakkillewbane	WSP7	1	0			
Bocks	Lough Namachree	WSP7	3	0			One flightline to north away from alignment.
<b>Subtotal Bocks Lough area</b>			<b>30</b>	<b>0</b>	<b>0</b>		
Comertagh	Raferagh	WSP4	6	0			
Comertagh	Comertagh	WSP4	1	0			

Area	Sub - site	Year	No. Surveys	Flightlines across alignment	% flights across alignment	Max. Nos Birds crossing alignment	Comment
Comertagh	Comertagh	WSP5	4	0			
Comertagh	Raferagh	WSP5	4	0			
Comertagh	Comertagh	WSP6	7	0			
Comertagh	Raferagh	WSP6	9	0			
Comertagh	Beagh Lough/ Greaghlone	WSP7	3	0			
Comertagh	Comertagh	WSP7	11	0			localised flightline from lake to adjacent grassland observed once, did not cross alignment
Comertagh	Raferagh	WSP7	12	0			
<b>Subtotal Comertagh Lough and associated lakes</b>			<b>57</b>	<b>0</b>	<b>0</b>		
Cremartin	Cremartin	WSP6	3	0			
<b>Subtotal Cremartin Lough Area</b>			<b>3</b>	<b>0</b>	<b>0</b>		
Egish	Lurgacham	WSP4	1	0			
Egish	Egish	WSP4	9	1		4	
Egish	Crossduff	WSP5	2	0			localised flight observed away from alignment
Egish	Egish	WSP5	10	0			One cormorant flightline across alignment
Egish	Tievaleny	WSP5	1	0			
Egish	Boraghy	WSP6	1	0			
Egish	Crossduff	WSP6	4	0			Three localised flightlines did not cross alignment
Egish	Egish	WSP6	4	0			
Egish	Morne	WSP6	5	0			
Egish	Lurgacham	WSP6	1	0			

Area	Sub - site	Year	No. Surveys	Flightlines across alignment	% flights across alignment	Max. Nos Birds crossing alignment	Comment
Egish	Crossduff	WSP7	2	0			localised flightline from lake to adjacent grassland observed once
Egish	Lurgacham	WSP7	6	0			
Egish	Egish	WSP7	10	0			
Egish	Morne	WSP7	7	0			
<b>Subtotal</b>			<b>63</b>	<b>1</b>	<b>1.6</b>	<b>4</b>	
Lough Nahinch	Lough Nahinch	WSP4	8	0			
Lough Nahinch	Nahinch	WSP5	5	0			
Lough Nahinch	Nahinch	WSP6	8	0			
Lough Nahinch	White Lough	WSP6	1	0			
Lough Nahinch	Nahinch	WSP7	3	0			
<b>Subtotal</b>			<b>25</b>	<b>0</b>	<b>0</b>		
<b>Total All Areas</b>			<b>200</b>	<b>5</b>	<b>2.5</b>		

Based on the results of the flightlines survey between 2010 and 2014 (findings of which are consistent with survey findings noted prior to this); the following assessment is made regarding the regularity of flightlines and assessment of whether a potential impact will arise refer to Table 4-7. This data is based on the summary flightline data detailed in Table 4-6.

**Table 4-7: Regularity of flightlines observed across the preferred line route, collision impact determination and requirement for mitigation based on data from 2010 – 2014.**

Whooper Swan area identified as relevant to the preferred line route	Relevant section of alignment	Regularity of flightline and comments	Potential Collision Impact (yes/no) – Mitigation requirements
Ballintra	Between Towers 139 and 147 at the River Blackwater crossing point	Flightlines recorded in 20% surveys - 4 identified flightlines (maximum 25 birds) across the alignment. A <b>regular</b> flightline was determined. A higher count (45 birds) was recorded in March 2009. Otherwise numbers were similar to the most recent surveys	Yes. Mitigation required.
Bocks Lough	Bocks Lough is at the end of a string of lake wetlands. The alignment bisects Bocks Lough and a linear cluster of Whooper Swan sites west of here close to towers 175 - 177.	No flightlines observed following 30 surveys. No Whooper Swans recorded on Bocks Lough in all years of survey.	No. Mitigation <u>not</u> required.
Comertagh	Between Towers 196 and 203. Alignment bisects a cluster of Whooper Swan sub-sites including Raferagh, Comertagh, Greaghlonge and Mill loughs.	No flightlines observed following 57 surveys. Whooper Swans in this area stay on lakes for extended periods (days/ weeks) with very few flightlines. Unconfirmed relatively irregular flightlines are likely to occur across the alignment given it is close to a number of these sites (within 500m).	Yes. Mitigation required.
Egish	Between Towers 160 and 169 the alignment passes between Lough Egish and Morne.	Flightlines recorded in 1% surveys - 1 identified flightline observed by 4 birds across the alignment during 63 surveys. Very irregular flightlines and very low numbers recorded in the vicinity of the alignment.	Yes. Precautionary Mitigation required (also for MS and CA).
Lough Nahinch	The northern section of the alignment between 115 and 118.	No flightlines observed following 25 flightline surveys. Whooper Swans are very irregular in this area.	No. Mitigation <u>not</u> required.
Cremartin Lough (area)	The northern section of the alignment between 123 and 130.	No flightlines observed following 3 flightline surveys and regular counts of the area. Whooper Swans not recorded since January 2012	No. Mitigation <u>not</u> required.

Note: MS = Mute Swan, CA = Cormorant.

