

N4 Collooney to Castlebaldwin, Proposed Road Development

APPENDIX NO. 12.5

BIRD SURVEY REPORT

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1 Introduction

As part of the completion of the Flora and Fauna chapter for the Environmental Impact Statement (Chapter 12 of the EIS) and associated Natura Impact Statement (NIS) for the proposed N4 Collooney to Castlebaldwin Road Realignment, ECOFACT was commissioned to undertake a wintering bird survey during the period October 2011 to March 2012 and a breeding bird survey in June 2013.

The main reason for undertaking the survey was due to the designation of Lough Arrow as a Special Protection Area (SPA) for birds in 2011 (Statutory Instrument 289/2011). Moreover as there are historical records of the Annex I bird species (Whooper Swan *Cygnus cygnus* [A038] from the study area, it was considered to necessary to investigate if the construction and operation of the proposed road realignment would have any significant implications for Whooper Swans or any other bird species of conservation importance.

The study was initially focused on Lough Corran and Boathole Loughs (see Figure 1) as the proposed road realignment would be closer to these lakes than the existing N4, and there were records of Whooper Swans from these locations. However, from November onwards all the main waterbodies in the study area were included in the monthly surveys, and a survey of all potential daytime grazing areas for swans (and geese) was also undertaken. Additional general ecological observations were made throughout the study period and will be reported elsewhere.

The Wintering Bird assessment involved a site visit at least once a month during the period October and March to locate favourite feeding and roosting sites. The surveys were undertaken from a number of vantage points and included both early morning, and evening counts. The breeding bird surveys were completed over two days, during June 2013. All bird species were considered during the current assessment. Consultation was undertaken with Birdwatch Ireland (BWI) and all relevant data from the BWI wintering bird surveys and Breeding Bird Surveys in the area was collated and reviewed in relation to the proposed development.

The current assessment follows the NRA guidance documents:

- *'Guidelines for ecological impact assessment for National Road Schemes'* (NRA, 2009)
- *'Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes'* (NRA 2008).

These surveys were completed by ECOFACT Environmental Consultants Ltd. on behalf of Sligo County Council NRDO.

2 Methodology

2.1 Desktop study

This study included an updated desk review of the ornithological interest of the site. Consultation was undertaken with Birdwatch Ireland and all relevant data from the BWI Wintering Bird Survey and Breeding Bird Survey in the area was collated and reviewed in relation to the proposed development. The Irish Wetland Bird Survey (I-WeBS) is an annual survey of wintering birds undertaken at a national level, focussing on wetland sites utilised by wintering birds. Bird count data for the closest sites were obtained from Birdwatch Ireland for use in the current assessment. The website of the National Parks and Wildlife Services (NPWS) was also consulted.

2.2 Wintering bird survey

The field study was undertaken during the period October 2011 to March 2012 and involved a total of 10 site visits. The site was visited at least once a month during the period October to March to locate feeding and roosting sites. The wintering bird survey followed the '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*' guidelines, (NRA, 2008). The surveys were undertaken from a number of vantage points and included both early morning and evening counts. All bird species were considered during the assessment, and the study covered all the main waterbodies in the study area. Table 1 presents a general description of surveys completed. Figure 1 presents a map of the study area and survey sites included in the 2011/ 12 wintering bird survey.

A survey of all potential daytime grazing areas for swans (and geese) was also undertaken. This involved an initial review of aerial photography of the study area and zone of influence of the proposed development, which identified the locations most likely to be used for this purpose. Additional general ecological observations were made throughout the study period and will be reported elsewhere.

Counts were carried out from the hill to the west of Lough Corran and Boathole Lough using a Kowa TSN 883 telescope. This telescope was also set up at an *ad hoc* basis near other waterbodies throughout the study area. More often Nikon 10x50 binoculars were used to survey the subject areas. In most cases all surveys were undertaken from the existing N4 road corridor, and the local secondary and tertiary road network within the broader study area of the *Proposed Road Development*. The farmlands around Lough Corran and Boathole Lough were accessed with the permission of the relevant landowners.

The survey was general and very extensive in nature with the aim of maximising the knowledge of the study area. The study extended to 500m or more on each side of the *Proposed Road Development* corridor. The study focused on waterbodies and areas most likely to be used for daytime foraging of geese and swans (i.e. low-lying grassland areas with flashes/near waterbodies). Lough Arrow and the Unshin River corridor were included regularly in the assessments. Lough Meharth (near Riverstown) was also visited regularly.

2.3 Breeding bird survey

The 2013 breeding bird surveys were carried out within the study area of the *Proposed Road Development* using the Countryside Bird Survey (CBS) methodology during the appropriate season. Surveyors followed the '*Ecological Surveying Techniques for Protected Flora and Fauna during the planning of National Road Schemes*' guidelines, (NRA, 2008). The surveys were undertaken on the 24th of June from 2.30pm to 11pm and the 25th of June, from 6.30am to 2.30pm. Almost the entire site was surveyed, taking account of suitable habitat areas previously identified in the wintering bird survey period (see Figure 1) and all species that were seen and heard were recorded.

The survey was carried out under dry, calm and bright weather conditions, optimal for breeding bird surveys.

Table 1 Description of wintering bird surveys completed.