#### 4.1.4.3 Summary key findings

To summarise based on the field survey a potential collision risk is identified as being at specific key areas along the proposed development. These areas include;

- Comertagh: The cluster of lakes including Loughs Comertagh, Mill, Beagh (Greaghlone) and Raferagh are host to regular small flocks of Whooper Swan. Whooper Swan were recorded regularly on at least one of these lakes during all years of survey. Whooper Swans disperse between these lakes throughout the winter. In WSP 7 only Whooper Swan were also observed on Beagh (Greaghlone) Lough. In summary this is a regularly used cluster of lakes bisected by the development. This data indicates unconfirmed relatively irregular flightlines are likely to occur across the preferred line route.
- Egish: Lough Egish and Lough Morne and smaller lakes (Lurgacham, Crossduff and Tievaleny) to the west are regularly used by small family groups of Whooper Swan. Lough Morne and Egish are bisected by the proposed development. Whooper Swans concentrate to the west of Lough Morne between Loughs Crossduff, Lurgacham and Tiervaleny throughout the winter period hence flightlines are predominantly west of the preferred line route.
- Ballintra: The Ballintra forage area (fields) is linked by flightlines to Lough Toome's or Crinkell and Tonyscallon (roost sites). At Ballintra a regular flight line was confirmed in WSP 1, 2 and 3 between this feeding area and Loughs Tonyscallan and Toome or Crinkill which are located approximately 1.5km and 2km east and southeast of Ballintra respectively. Whooper Swans also graze in outlier fields close to Ballintra and these lakes. This area was less active in WSP 4 and no activity was noted in WSP 5 or WSP 6. This area was again used in WSP 7 and a flightline to Lough Toome (or Crinkell) was confirmed.

The following sites close to the proposed development (within 2km) were regularly surveyed and based on the survey findings it is considered that the development does not pose a significant collision risk to Whooper Swan in these areas:

- Lough Nahinch and environs. The entire northern section of the alignment including several small lakes such as Tassan and Nahinch were regularly surveyed. This area is not important for Whooper Swan and numbers which occur are very sporadic and low. No flightlines were observed.
- Cremartin Lough. The area east of Cremartin Lough (Lackagh) was used in the early years of survey. No flightline was observed relative to the proposed development. Flightlines observed were at least 2km east of here.

- The area south of Lough Greaghlone to the MSA northern boundary does not hold significant concentrations of Whooper Swan. Despite regular drive round and aerial surveys no significant concentrations of Whooper Swans were observed.
- Bocks: Whooper Swans disperse between Loughs Namachree, Shantonagh, Bellatrain and Lisnakkilwbane throughout the winter period. Flightlines (observed and likely unobserved) in this area do not regularly cross the preferred line route as sites utilised all occur to the west of the corridor. This was confirmed based on regular surveys of Bocks Lough (within the corridor) where no Whooper Swans were recorded to date. In addition flightline checks of observed Whooper Swans confirmed roosting on lakes where foraging was observed during the day. In one case a flightline was observed from the northern shore of Lough Namachree north which did not cross the preferred line route.
- No records of Whooper Swan were determined for other numerous lakes (Loughs) and ponds despite regularly survey (at least once/ month). These include the following lough's within 2km of the preferred line route, presented from north to south; Tassan, White, Black, Cornamucklagh, Letterbane, Ghost, Drumgristin, Coogans, Cordoo, Corfin, Boraghy, unnamed ponds Corvalley townland and Muff.

## 4.2 OTHER WINTERING BIRDS

While the focal point of the study was Whooper Swans, other wintering bird species of conservation concern, and/or species which are potentially sensitive to transmission line development were also surveyed and recorded. Table 4-8 below details peak counts of other bird species (not including Whooper Swan) recorded in WSP7. Numerous other small lakes (not detailed) occur in CMSA which are used by small numbers (generally < 2) of species, in particular Mute Swan, Cormorant, Mallard and Moorhen.

**Table 4-8: Peak counts of wintering bird species WSP 7 (excluding whooper swan)**

Site Name	Other Bird Species (peak count during WSP 7)
Ballintra	110 Golden Plover, 200 Lapwing, 1 Grey Heron
Ballyhoe Wetlands	33 Mute Swan, 6 Coot, 15 Cormorant, 4 Tufted Duck, 1 Great Crested Grebe, 3 Moorhen, 1 Little Grebe
Barnagrow	20 Cormorant, 3 Great Crested Grebe, 10 Lapwing, 4 Mute Swan
Bawn Lakes	1 Mute Swan, 7 Cormorant, 5 Great Crested Grebe, 2 Goldeneye
Beagh Lough/ Greaglone	2 Mute Swan, 1 Cormorant, 1 Moorhen
Bellatrain Lough	14 Mute Swan, 4 mallard, 2 Great Crested Grebe
Cardoo Lough	6 Mute Swan, 2 Great Crested Grebe, 2 Cormorant
Comertagh Lough	9 Mute Swan, 2 Great Crested Grebe, 1 Tufted Duck, 4 mallard
Creeve Lough	19 Tufted Duck, 5 Mute Swan, 2 Great Crested Grebe, 1 Grey Heron, 1 Cormorant
Creevy	2 Coot, 6 Mute Swan, 2 Tufted Duck
Derrynalobinagh (Eastern End Dromore Wetlands))	<u>57 Mute Swan</u> , 150 Golden Plover, 50 Mallard, <u>35 Teal</u> , 20 Moorhen, <u>23 Curlew</u> , 120 Lapwing, 40 Wigeon, 1 Grey Heron, 2 Tufted Duck, 2 Great Crested Grebe, 1 Black Swan*, <u>26 Dunlin</u> , 1 Snipe, 1 Coot,
Dromore Wetland (Partial Checks)	6 Mute Swan, 30 Tufted Duck, 3 Cormorant, 2 grey Heron, 6 Mallard, 2 Great Crested Grebe, 46 Lapwing, Tufted duck
Drumharriff Lough	2 Coot, 4 Little Grebe,
Drumillard Lough	24 Tufted Duck, 5 Mallard, 3 Little Grebe, 10 Goldeneye, 15 Lapwing, 1 Great Crested Grebe
Lismagurshin or Cremartin Lough	2 Great Crested Grebe, 2 Cormorant, 2 Mallard
Lisnakkillewbane Lough	18 Mute Swan, 2 Great Crested Grebe, 2 Cormorant, 4 Mallard, 40 Duck (unid)
Lough Egish	11 Mute Swan, 6 Cormorant, 280 Golden Plover, 4 Great Crested Grebe, 26 Tufted Duck, 60 Lapwing, 1 Grey Heron, 1 Goldeneye
Lough Major	4 Mute Swan, 3 Cormorant, 52 Wigeon, 7 Great Crested Grebe, 25 Mallard, 60 Lapwing, 2 Grey Heron, 3 Coot
Lough Morne	<u>9 Little Grebe</u> , 8 Mute Swan, <u>3 Gadwall</u> , 1 Cormorant, 1 Great Crested Grebe, 12 Mallard, 30 Tufted Duck, 6 Teal
Lough Nagarnaman	10 Tufted Duck
Lough Namachree	11 Mute Swan, 1 Greylag Goose, 1 Cormorant, 2 Great Crested Grebe, 17 Wigeon, 1 Black Swan *, 2 Grey Heron
Lough Patrick	34 Mallard, 4 Great Crested Grebe
Lough Ross	150 Wigeon, 112 Lapwing, 4 Cormorant, 4 Great Crested Grebe, 6 Mallard
Lough Sillan	11 Great Crested Grebe, 2 Mute Swan, 1 Grey Heron
Mill Lough	4 Mute Swan
Milltown Lough	5 Mute Swan, 1 Great Crested Grebe
Muckno Mill Lough	7 Mute Swan, 9 Cormorant, 2 Great Crested Grebe
Muff Lough	4 Little Grebe, 2 mute Swan, 1 grey Heron
Raferagh	2 Mute Swan, 4 Teal, 1 Moorhen
Shantonagh Lake	7 Mute Swan, 4 Great Crested Grebe
Tullyvaragh Lough	<u>380 Wigeon</u> , <u>130 Tufted Duck</u> , 90 Lapwing, 18 Mallard, 11 Teal, 2 Mute Swan, 6 Snipe, 6 Cormorant, 2 Shelduck, 4 Goldeneye, 4 Canada Goose, 240 Golden Plover,