Date	Description of surveys undertaken
October 2011	A site visit was undertaken on the 29 th October 2011 and access routes and suitable vantage points for Lough Corran and Boathole Lough were considered. It was decided that both loughs could be seen from a point on the western side of the complex, along the approximate line of the proposed N4 road realignment. General observations of these waterbodies were undertaken from 10am to 12pm. Following this Lough Arrow was viewed during a windshield survey (following local road network around lake with regular stops).
November 2011	A site visit to Lough Corran and Boathole Lough was undertaken at dawn the 7 th November 2011. The survey extended from 7.30am until 9am. The site was surveyed again at dusk (3:45pm until 5:15pm). During the day general observations in the study area were made. Dawn and dusk surveys were carried out at Boathole Lough and Lough Corran on 28 th November 2011 (dusk survey only from 3.45pm until 5pm) and 29 th November 2011 (dawn from 7.40am until 8.45am and dusk survey from 3.30pm until 5pm). The conditions for the dawn survey and the first dusk survey were relatively poor due to frequent, moderate rainfall (being heavy at times). Conditions for the second dusk survey were generally better as low levels of cloud were present for the first half of the survey giving good visibility of both Loughs. However, conditions gradually worsened due to constant slight rainfall for the remainder of the survey resulting in poorer visibility. During the day checks at Lough Arrow, Toberscanavan Lough, Ardloy & Aghalene Loughs complex, Loghmeenagan, Cleavry Lough and Lough Mehart were undertaken. General observation of potential grazing areas in the study area were also undertaken.
December 2011	A site visit to Lough Corran and Boathole Lough was undertaken at dawn the 9 th December 2011. The survey extended from 7.30am until 9am. For the rest of the day checks were made at Lough Arrow, Toberscanavan Lough, Ardloy & Aghalene Loughs complex, Loghmeenagan, Cleavry Lough, swallow hole complex and Lough Mehart. Again, general observation of potential grazing areas in the study area were also undertaken. During the day conditions were dry and overcast with a slight breeze, but with good visibility. The temperature was mild and reached 12.5°C in the afternoon.
January 2012	Dawn surveys were carried out at Boathole Lough and Lough Corran on 18 th and 19 th January 2012 (dawn from 7:30am until approximately 9am. Conditions for both dawn surveys were clear (30-40% cloud cover on average), calm, with very good visibility. An extensive survey was undertaken on the 27 th January 2012, coinciding with a period of clear, settled weather. The assessment involved site visits to Toberscanavan Lough, Lough Corran/Boathole, Ardloy & Aghalene Loughs complex, Loghmeenagan, Cleavry Lough and Lough Mehart. The study commenced at northern end of the study area and was completed in the late afternoon. A dusk survey was then completed at Boathole Lough and Lough Corran from 3:30pm until just after 5pm.
February 2012	An extensive survey was again undertaken on the 24 th February 2012. Settled clear weather conditions with good visibility prevailed on this day. The assessment involved site visits to all the waterbodies in the study area (as per previous visit). The study commenced at the northern end of the study area and was completed in the late afternoon with observations on Lough Arrow.
March 2012	An extensive survey was again undertaken on the 15 th March 2012, coinciding with very settled clear weather. The assessment involved an early morning visit to Loghmeenagan (7:30am) following by site visits to Toberscanavan Lough, Lough Corran/Boathole, Ardloy & Aghalene Loughs complex, swallow hole complex, Cleavry Lough and Lough Mehart.

Locations of the wintering bird survey sites for the proposed N4 Collooney to Castlebaldwin Realignment

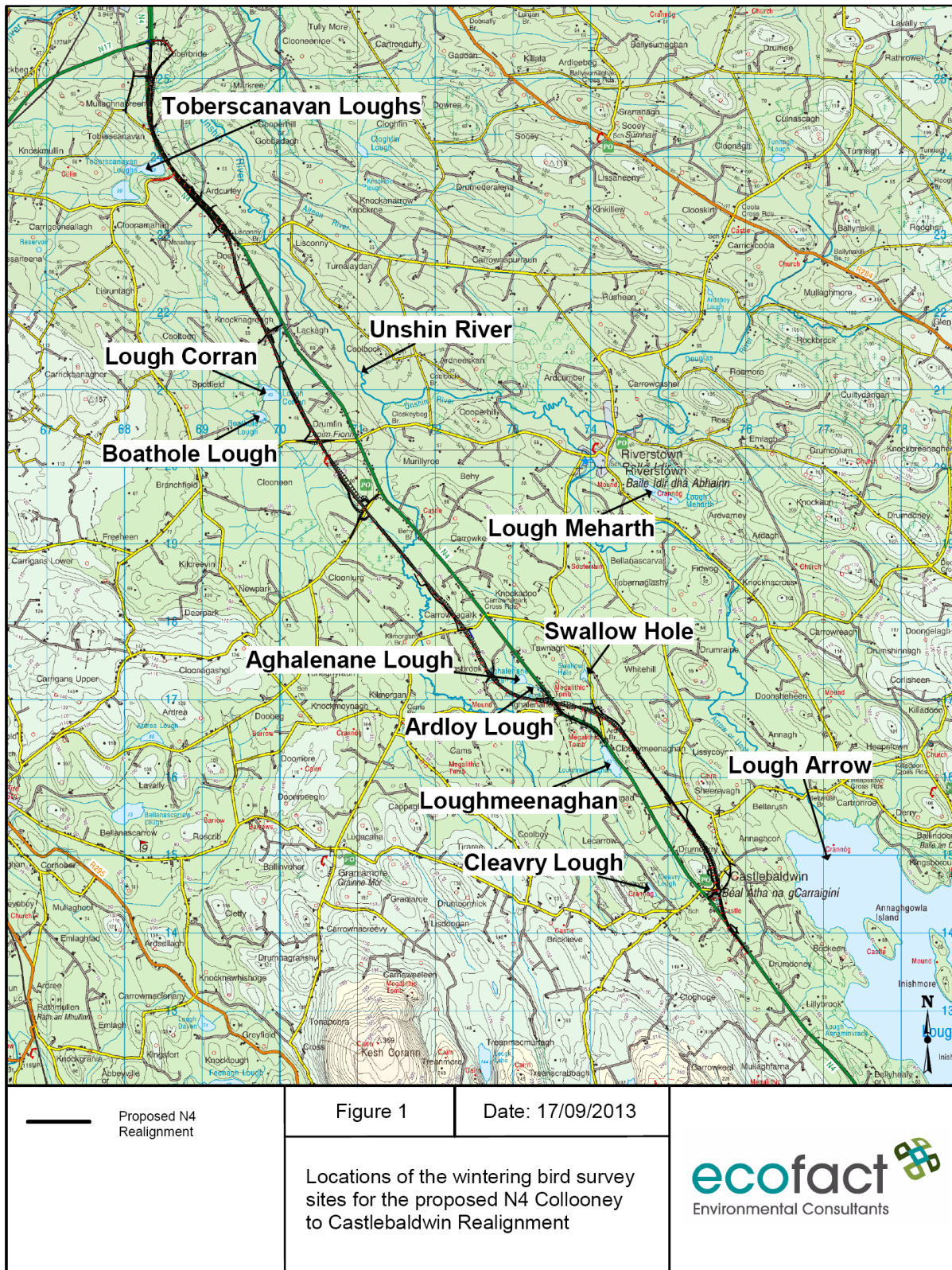


Figure 1 Map showing the locations of the wetland sites and associated habitats visited during the wintering birds survey.