Note:

1. No nationally significant counts of any species were noted. Species counts underlined are noteworthy and considered to be of County importance
2. \* = Non Native Species possible escapee from collection



Based on all surveys to date (WSP 1 – WSP 7) the Key sites for other wintering bird species in the study area are;

Dromore Wetlands including the eastern edge at Derryloobinagh is the most important area. This extensive linear wetland incorporates the Dromore River and associated wetlands and lakes. The focus of the survey was at the eastern end closest to Ballybay (Derryloobinagh) which was regularly counted (unlike the rest). This area supports important concentrations of waders and wildfowl and in particular Mute Swan, Curlew (not recorded elsewhere), Teal, Wigeon, and Dunlin (passage flock recorded on one occasion – not recorded elsewhere). Overall it is considered nationally important when Whooper Swan are included in this evaluation.

Tullyvaragh Lough is the second most important site identified in the study area for wintering wildfowl. This turlough supports high numbers of Wigeon in particular. It also supports locally important concentrations of Golden Plover, Tufted Duck and Lapwing.

All these sites are avoided by the preferred line route and no significant risks are identified.

Other Sites: Remaining sites are much less important though some such as Loughs Egish, Morne, Creeve and Barnagrow are regularly used at least at specific times of the year for locally important concentrations of wintering bird species detailed.

Mute Swan and Cormorant flightlines were observed irregularly between WSP 1 and WSP 7 in the Lough Egish area and it is likely that relatively regular movements of these species occur across the preferred line route at this location. Cormorant, in particular, regularly disperse between lake sites throughout the CMSA and lake clusters / river valleys are where flights are concentrated. Locations where Cormorant concentrate e.g. Lough Blaney and Dromore wetlands are removed from the preferred line route except in the Lough Egish/ Morne area. Very low numbers of these species were recorded outside these areas.

Two sites in the vicinity of the route corridor were identified as possible Hen Harrier roosts namely Raferagh and Drumgallon Bog. No Hen Harrier were observed relative to the proposed development. A Ringtail (immature male) Hen harrier was observed foraging over rough pasture on 21<sup>st</sup> November 2013 close to the study area near Crossbane Lough. The preferred line route avoids significant Hen Harrier roost sites.

## 5 CONCLUSION

### 5.1 WHOOPER SWAN

This report highlights a number of key sensitive locations which require consideration of potential impacts and mitigation in the EIS.

The areas where Whooper Swan flightlines have been observed as crossing the preferred line route and hence where a collision risk is likely are summarised as follows;

- Ballintra/Tonyscallon/Toome or Crinkill Lough;
- west of Lough Egish/ eastern Lough Morne and
- Raferagh Pond/Mill Lough/Comeragh Lough.

### 5.2 OTHER WINTERING BIRDS

Other wintering bird records of note and relevant locations are detailed in this report. Flightlines of other collision prone bird species such as Mute Swan are very irregular and of short distance typically in the immediate vicinity of lake sites where they are concentrated. Lake sites are avoided by the development though inter lake flights in particular around Lough Egish occur which relevant to the proposed development.

## **Glossary**

- CMSA Cavan Monaghan Study Area
- EIA Environmental Impact Assessment
- EIS Environmental Impact Statement
- EU European Union
- FRREC Fall River Rural Electric Cooperative
- IWSSG Irish Whooper Swan Study Group
- I-Webs Irish Wetland Bird Survey
- kV Kilovolts
- MBEC Mackenzie Bradshaw Environmental Consulting
- MSA Meath Study Area
- NPWS National Parks and Wildlife Service
- OHL Over Head Line
- SPA Special Protection Area
- TRLT Teton Regional Land Trust
- WSP Winter Survey Period



# APPENDIX 1

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# APPENDIX 2

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**Whooper Swan Surveys: Summary Statistics and Counts WSP1-7**







Site Name	Whooper Swan Summary Statistics for Cavan/Monaghan 2007 - 2014											
	WSP6						WSP7					
	No Surveys	% Occurance	Mean	STDEV	Min	Max	No Surveys	% Occurance	Mean	STDEV	Min	Max
Dromore Wetlands (Derryroosk Mullanary etc)	5	0	0	0	0	0	12	42	7	13	0	41
Lough Namachree	24	33	8	14	0	37	15	60	14	14	0	37
Ballintra	27	0	0	0	0	0	30	20	2	6	0	25
Shantonagh Lough	25	28	4	8	0	23	12	17	4	9	0	25
Beagh Lough/ Greaglone	28	0	0	0	0	0	25	12	1	5	0	24
Tullyvaragh Upper / Moylan Lough	32	78	13	12	0	40	13	77	10	8	0	22
Lough Avaghon	0				0	0	6	17	3	8	0	19
Milltown Lough	18	33	5	8	0	24	10	50	5	6	0	17
Corvally Lough	28	0	0	0	0	0	26	12	1	4	0	14
Lough Nagarnaman	22	5	0	1	0	4	14	7	1	3	0	13
Comertagh Lough	29	17	1	5	0	24	25	24	2	4	0	12
Derrynalobbinagh	14	7	0	0	0	1	27	11	1	3	0	12
Raferagh (pond)	28	36	2	4	0	12	25	4	0	2	0	12
Barnagrow Lough	12	8	0	1	0	3	9	11	1	3	0	10
Bellatrain Lough	24	0	0	0	0	0	13	15	1	3	0	10
Creeve lake	21	71	6	6	0	25	15	73	5	3	0	9
Ballyhoe Lough / wetlands	10	40	13	23	0	63	1	100	8		8	8
Lisnakillewbane Lough	24	4	0	2	0	11	14	21	1	2	0	8
Lurgacham (Lough + fields)	24	17	3	6	0	17	21	10	1	2	0	7
Mill Lough	27	7	0	2	0	9	24	13	0	2	0	7
Lough Nahinch / Tassan/ White	18	0	0	0	0	0	14	7	0	1	0	5
Lough Mome	30	17	2	5	0	22	28	18	1	1	0	4
Corrawaddy Lough	0				0	0	3	67	2	2	0	3
Crossduff Lough	23	17	2	6	0	17	11	9	0	1	0	3
Tievaleny Lough	18	0	0	0	0	0	10	10	0	0	0	1
Annaghierin Lough	15	0	0	0	0	0	11	0	0	0	0	0
Bawn Lakes	23	0	0	0	0	0	14	0	0	0	0	0
Black Lough	0				0	0	10	0	0	0	0	0
Blaney Castle Lake or Muckno Lough	26	4	0	0	0	2	5	0	0	0	0	0
Boraghy Lake	0				0	0	3	0	0	0	0	0
Bocks Lough	0				0	0	10	0	0	0	0	0
Cambo Lough	0				0	0	3	0	0	0	0	0
Cappagh River Area	0				0	0	3	0	0	0	0	0
Cardoo Lough	0				0	0	3	0	0	0	0	0
Clay Lake	0				0	0	2	0	0	0	0	0
Corliss Lough	15	0	0	0	0	0	11	0	0	0	0	0
Corraghy Lough	17	0	0	0	0	0	10	0	0	0	0	0
Creevekeeran	21	0	0	0	0	0	3	0	0	0	0	0
Creevy Lough	23	0	0	0	0	0	14	0	0	0	0	0
Crossbane Lough Area	0				0	0	7	0	0	0	0	0
Derrygoony Lough	12	8	1	2	0	6	6	0	0	0	0	0
Derryroosk	0				0	0	5	0	0	0	0	0
Drumgallon	0				0	0	3	0	0	0	0	0
Drumharriff Lough	0				0	0	2	0	0	0	0	0
Drumillard lough	23	0	0	0	0	0	13	0	0	0	0	0
Druminnick Lough	17	0	0	0	0	0	8	0	0	0	0	0
Drumlougher	15	0	0	0	0	0	2	0	0	0	0	0
East Laragh Lough 2	21	0	0	0	0	0	16	0	0	0	0	0
Fane River	24	0	0	0	0	0	2	0	0	0	0	0
Killygola Lough	0				0	0	14	0	0	0	0	0
Kiltybane Lough	18	0	0	0	0	0	2	0	0	0	0	0
Lackagh	11	0	0	0	0	0	10	0	0	0	0	0
Lantaur	9	0	0	0	0	0	5	0	0	0	0	0
Laragh Lough	25	12	1	2	0	6	19	0	0	0	0	0
Lismagurshin or Cremartin Lough	15	0	0	0	0	0	10	0	0	0	0	0
Lough Alina	23	4	0	1	0	3	13	0	0	0	0	0

Site Name	Whooper Swan Summary Statistics for Cavan/Monaghan 2007 - 2014											
	WSP6						WSP7					
	No Surveys	% Occurance	Mean	STDEV	Min	Max	No Surveys	% Occurance	Mean	STDEV	Min	Max
Lough Dermot	0				0	0	6	0	0	0	0	0
Lough Egish	31	0	0	0	0	0	28	0	0	0	0	0
Lough Major	15	0	0	0	0	0	15	0	0	0	0	0
Lough Patrick	28	18	2	8	0	42	12	0	0	0	0	0
Lough Ross	23	0	0	0	0	0	13	0	0	0	0	0
Lough Sillan	22	0	0	0	0	0	9	0	0	0	0	0
Lough Tacker	0				0	0	12	0	0	0	0	0
Lough Smiley (I north)	23	0	0	0	0	0	5	0	0	0	0	0
Moyduff Lough	0				0	0	2	0	0	0	0	0
Muckno Mill Lough	26	23	1	1	0	4	12	0	0	0	0	0
Muckno Mill Lough (Tributary)	21	0	0	0	0	0	3	0	0	0	0	0
Muddy Lough	0				0	0	5	0	0	0	0	0
Mullaghard Lough	0				0	0	8	0	0	0	0	0
Mullyore flood	0				0	0	2	0	0	0	0	0
Muff Lough	0				0	0	7	0	0	0	0	0
*Rectory Lake	0				0	0	2	0	0	0	0	0
Shinan Lough	0				0	0	5	0	0	0	0	0
Steelpetons Lough	0				0	0	3	0	0	0	0	0
St. Peter's Lough	0				0	0	11	0	0	0	0	0
Tassan Lough	0				0	0	7	0	0	0	0	0
Tonyscallan Lough	18	0	0	0	0	0	17	0	0	0	0	0
Tooncrinkell Lough	20	0	0	0	0	0	13	0	0	0	0	0
Tullyvaragh Lower	9	22	7	14	0	34	3	0	0	0	0	0