3 Results

3.1 Desk study

Bird surveys in the vicinity of the *Proposed Road Development* were previously undertaken by Cotton (2000). The status of birds in Ireland has been classified by Birdwatch Ireland and the RSPB as detailed in 'The status of birds in Ireland: an analysis of conservation concern, 2008-2013' (Lynas *et al.*, 2007). Birds on the Red List are of high conservation interest in Ireland and are priority species for conservation action. Species are Red-listed if their population has declined dramatically in the recent years; or their breeding population has undergone a significant decline since 1900; or if they are of global conservation concern. Birds on the amber list are of medium conservation concern. Species are Amber-listed if their population has declined moderately in recent years; if they are rare breeders; their wintering or breeding population is localised or of internationally important numbers; or have unfavourable conservation status in Europe. Species are Green-listed if they do not meet Red or Amber-listing criteria.

Bird species on the amber or red lists previously recorded in the study area by Cotton (2000) are provided in Table 2. Only one species on Annex I of the EU Birds Directive (2009) was recorded previously in the study area - Whooper Swan *Cygnus cygnus*. This record was from the Boathole Lough and Lough Corran wetland complex.

Table 2 Bird species of conservation status recorded in the study area by Cotton (2000).

Species		Conservation Status
Coot	<i>Fulica atra</i>	Amber List
Cormorant	<i>Phalacrocorax carbo</i>	Amber List
Cuckoo	<i>Cuculus canorus</i>	Amber List
Great Crested Grebe	<i>Podiceps cristatus</i>	Amber List
Lapwing	<i>Vanellus vanellus</i>	Red List
Redpoll	<i>Acanthis flammea</i>	Amber List
Sand Martin	<i>Riparia riparia</i>	Amber List
Snipe	<i>Gallinago gallinago</i>	Amber List
Stonechat	<i>Saxicola torquata</i>	Amber List
Swallow	<i>Hirundo rustica</i>	Amber List
Teal	<i>Anas crecca</i>	Amber List
Tufted Duck	<i>Aythya fuligula</i>	Amber List
Whinchat	<i>Saxicola rubetra</i>	Amber List
Whooper Swan	<i>Cygnus cygnus</i>	Amber List / Bird's Directive (Annex I)
Wigeon	<i>Anas penelope</i>	Amber List
Pochard	<i>Aythya farina</i>	Amber List
Sand Martin	<i>Riparia riparia</i>	Amber List
Snipe	<i>Gallinago gallinago</i>	Amber List
Stonechat	<i>Saxicola torquata</i>	Amber List
Teal	<i>Anas crecca</i>	Amber List
Curlew	<i>Numenius arquata</i>	Red List
Red-breasted Merganser	<i>Mergus serrator</i>	Amber List

3.1.1 Designated areas

There are no Natura 2000 sites designated under the EU Habitats Directive (1992) directly affected by the *Proposed Road Development*; however, the Lough Arrow SPA site lies in close proximity to the southern end of the proposed realignment (700m at its closest point). The location of designated Natura 2000 sites, including both cSAC and SPA sites are presented in Figures 2 and 3.

The Unshin River cSAC is notable as an example of a pristine river corridor that has not been affected by the arterial drainage works and retains natural habitats along its margins. Table 3 gives the qualifying Interests of the Unshin River cSAC. The Unshin is protected under the Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). It is designated for the protection and conservation of the Annex I habitats floating river vegetation and alluvial wet woodlands. The Unshin and its tributaries form a very important system for the Annex II species Atlantic salmon and is the most important salmon producing river in Co. Sligo. The site is also selected for Otters, another Annex II listed species of the EU Habitats Directive (1992). The NPWS site synopsis for this designation includes Whooper swan and Kingfisher, both of which are listed on Annex I of the EU Birds Directive (2009). The Unshin River cSAC runs parallel and to the east of the existing N4, from Lough Arrow to Ballysadare Bay. The proposed realignment crosses a number of watercourses which are tributaries within the Unshin River catchment. At its closest point the *Proposed Road Development* lies within 300m of the Unshin River; however, this is at a greater distance than the existing N4.

Table 3 Qualifying Interests of the Unshin River cSAC.

	Natura Code	Qualifying interest
Annex I Habitats	91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)
	3260	Rivers with floating vegetation often dominated by Water-crowfoot
Annex II Species	1106	Atlantic salmon (<i>Salmo salar</i>)
	1355	Otter (<i>Lutra lutra</i>)
Additional ecological features detailed in the site synopsis	A229	Kingfisher (<i>Alcedo atthis</i>) (Annex I of Birds Directive)
	A038	Whooper swan (<i>Cygnus cygnus</i>) (Annex I of Birds Directive)

The Lough Arrow cSAC lies approximately 350m south-east from the *Proposed Road Development* at its closest point. The road crosses a minor watercourse (tributary of the Drumderry Stream) that drains into Lough Arrow due south of Castlebaldwin. The Annex I listed habitat '[3140] hard oligo mesotrophic waters with benthic vegetation of *Chara* spp.' is the primary qualifying interest of the site. The qualifying interests of the Lough Arrow cSAC are set out in Table 4. The lake is sheltered on three sides by hills and is the source of the Unshin River. Lough Arrow is unusual in being a largely spring-fed, mesotrophic natural lake which has changed little in the last 40 years. The shores of the lake are for the most part stony; several bays occur in which Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*) are found in abundance. In places the reedbeds extend out into the lake and Bogbean (*Menyanthes trifoliata*) and Yellow Iris (*Iris pseudacorus*) occur. The lakeshore vegetation, which includes sedges (*Carex* spp.), Water Mint (*Mentha aquatica*) and Water Horsetail (*Equisetum fluviatile*), grades into areas of mossy boulders and woodland. The lakes support a diverse submerged aquatic flora.

Table 4 Qualifying Interests of the Lough Arrow cSAC.