## Whooper Swan Counts in Cavan/ Monaghan 2007 - 2014

Site Name	Grid Reference	WSP3																	
		Oct	Oct	Nov	Nov	Dec	Dec	Jan	Jan	Feb	Feb	Feb	Mar	Mar	Mar	Mar	Mar	Apr	Apr
		21/10/09	22/10/09	17/11/09	18/11/09	08/12/09	09/12/09	19/01/10	20/01/10	01/02/10	09/02/10	10/02/10	01/03/10	11/03/10	12/03/10	19/03/2010	30/03/2010	08/04/10	09/04/10
Dromore Wetlands (Derryrook Mullanary etc)	H678212																		
Lough Namachree	H745099	0	0	0	0	20	20	23	23		0	0		0	0			0	5
Ballintra	H745203	0	0	0	0			16	16			0	14		0				
Shantonagh Lough	H758108	0	0	0	4			0	17		0	0		0	0			16	
Beagh Lough/ Greaglone																0			
Tullyvaragh Upper /	H853089	0	0		0		20		35			58			0			0	
Lough Avaghon	H 688 132																		
Milltown Lough	H710039	0	0	0	0				0			0						0	
Corvally Lough																		0	
Lough Nagarnaman	H820110	0	0		0				0			0			26			0	
Comertagh Lough	H761033	0	0		0				0			5			16			12	0
Derrynalobinagh	H705200	0	0	0	0				0			0			0			0	
Raferagh (pond)	H759046																	4	
Barnagrow Lough	H670073												29		0				
Bellatrain Lough	H740107																		
Creeve lake	H7216	0	0		2		13		7	8		12	5		3			4	
Ballyhoe Lough / wetlands	H8495												71		0				
Lisnakkilbane Lough	H727112	0	0	4	0			0	0			15		0	0			0	5
Lurgacham (Lough + fields)	H747134																		
Mill Lough	H756037																		
Lough Nahinch / Tassan/ White	H784268														12	12			
Lough Morne	H7613	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corrawaddy Lough																			
Crossduff Lough	H759139						6		14	14	0	0		0	0			0	
Tievaleny Lough	H739131																		
Annaghierin Lough	H699038	0	0		0				0			0			0				
Bawn Lakes	H7110	0	0		0				0			0			0			0	
Black Lough																			
Blaney Castle Lake or Muckno Lough	H844206																		
Boraghy Lake																			
Bocks Lough																			
Cambo Lough																			
Cappagh River Area																			
Cardoo Lough																			
Clay Lake																			
Corliss Lough	H888178																		
Corraghy Lough	H686050																		
Creevekeeran	H898147									10		0			0				
Creevy Lough	H830070	0	0		0				8			0			0			0	
Crossbane Lough Area																			
Derrygoony Lough	H700107																		
Derryrook																			
Drumgallon																			
Drumharriff Lough																			
Drumillard lough	H858117	0	0		0		0		0			0			0			0	
Druminnick Lough	H689057								35	30		7	7		0				
Drumlougher	H895185																		
East Laragh Lough 2	H850227	0	0		0				0			0			0			0	
Fane River	H880136																		
Killygola Lough																			
Kiltybane Lough	H895196																		
Lackagh	H780236								5			0			0				
Lantaur	H710224																		
Laragh Lough	H7922	0	0		0				0			0			0			0	
Lismagurshin or Cremartin	H774243																	2	
Lough Alina	H884182																		
Lough Dermot																			
Lough Egish	H7913	0	0	0	0	0	0	0	0		0	0		0	0			0	0
Lough Major	H7220	0	0	0	0				0			0			0				
Lough Patrick	H885190	0	0		0				0			28			0			13	
Lough Ross	H880160	0	0		0		0		0			0			0			0	
Lough Sillan	H700066	0	0		0				0			0			0			0	
Lough Tacker																			
Lough Smiley (I north)	H820220	0	0	0	0				0			0			0			0	









Site Name	Grid Reference	Whooper Swan Counts in Cavan/ Monaghan 2007 - 2014					
		WSP4					
		Apr 03/04/11	Apr 05/04/11	Apr 07/04/11	Apr 08/04/11	Apr 12/04/11	Apr 14/04/11
Dromore Wetlands (Derryrook Mullanary etc)	H678212						
Lough Namachree	H745099	0	0	9	9		0
Ballintra	H745203	0	0			0	
Shantonagh Lough	H758108	0	0	0	0		
Beagh Lough/ Greaglone		0	0	0	0	0	
Tullyvaragh Upper / Moylan Lough	H853089	0		0	0		
Lough Avaghon	H 688 132						
Miltown Lough	H710039	0	0	0	0		
Corvally Lough		0	0	0	0		
Lough Nagarnaman	H820110	0	1	0	0	0	
Comertagh Lough	H761033	0	4	0	0	0	
Derrynalooabinagh	H705200	12	0			0	
Raferagh (pond)	H759046	0	0	0	0	0	
Barnagrow Lough	H670073			0			
Bellatrain Lough	H740107		0	0			
Creeve lake	H7216	0	0	0			
Ballyhoe Lough / wetlands	H8495						
Lisnakkilwbane Lough	H727112	0	0	0	0		
Lurgacham (Lough + fields)	H747134		0	0	0		
Mill Lough	H756037	0	0	0	0	0	
Lough Nahinch / Tassan/ White	H784268		0	0	0	0	
Lough Morne	H7613	0	0	0	0		
Corrawaddy Lough							
Crossduff Lough	H759139	0	0	0		0	
Tievaleny Lough	H739131		0				
Annaghierin Lough	H699038			0			
Bawn Lakes	H7110		0	0			0
Black Lough							
Blaney Castle Lake or Muckno Lough	H844206		0	0	0		
Boraghy Lake							
Bocks Lough							
Cambo Lough							
Cappagh River Area							
Cardoo Lough							
Clay Lake							
Corliss Lough	H888178	0					
Corraghy Lough	H686050						
Creevekeeran	H898147						
Creevy Lough	H830070		0			0	
Crossbane Lough Area							
Derrygoony Lough	H700107			0			0
Derryrook							
Drumgallon							
Drumharriff Lough							
Drumillard lough	H858117	0	0			0	
Druminnick Lough	H689057						
Drumlougher	H895185						
East Laragh Lough 2	H850227						
Fane River	H880136		0		0		
Killygola Lough							
Kiltybane Lough	H895196						
Lackagh	H780236	0	0	0	0		
Lantaur	H710224						
Laragh Lough	H7922	0	0	0	0		
Lismagurshin or Cremartin Lough	H774243	0	0				
Lough Alina	H884182	0	0				
Lough Dermot							
Lough Egish	H7913	0	0	0	0		
Lough Major	H7220	0	0			0	
Lough Patrick	H885190	0	0	0	0		
Lough Ross	H880160	0	0				
Lough Sillan	H700066	0	0	0	0		0
Lough Tacker							
Lough Smiley (I north)	H820220	0	0	0	0		
Moyduff Lough							
Muckno Mill Lough	H840227	0	0	0	0	0	
Muckno Mill Lough (Tributary)	H842234	0	0	0	0	0	
Muddy Lough							
Mullaghard Lough							
Mullyore flood	N859983						
Muff Lough							
*Rectory Lake							
Shinan Lough							
Steelpetons Lough							
St. Peter's Lough							
Tassan Lough							
Tonyscallan Lough	H762208	0		0	0		
Tooncrinkell Lough	H766196	0		0	0		
Tullyvaragh Lower	H846097						











Whooper Swan Counts in Cavan/ Monaghan 2007 - 2014

Site Name	Grid Reference	WSP6																			
		Dec	Dec	Dec	Dec	Jan	Jan	Jan	Jan	Jan	Jan	Jan	Feb	Feb	Feb	Feb	Feb	Feb	Feb	Feb	Feb
		18/12/12	19/12/12	26/12/12	31/12/12	03/01/13	9/01/01/13	10/01/13	15/01/13	16/01/13	31/01/13	01/02/13	04/02/13	10/02/13	12/02/13	14/02/2013	21/02/13	22/02/13	23/02/13	25/02/13	26/02/13
Dromore Wetlands (Derryroosk Mullanary etc)	H678212															0					
Lough Namachree	H745099		0		0		0		0		25		0		0	0				14	
Ballintra	H745203			0	0	0		0		0					0	0					
Shantonagh Lough	H758108		18				0		23	23	0		0		0	0				0	
Beagh Lough/ Greaglone							0				0		0		0					0	
Tullyvaragh Upper / Moylan Lough	H853089			16	23		18		22		23	23	25	25		0	34		25		
Lough Avaghon	H 688 132																				
Milltown Lough	H710039					0	24		4		13		0		0					19	
Corvally Lough							0				0		0		0					0	
Lough Nagarnaman	H820110		0						0			0		0		0	0			0	
Comertagh Lough	H761033						24		0		0	0	0		0					0	
Derrynalobinagh	H705200		0						0						0		1			0	
Raferagh (pond)	H759046						0				0		0		0					0	
Barnagrow Lough	H670073										0		0		0					0	
Bellatrain Lough	H740107		0				0		0		0		0		0		0		0	0	
Creeve lake	H7216						0		4		4		4	0		0	4			4	
Ballyhoe Lough / wetlands	H8495						0		63				50		0					15	
Lisnakkilwbane Lough	H727112		0				11		0		0		0		0	0				0	
Lurgacham (Lough + fields)	H747134						0		0		0		0		0		17	17		16	
Mill Lough	H756037						0		0		0		0		0					0	
Lough Nahinch / Tassan/ White	H784268	0				0			0							0	0				
Lough Morne	H7613							11	11		0		11		22	11		0	0		
Corrawaddy Lough																				0	
Crossduff Lough	H759139						0		0		0		0		0		17	17		0	
Tievaleny Lough	H739131						0		0		0		0	0		0				0	
Annaghierin Lough	H699038						0		0		0		0		0					0	
Bawn Lakes	H7110						0		0		0		0		0		0			0	
Black Lough																					
Blaney Castle Lake or Muckno Lough	H844206		0	0	0		0		0		0		0		0	0				0	
Boraghy Lake																					
Bocks Lough																					
Cambo Lough																					
Cappagh River Area																					
Cardoo Lough																					
Clay Lake																					
Corliss Lough	H888178						0		0		0		0		0					0	
Corraghy Lough	H886050						0		0		0		0		0					0	
Creevekeeran	H898147						0		0		0		0		0	0				0	
Creevy Lough	H830070		0	0	0				0						0	0				0	
Crossbane Lough Area																					
Derrygoony Lough	H700107								6		0		0		0					0	
Derryroosk																					
Drumgallon																					
Drumharriff Lough																					
Drumillard lough	H858117			0	0		0		0				0		0					0	
Druminnick Lough	H689057						0		0		0		0		0					0	
Drumlougher	H895185						0		0		0		0		0		0			0	
East Laragh Lough 2	H850227						0		0		0		0		0		0			0	
Fane River	H880136						0		0		0		0		0		0			0	
Killygola Lough																					
Kiltybane Lough	H895196						0				0		0		0		0			0	
Lackagh	H780236												0		0		0			0	
Lantaur	H710224														0		0			0	
Laragh Lough	H7922	0	0			0	0				0		0		0		0		4		
Lismagurshin or Cremartin Lough	H774243	0													0		0				
Lough Alina	H884182		0		0		0		0		0		0		0		0			0	
Lough Dermot																					
Lough Egish	H7913		0				0				0		0		0		0			0	
Lough Major	H7220		0			0			0	0					0		0			0	
Lough Patrick	H885190		0	0	0		0		0		0		3		0		0		14	0	
Lough Ross	H880160		0				0		0		0		0		0		0			0	
Lough Sillan	H700066						0		0		0		0		0		0			0	
Lough Tacker																					
Lough Smiley (I north)	H820220					0	0		0		0				0		0			0	
Moyduff Lough																					
Muckno Mill Lough	H840227		0			0	0		0		0		0		0		0			2	
Muckno Mill Lough (Tributary)	H842234						0		0		0		0		0		0			0	
Muddy Lough																					
Mullaghard Lough																					
Mullyore flood	N859983																				
Muff Lough																					
*Rectory Lake																					
Shinan Lough																					
Steelpetons Lough																					
St. Peter's Lough																					
Tassan Lough																					
Tonyscallan Lough	H762208		0			0			0						0		0				
Tooncrinkell Lough	H766196	0	0			0			0						0		0				
Tullyvaragh Lower	H846097														0						