	Natura Code	Qualifying interest
Annex I Habitats	3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.
Annex II Species	1355	Otter (<i>Lutra lutra</i>)

Lough Arrow SPA is located approximately 700m to the south of the proposed development, due east of Castlebaldwin village. This SPA is designated for the conservation of nationally important populations of Little Grebe (*Tachybaptus ruficollis*) [A004] and Tufted Duck (*Aythya fuligula*) [A061] with Wetlands and Waterbirds [A999], i.e. the lake itself, also listed as a qualifying interest of the SPA. The Whooper swan [A038] which is also listed on Annex I of the EU Birds Directive (2009) has been recorded from the lake and is listed in the Natura 2000 Standard Data Form for this site. Diving ducks are well represented with Pochard (*Fuligule milouin*), and Goldeneye (*Bucephala clangula*) occurring in numbers of regional importance. High numbers of other species have been recorded, including Coot (*Fulica atra*) and Mallard (*Anas platyrhynchos*). The likely presence of these conservation interests within the designated Lough Arrow SPA potentially affected by the proposed realignment is outlined in Table 5.

Table 5 Conservation Interests of the Lough Arrow SPA.

	Natura Code	Qualifying interest
Conservation interests	A004	Little grebe (<i>Tachybaptus ruficollis</i>)
	A061	Tufted duck (<i>Aythya fuligula</i>)
	A999	Wetlands & Waterbirds
Other Features of Interest	A038	Whooper swan (<i>Cygnus cygnus</i>)

Special Areas of Conservation within 15 km of the proposed N4 Collooney to Castlebaldwin Realignment

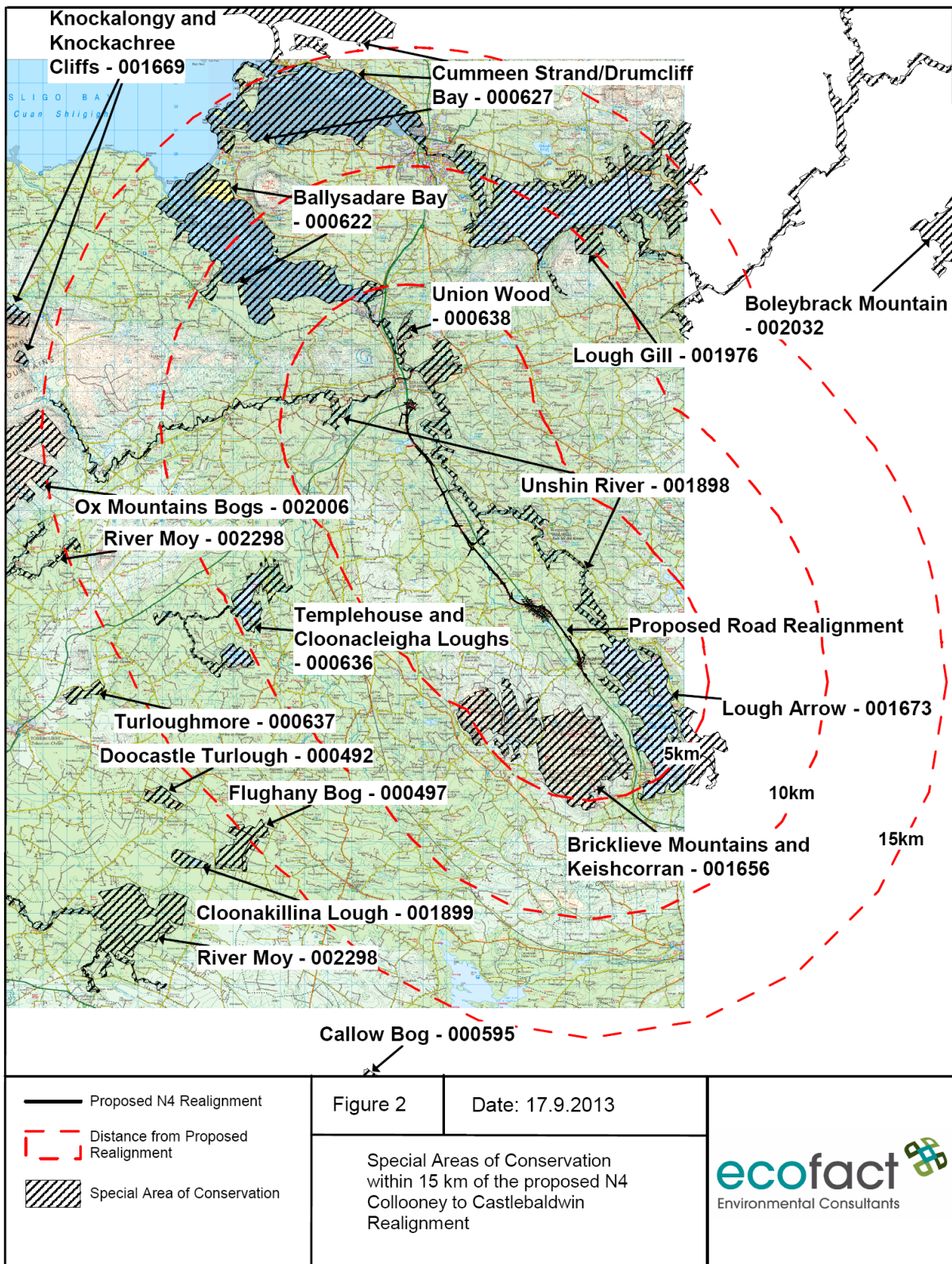


Figure 2 Map showing the Special Areas of Conservation (SAC) sites within the study area of the Proposed Road Development.

Special Protection Areas within 15 km of the proposed N4 Collooney to Castlebaldwin Realignment