		Whooper Swan Counts in Cavan/ Monaghan 2007 - 2014																
		WSP6																
Site Name	Grid Reference	Feb	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Apr	Apr	Apr	Apr	Apr
		28/02/13	01/03/13	02/03/13	06/03/13	07/03/13	14/03/13	15/03/13	20/03/13	21/03/13	22/03/13	26/03/13	27/03/13	03/04/13	04/04/13	05/04/13	08/04/13	09/04/13
Dromore Wetlands (Derryroosk Mullanary etc)	H678212		0															
Lough Namachree	H745099		0				34		0		0		0	11			0	
Ballintra	H745203	0	0		0	0			0		0		0	0			0	
Shantonagh Lough	H758108		17				0		0		0		0	0			0	
Beagh Lough/ Greaglone			0				0				0	0	0	0			0	0
Tullyvaragh Upper / Moylan Lough	H853089			22		40	4	34	1	15			0	0	0	0		
Lough Avagham	H 688 132																	
Milltown Lough	H710039						0							0			0	
Corvally Lough			0				0				0	0		0			0	0
Lough Nagarnaman	H820110					0	0		0	0			0	0			0	
Comertagh Lough	H761033		0				0				0	0	0	0			0	0
Derrynalobinagh	H705200		0			0			0				0	0			0	
Raferagh (pond)	H759046		0				0				0	0		0			0	0
Barnagrow Lough	H670073		0				0							0			0	
Bellatrain Lough	H740107		0				0		0		0		0	0			0	
Creve lake	H7216		25				13		18				10	0			0	
Ballyhoe Lough / wetlands	H8495													4				
Lisnillewbane Lough	H727112		0				0		0				0	0			0	
Lurgacham (Lough + fields)	H747134		0				0		0		0		0	0			0	
Mill Lough	H756037		0				0		0		0	0	0	0			0	0
Lough Nahinch / Tassan/ White	H784268	0	0		0	0			0	0			0	0			0	
Lough Morne	H7613		0		0		0		0		0		0	0			0	
Corrawaddy Lough																		
Crossduff Lough	H759139		0				0		0		0		0	0			0	
Tievaleny Lough	H739131						0				0			0			0	
Annaghierin Lough	H699038						0							0			0	
Bawn Lakes	H7110		0				0		0		0		0	0			0	
Black Lough																		
Blaney Castle Lake or Muckno Lough	H844206					0	0		0					0			0	
Boraghy Lake																		
Bocks Lough																		
Cambo Lough																		
Cappagh River Area																		
Cardoo Lough																		
Clay Lake																		
Corliss Lough	H888178						0							0			0	
Corraghy Lough	H686050						0			0				0			0	
Crevekeeran	H898147					0	0			0				0			0	
Creve Lough	H830070						0		0	0			0	0			0	
Crossbane Lough Area																		
Derrygoony Lough	H700107														0			0
Derryroosk																		
Drumgallon																		
Drumharriff Lough																		
Drumillard lough	H858117		0				0		0	0				0			0	
Druminnick Lough	H689057						0			0				0			0	
Drumlougher	H895185						0							0			0	
East Laragh Lough 2	H850227		0			0	0		0		0			0			0	
Fane River	H880136					0	0		0	0				0			0	
Killygola Lough																		
Kiltybane Lough	H895196					0	0		0					0			0	
Lackagh	H780236					0			0					0			0	
Lantaur	H710224					0			0					0			0	
Laragh Lough	H7922					0	0		0	0				0			0	
Lismagurshin or Cremartin Lough	H774243	0	0		0	0			0	0				0			0	
Lough Alina	H884182					0	0		0					0			0	
Lough Dermot																		
Lough Egish	H7913		0			0	0		0				0	0			0	
Lough Major	H7220		0			0	0		0				0	0			0	
Lough Patrick	H885190			42		0	0		0				0	0			0	
Lough Ross	H880160					0	0		0				0	0			0	
Lough Sillan	H700066		0				0		0		0			0			0	
Lough Tacker																		
Lough Smiley (I north)	H820220		0			0	0		0		0			0			0	
Moyduff Lough																		
Muckno Mill Lough	H840227			3		3	0		0					0			0	
Muckno Mill Lough (Tributary)	H842234					0	0		0					0			0	
Muddy Lough																		
Mullaghard Lough																		
Mullyore flood	N859983																	
Muff Lough																		
*Rectory Lake																		
Shinan Lough																		
Steelpetons Lough																		
St. Peter's Lough																		
Tassan Lough																		
Tonyscallan Lough	H762208	0			0	0			0				0	0			0	
Tooncrinkell Lough	H766196	0	0		0	0			0				0	0			0	
Tullyvaragh Lower	H846097						30	34	0	0			0	0	0		0	