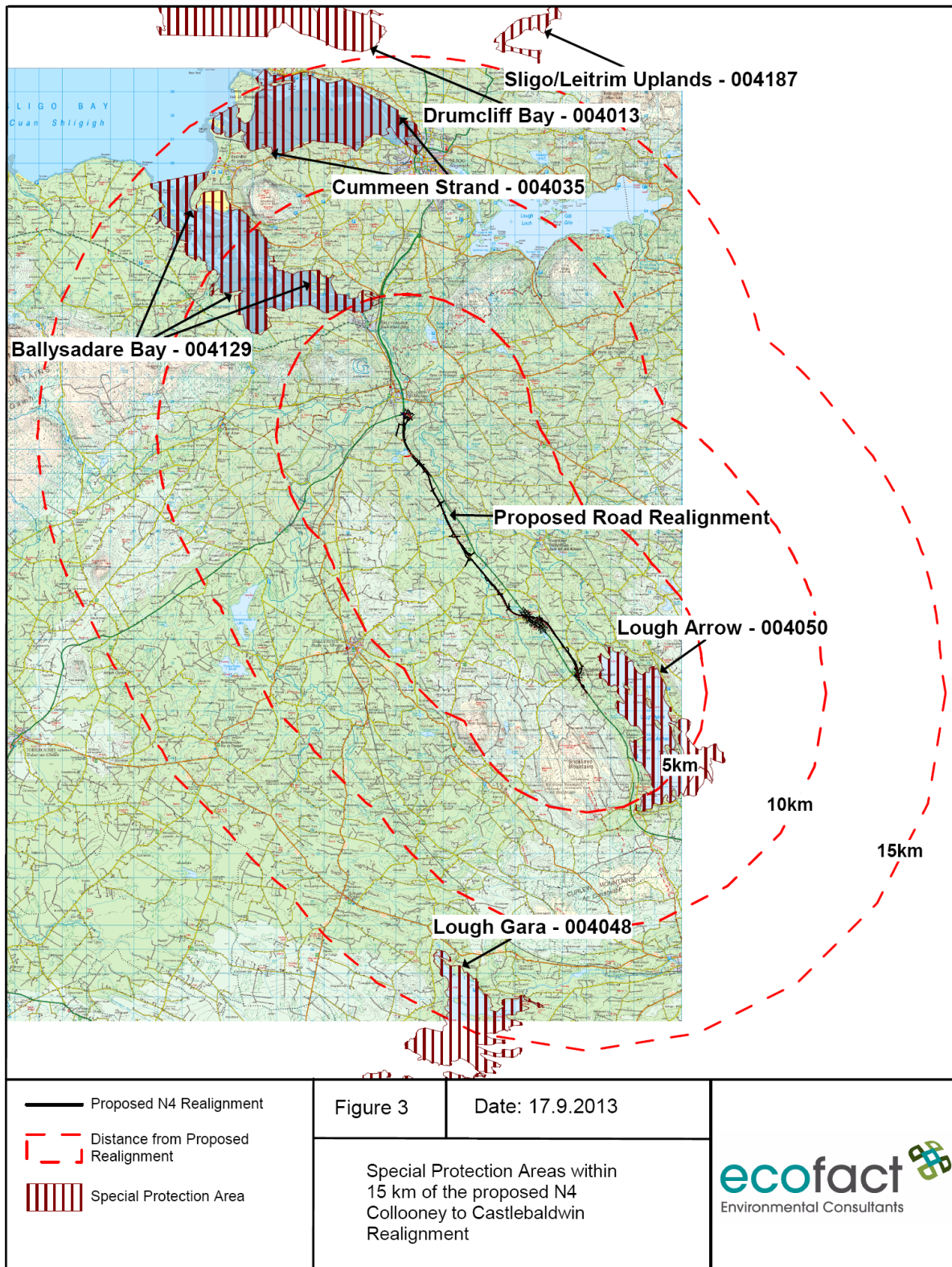


Figure 3 Map showing the Special Protection Area (SPA) sites within the study area of the *Proposed Road Development*.

3.1.2 I-WeBS bird survey data

Data (peak counts) from the Irish Wetland Bird Survey (I-WeBS) published by Crowe *et al.* (2005), were used to assess the presence of important sites for wetland birds in the surrounding environs of the proposed N4 Collooney to Castlebaldwin road realignment. A total of 34 sites selected as part of these surveys were found to be located within 15km of the proposed road realignment. A total of three I-WeBS survey sites of international importance are located between 5-15km of the proposed development: Ballysadare Bay, Sligo Harbour and Lough Gara. All of these sites are designated as Special Protection Areas (SPA).

- Ballysadare Bay is located approximately 5km north-west of the proposed development, extending about 10km westwards from the town of Ballysadare, Co. Sligo. Extensive intertidal sand and mudflats are contained within the bay, which are largely exposed at low tide, that provide important food items for wintering waterfowl. The SPA is of high ornithological importance for a range of waterfowl species in autumn and winter. This site is designated as a SPA as it supports internationally important numbers of Light-bellied Brent Goose *Branta bernicla hrota* (421) and nationally important numbers of Grey Plover *Pluvialis squatarola* (228), Dunlin *Calidris alpina* (2421), Bar-tailed Godwit *Limosa lapponica* (431), and Redshank *Tringa totanus* (649).
- Sligo Harbour, situated adjacent to Sligo town, is located approximately 12km north of the proposed N4 road realignment. This site contains the Cummeen Strand SPA. The harbour consists of largely intertidal sand and mudflats that are exposed at low tide. These support a diverse macro-invertebrate fauna which provide the main food source for wintering waterfowl. The harbour is fringed in parts by salt marsh that provide roosting sites for birds during high tide periods. The site is of high ornithological importance as it supports important concentrations of wintering waterfowl. This site is designated as an SPA as it supports internationally important numbers of Light-bellied Brent Goose *Branta bernicla hrota* (387) and nationally important numbers of Oystercatcher *Haematopus ostralegus* (1205), Redshank *Tringa totanus* (1004), and Greenshank *Tringa nebularia* (49).
- Lough Gara is a shallow limestone lake that is located approximately 12km south-west of the proposed N4 road realignment. The Lough is situated approximately 7km west of Boyle and 7km north-east of Ballaghaderreen. Lough Gara is of high ornithological importance and designated as a SPA principally on account of the internationally important Greenland White-fronted Goose *Anser albifrons flavirostris* (679) population that is associated with the lake and also the high numbers of Whooper Swan *Cygnus cygnus* (654). I-WeBS data from 2006/06 - 2009/10 shows the peak Greenland White-fronted Goose count at Lough Gara was 148, the mean count being 69.

One I-WeBS survey site of national importance is located within 15km of the proposed N4 road realignment.