Whooper Swan Counts in Cavan/ Monaghan 2007 - 2014

Site Name	Grid Reference	WSP7																				
		Jan	Jan	Jan	Jan	Feb	Feb	Feb	Feb	Feb	Feb	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Apr	Apr
		13/01/14	14/01/14	23/01/14	27/01/14	05/02/14	10/02/14	11/02/14	24/02/14	25/02/14	28/02/14	04/03/2014	07/03/14	12/03/04	13/03/14	14/03/14	20/03/14	21/03/14	24/03/14	27/03/14	01/04/14	02/04/14
Dromore Wetlands (Derryroosk Mullanary etc)	H678212																				0	
Lough Namachree	H745099			8	17			28	0	32				0							0	
Ballintra	H745203	0			0			0		3	0			25	0	14				0	0	0
Shantonagh Lough	H758108			0	0			0		0				25	0					0	0	0
Beagh Lough/ Greaglonge				24	0			11	2	0				0	0					0	0	0
Tullyvaragh Upper / Moylan Lough	H853089	14		13	13	16		14				16		0						3		3
Lough Avaghon	H 688 132			0						19				0						0		0
Miltown Lough	H710039			0	0			10	9	6				0					0			0
Corvally Lough				0	12			0	0	0				0	0					0	0	0
Lough Nagarnaman	H820110	0		0	0	0		0		0		0		0	0				0	0	0	0
Comertagh Lough	H761033			0	0	0		0	0	0				0	0					0	0	0
Derrynalooabinagh	H705200			0	0	0		0	0	0				0	0				0	0	0	0
Raferagh (pond)	H759046			0	0			0	0	0				0	0				0	0	0	0
Barnagrow Lough	H670073			0	0			0	0	0				0	0				10			0
Bellatrain Lough	H740107			0	0			0	0	0				0	0							0
Creeve lake	H7216			9	0			0		4				0	6				9			0
Ballyhoe Lough / wetlands	H8495																					8
Lisnakillewbane Lough	H727112			4	0			2	0	0				0	0				0			0
Lurgacham (Lough + fields)	H747134			0	0			0	0	0				0	0				0			0
Mill Lough	H756037			2	0			0	0	0				0	0					0	0	0
Lough Nahinch / Tassan/ White Lough Morne	H784268 H7613			0	0			0	0	0				0	0				0	0	0	0
Corrawaddy Lough			3											3								0
Crossduff Lough	H759139			0	0			0		0				0								0
Tievaleny Lough	H739131					1		0		0				0								0
Annaghierin Lough	H699038			0	0			0	0	0				0					0			0
Bawn Lakes	H7110			0	0			0	0	0				0	0				0			0
Black Lough				0	0			0	0	0				0					0			0
Blaney Castle Lake or Muckno Lough	H844206									0				0					0			0
Boraghy Lake										0				0								0
Bocks Lough				0	0					0				0	0							0
Cambo Lough										0				0					0			0
Cappagh River Area														0								0
Cardoo Lough														0								0
Clay Lake														0								0
Corliss Lough	H888178	0		0	0	0		0		0			0		0				0	0		0
Corraghy Lough	H686050			0	0			0		0				0					0			0
Creevekeeran	H898147													0								0
Creevy Lough	H830070	0		0	0	0		0		0				0					0	0	0	0
Crossbane Lough Area			0											0								0
Derrygoony Lough	H700107									0				0					0			0
Derryroosk														0					0			0
Drumgallon														0								0
Drumharriff Lough														0					0			0
Drumillard lough	H858117	0		0	0	0		0		0				0	0				0	0		0
Druminnick Lough	H689057			0	0					0				0								0
Drumlougher	H895185													0								0
East Laragh Lough 2	H850227	0		0	0	0		0		0				0					0	0	0	0
Fane River	H880136													0								0
Killygola Lough		0		0	0	0		0		0				0	0				0	0		0
Kiltybane Lough	H895196													0								0
Lackagh	H780236			0	0					0				0					0			0
Lantaur	H710224									0				0								0
Laragh Lough	H7922	0		0	0	0		0		0				0	0				0	0	0	0
Lismagurshin or Cremartin Lough	H774243			0	0					0				0					0			0
Lough Alina	H884182	0		0	0	0		0		0				0					0	0		0
Lough Dermot				0	0					0				0								0
Lough Egish	H7913			0	0					0				0					0	0		0
Lough Major	H7220			0	0			0		0				0	0				0	0		0
Lough Patrick	H885190	0		0	0	0		0		0				0					0			0
Lough Ross	H880160	0		0	0	0		0		0				0					0			0
Lough Sillan	H700066			0	0					0				0					0			0
Lough Tacker		0		0	0	0		0		0				0					0	0		0
Lough Smiley (I north)	H820220			0	0									0					0			0
Moyduff Lough																			0			0
Muckno Mill Lough	H840227	0		0	0			0		0				0	0							0
Muckno Mill Lough (Tributary)	H842234					0								0								0
Muddy Lough								0		0				0								0
Mullaghard Lough				0				0		0				0					0			0
Mullyore flood	N859983													0								0
Muff Lough			0							0				0		0						0
*Rectory Lake														0								0
Shinan Lough					0			0						0					0			0
Steelpetons Lough														0								0
St. Peter's Lough		0		0	0	0		0		0				0					0			0
Tassan Lough				0	0			0		0				0								0
Tonyscallan Lough	H762208	0		0	0			0		0				0					0	0		0
Tooncrinkell Lough	H766196			0	0			0		0				0					0			0
Tullyvaragh Lower	H846097									0				0					0			0





# TOBIN

Patrick J. Tobin & Co. Ltd.

## INTERNATIONAL NETWORK

Galway  
Fairgreen House,  
Fairgreen Road,  
Galway.  
Ph +353 (0)91 565211  
Fax +353 (0)91 565398  
E-mail [galway@tobin.ie](mailto:galway@tobin.ie)

Dublin  
Block 10-4,  
Blanchardstown Corporate  
Park,  
Dublin 15.  
Ph +353 (0)1 803 0406  
Fax +353 (0)1 803 0409  
E-mail [dublin@tobin.ie](mailto:dublin@tobin.ie)

Castlebar  
Market Square,  
Castlebar,  
Co. Mayo.  
Ph +353 (0)94 902 1401  
Fax +353 (0)94 902 1534  
E-mail [castlebar@tobin.ie](mailto:castlebar@tobin.ie)

Krakow (Poland)  
Ul. Cystersow 9,  
31-553,  
Krakow,  
Poland.  
Ph +4812353 8646  
Fax +48123537329  
E-mail [poland@tobin.ie](mailto:poland@tobin.ie)

Oxfordshire (UK)  
CAB International  
Nosworthy Way,  
Wallingford,  
Oxfordshire.  
Ph +441491829327  
Fax +441491833508  
E-mail [uk@tobin.ie](mailto:uk@tobin.ie)

visit us @ [www.tobin.ie](http://www.tobin.ie)