- Lough Arrow is a large limestone lake that is located adjacent to Castlebaldwin and approximately 1km east of the proposed N4 road realignment. Lough Arrow supports moderate numbers of wintering waterfowl. This site is designated as a SPA and is at least of regional importance for wintering waterfowl (but of international importance due to this SPA designation). The site is rated as the second most important site in Ireland for Little Grebe *Tachybaptus ruficollis* (194). Lough Arrow is an excellent site for breeding Great Crested Grebe *Podiceps cristatus*, with the population being of national importance (23 pairs). The site is recorded to support the following waterbird species: Great Crested Grebe *Podiceps cristatus* (6), Cormorant *Phalacrocorax carbo* (11), Grey Heron *Ardea cinerea* (1), Mute Swan *Cygnus olor* (30), Whooper Swan *Cygnus cygnus* (7), Wigeon *Anas penelope* (39), Teal *Anas crecca* (16), Mallard *Anas platyrhynchos* (65), Pochard *Aythya ferina* (111), Tufted Duck *Aythya fuligula* (301), Goldeneye *Bucephala clangula* (132), Smew *Mergellus albellus* (1), Coot *Fulica atra* (187), Moorhen *Gallinula chloropus* (3), Water Rail *Rallus aquaticus* (1), Curlew *Numenius arquata* (33). Table 6 gives BirdWatch Ireland Irish Wetland Bird Survey data for Whooper Swans during the 1994/95 and 2000/01 period. Table 7 gives more recent data on this species as well as for Greenland White-fronted Goose. It can be seen from data between 1994/95 – 2000/01 and 2006/06 - 2009/10 that Lough Arrow has increased in importance for Whooper Swan. Numbers of this bird increased from a peak of 7 from the earlier survey to 52 during the most recent survey.

Thirty additional I-WeBS and WeBS survey sites not listed as internationally or nationally important are located within 15km of the proposed N4 road realignment. A total of fourteen sites are located between 0-5km, ten sites between 6-10km, and six sites between 11-15km from the proposed development.

- Toberscanavan Loughs is located between Toberscanavan and Cloonamahan townlands directly adjacent to the proposed N4 road realignment on the western side. The lake supports low numbers of waterbirds with the following species recorded from this site: Little Grebe (1), Cormorant (3), Moorhen (1). Loughmeenaghan is located approximately 300m west of the proposed N4 road realignment directly north of Cloongad townland. The lake was noted to support low numbers of Whooper Swan (6) in addition to Grey Heron (1), Mute Swan (2), and Curlew (6).
- Riverstown Swallow Hole is located 500m south-east of Tawnagh townland and approximately 400m east of the proposed N4 road realignment. The site was recorded to support a small number of waterbird species: Mute Swan (2), Wigeon (12), Teal (24), Moorhen (4), Snipe (1), Curlew (12).
- Cleavry Lough is located directly east of Cleavry townland and approximately 1km west of the proposed N4 road realignment. The site is considered to be of low importance for waterbirds as only a low number of Moorhen (2) were recorded at this site. Ballysadare River flows directly north of Collooney town into Ballysadare Bay. The most southerly section of the river is located approximately 1.5km north of the proposed N4 road realignment. The site is considered to be of low importance for waterbirds as only low numbers of Mallard (5) and Kingfisher (1) were recorded at this site. Lough Meharth is located directly south of Riverstown approximately 2.5km east of the proposed N4 road realignment. This lake is of some importance to Wigeon (48) and Curlew (24). This site also supports low numbers of a small range of waterbird species including Mute Swan (2), Teal (4), Mallard (6), Tufted Duck (6), Coot (2), and Moorhen (1).
- Ballygawley Lough is located roughly 2km north-east of Collooney and approximately 3.5km north-east of the proposed N4 road realignment. This site was found to be particularly utilised and of some importance to Whooper Swan (43), Wigeon (24), Teal (25), and Mallard *Anas platyrhynchos* (31). Low numbers of Little Grebe (5), Cormorant *Phalacrocorax carbo* (6), Grey Heron *Ardea cinerea* (1), Mute Swan (3), Pochard (3), Tufted Duck (10), Scaup (1), Goldeneye (5), Moorhen (1), and Curlew (1) were also recorded from the site highlighting that this site supports a range of waterbird species.
- Lough Gowra is located roughly 700m north of Greenan townland and approximately 4km south-west of the proposed N4 road realignment. A low number of waterbird species were recorded at this site with Wigeon (28) being the most abundant.
- Lough Nasool is located approximately 4.5km east of the proposed N4 road realignment directly north of Cornamucklagh townland. Only low numbers of Mute Swan (1) was recorded at this site.
- Ardboy Lough is located roughly 1km east of Rusheen townland and approximately 5km east of the proposed N4 road realignment. Only low numbers of Teal (2) were recorded at this site.
- Lough Bo is located directly south-east of Loughbo Cross Rds. and approximately 5km east of the proposed N4 road realignment. A small number of Whooper Swan (6) and Mallard (2) were recorded at this site.
- Lough Dargan is located south of Arnasbrack townland and approximately 5km north-east of the proposed N4 road realignment. A small number of waterbird species were recorded at this site with Teal (22) being most abundant.
- Templevanny Lough is located directly south of Templevanny townland and approximately 5km south-west of the proposed N4 road realignment. A small number of waterbird species were recorded at this site with Wigeon (48) and Curlew (24) being most abundant.
- Lough Agh is located approximately 5km east of the proposed N4 road realignment between Ballinlig and Derrylea townlands. Only a low number of Mallard (1) was recorded at this site.
- Feenagh Lough is located directly south of Knocklough townland and approximately 6km south-west of the proposed N4 road realignment. A small number of waterbird species were recorded from this site including low numbers of Whooper Swan (7), Mallard (30), Tufted Duck (19), and Curlew (14) were found to be particularly prevalent.
- Lough Daven is located 500m north of Knocklough townland and approximately 6km south-west of the proposed N4 road realignment. A low number of waterbird species were recorded at this site with Curlew (11) being most abundant.
- Lough Gill is located directly south-east of Sligo town and approximately 6.5km north-east of the proposed N4 road realignment. The site supports a range of waterbird species including a small number of Whooper Swan (5). Mallard (336) were also recorded in large numbers at this site.
- Lough Key in Co. Roscommon is located to the north-east of Abbeytown and approximately 8km south-east of the proposed N4 road realignment. The site supports a range of waterbird species including a low number of Whooper Swan *Cygnus cygnus* (1), Coot (51) and Mallard (36) were recorded to be of particular prevalence at this site.

- Carrowmore (Coen's) Lough is located roughly 1km south-west of Sligo town and approximately 8.5km north of the proposed N4 road realignment. A low number of waterbird species were recorded at this site with Mallard (13) being most abundant.
- The Garvoge River flows through Sligo town into Sligo harbour and is located approximately 9km north-east of the proposed N4 road realignment. A small number of waterbird species were recorded at this site with Black-headed Gull *Chroicocephalus ridibundus* (5) being most prevalent.
- Fin Lough (Co. Sligo) is located between Rockfinlough and Finlough townlands approximately 9km west of the proposed N4 road realignment. Only a low number of Mute Swan *Cygnus olor* (1) was recorded at this site.
- Ardline Lake is located directly north of Ardline townland and approximately 9km east of the proposed N4 road realignment. Only low numbers of Mallard (1) and Moorhen (2) were recorded at this site.
- Killoran North Lough is located north-east of Killoran townland approximately 10km west of the proposed N4 road realignment. Only a low number of Mallard (1) was recorded at this site.
- Lough Skean in Co. Roscommon is located roughly 1km south-west of Ballyfarnon and approximately 10km south-east of the proposed N4 road realignment. The site supports a range of waterbird species including large numbers of Pochard (407) and Tufted Duck (133) as well as small numbers of Whooper Swan (13).
- Colgagh Lough is located adjacent to Clogher More townland and is approximately 12km north-east of the proposed N4 road realignment. The site supports a range of waterbird species with Little Grebe (27), Wigeon (40), Teal (29), and Tufted Duck (35) being most prevalent. A small number of Whooper Swan *Cygnus cygnus* (7) were also recorded at this site.
- Lough Anelteen is located between Loughanelteen and Ballynamona townlands approximately 13km north-east of the proposed N4 road realignment. A small number of waterbird species were recorded at this site with Wigeon (32) being most abundant.
- Lough Meelagh in Co. Roscommon is located directly south of the townland Glebe and approximately 13km south-east of the proposed N4 road realignment. A range of waterbird species were recorded at this site with Goldeneye (45) being most prevalent.
- Killananima in Co. Leitrim is located roughly 1km south of Dromahair and approximately 13.5km north-east of the proposed N4 road realignment. A relatively large number of Whooper Swan (35) were recorded at this site.
- Northwest Leitrim Mountain Lakes in Co. Leitrim are adjacent to Dromahair town to the east and located approximately 14km north-east of the proposed N4 road realignment. This site supports a large range of waterbird species including large numbers of Whooper Swan (169). Wigeon (57), Teal (73), Mallard (71), Tufted Duck (92), Goldeneye (50), and Lapwing (55) were also recorded to be particularly prevalent at this site.
- Fin Lough in Co. Roscommon is directly north of Oakport Demense townland and located approximately 15km south-east of the proposed N4 road realignment. A small number of waterbird species were recorded from this site with Mallard (10) being most abundant.

Table 6 BirdWatch Ireland Irish Wetland Bird Survey (I-WeBS) and Wetland Bird Survey (WeBS) site coverage and peak counts where Whooper Swans were recorded between 1994/95 and 2000/01.

Survey Site	Approx. distance from proposed development	No. of Seasons	No. of Counts	Peak Count
Loughmeenaghan	300m	1	3	6
Lough Arrow	1km	1	3	7
Ballygawley Lough	3.5km	3	14	43
Lough Bo	5km	1	2	6
Feenagh Lough	6km	1	1	7
Lough Gill	6.5km	2	6	5
Lough Key	8km	4	4	1

Survey Site	Approx. distance from proposed development	No. of Seasons	No. of Counts	Peak Count
Lough Skean	10km	5	7	13
Colgagh Lough	12km	1	3	7
Lough Gara	12km	4	11	654
Lough Meelagh	13km	5	5	8
Killananima	13.5km	1	1	35
Northwest Leitrim Mountain Lakes	14km	2	37	169

Table 7 BirdWatch Ireland Irish Wetland Bird Survey (I-WeBS) and Wetland Bird Survey (WeBS) peak counts for Whooper Swans and Greenland White-fronted Goose recorded between 2006/06 and 2009/10. Distance between these count sites and the Proposed Road Development.

Species	Survey Site	Approx. distance	2005/06	2006/07	2007/08	2008/09	2009/10	Peak	mean
Whooper Swan	Lough Arrow	1km	52		16			52	34
	Northwest Leitrim Mountain Lakes	14km	7		43	43		43	23
Greenland White-fronted Goose	Lough Gara	12km	71	56		148	68	148	69

Birdwatch Ireland Count Sites within 15km of the Proposed N4 Collooney to Castlebaldwin Realignment

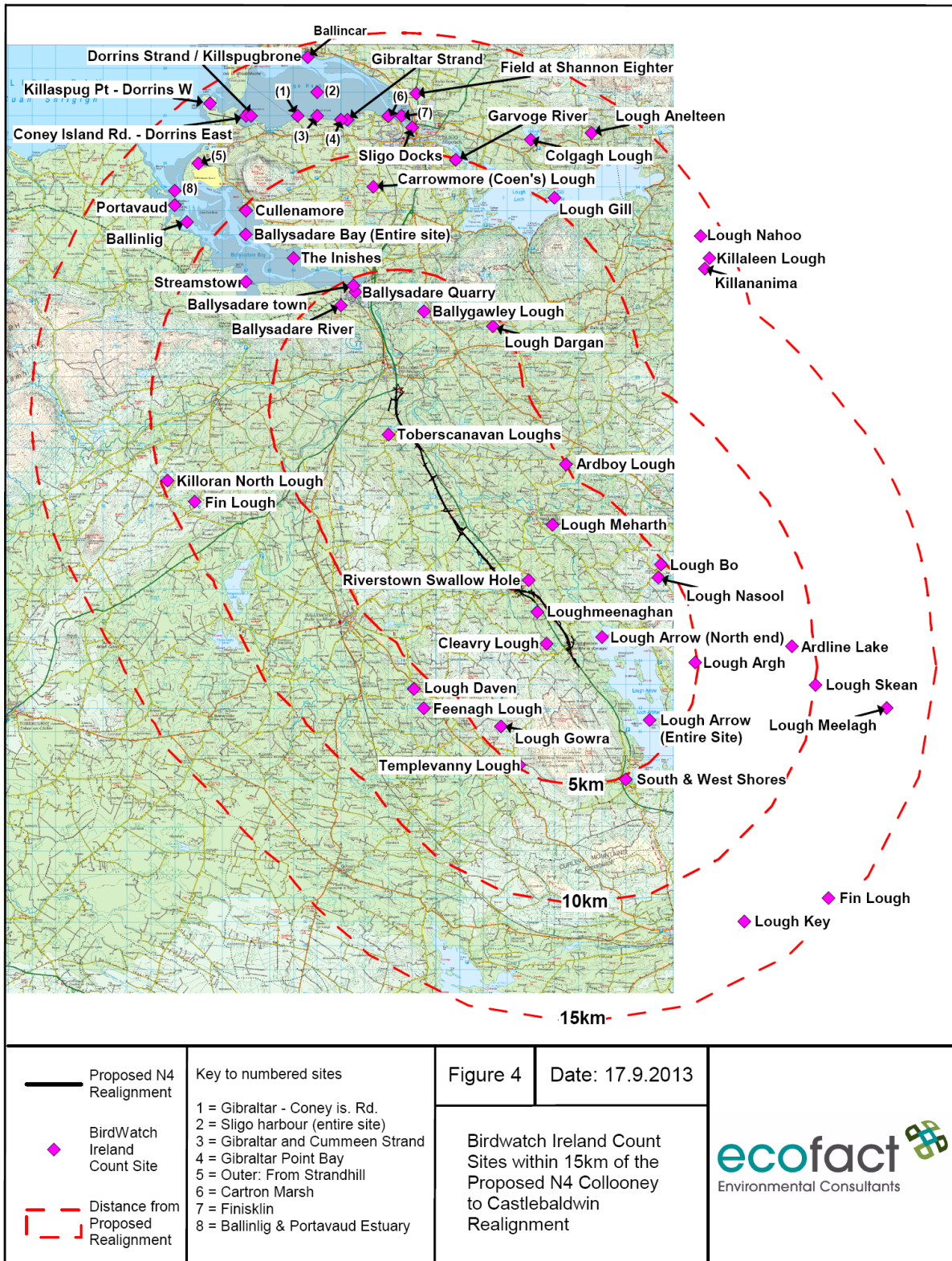


Figure 4 Birdwatch Ireland count sites within 15km of the proposed N4 Collooney to Castlebaldwin realignment.

3.2 Wintering bird survey results 2011-2012

Wintering bird species recorded during the 2011/2012 wintering bird survey include results from surveys carried out between November 2011 and March 2012 inclusive. During the course of the wintering bird surveys the following locations were surveyed: Toberscanavan Loughs, Lough Corran, Boathole Lough, Lough Mehart (Riverstown), the Swallow Hole Complex, Ardloy & Aghalenane Loughs, Loughmeenaghan and Cleavry Lough.

In Crowe (2005), a site was classified as 'internationally important' if it regularly supported in excess of 20,000 waterbirds and/or if it supported at least 1% of the fly-away population of any waterbird species. A site was deemed to be 'nationally important' if it supported in excess of 1% of the all-Ireland population. The threshold number for national importance for each species recorded during the current surveys (based on Crowe, 2005) is provided within each species account below.

Birds previously recorded in the vicinity of the *Proposed Road Development* by Cotton (2000) but not recorded in the current study are Goldeneye *Bucephala clangula*, Great Crested Grebe *Podiceps cristatus* and Water Rail *Rallus aquaticus*. Due to natural temporal variation (movement of birds between waterbodies), such a result is not considered unusual. Goldeneye is a winter visitor to Ireland. Most occur in Ireland between November and April, migrating from their breeding grounds in Fennoscandia. The species is a scarce breeding bird but a common winter visitor with a relatively widespread distribution in Ireland, found on inland lakes and coastal estuaries. They nest in holes in trees and nestboxes, and occasionally in rabbit burrows, usually near water. This species is Amber-listed due to its small breeding population and localised wintering range. The European population has been evaluated as Secure. Great Crested Grebe is a resident species that breeds throughout Ireland, often around coasts in winter. The species breed on large, shallow eutrophic loughs, and along canals and slow flowing rivers with wetlands containing emergent vegetation bordered by open water generally being preferred. They build floating nests among emergent vegetation. This species is Amber-listed due to its localised wintering population (<10 sites). The European population is regarded as Secure. Water Rail is resident at wetlands throughout Ireland, being widespread in both inland and coastal areas. The species favours extensive reedbeds, marshes, and overgrown margins of water-cress beds. Nest is built close to the ground, near or on water, usually in thick vegetation. This species is Amber-listed due to a decline in the breeding population.

3.2.1 Red listed species (high conservation concern) and Annex I species

Lapwing *Vanellus vanellus* is a resident bird common in many parts of Ireland. They breed on undisturbed farmland, and appear to prefer nesting in fields that are relatively bare (particularly when cultivated in the spring) and adjacent to grass. The species are also known to breed on moors and open country throughout. They winter in a variety of habitats, including major wetlands, pasture and rough land adjacent to bogs. This species is Red-listed (Lynas *et al*, 2007) as the European population is considered to be vulnerable. During the 2011/2012 wintering bird survey, Lapwing was recorded from Lough Corran during November (N=2) and January (N=6). This species was not recorded in any other part of the study area. The national threshold number for this species is 2,000. Considering the minimal numbers of Lapwing recorded, the study area is not deemed to be of significant importance for this species.

Whooper Swan *Cygnus cygnus* is a winter visitor to wetlands throughout Ireland from breeding grounds in Iceland. It is listed under Annex I of the EU Birds Directive (2009) and is Amber-listed (Lynas *et al*, 2007); due to Ireland hosting more than 20% of the European wintering population and due to the majority of Whooper Swans wintering at ten or less sites, as well as its very small breeding population. The European population has been evaluated to be Secure. Whooper Swans arrive in Ireland from Iceland in early October and leave in late March/early April. They usually arrive and depart through Lough Foyle/Lough Swilly with their numbers tending to peak in mid winter. They feed on a variety of habitats, from improved pasture to callows, permanent lakes and turloughs to potato crops and roost on lakes at night. They move within sites and between sites during the winter. Whooper Swans have been recorded on Lough Arrow and along the River Unshin, Boathole Lough and Lough Corran. There was a high count of 654 Whooper Swans at nearby Lough Gara in the winter of 1996-97 (the threshold for international importance at the time was 160). However, a Whooper Swan census carried out in January 2010 found a total of 186 in 9 flocks in Co. Sligo.

During the 2011/2012 wintering bird survey, three Whooper Swans were recorded from Loughmeenaghan during the January and February surveys (deemed to be the same birds). One Whooper Swan was recorded at Lough Corran in December 2011 (single observation). A flock of 11 Whooper Swans was recorded near Hollybrook House on the shoreline of Lough Arrow on the 27th January 2012. This was the only flock seen during the survey. The national threshold number for this species is 130, and the numbers recorded on waterbodies in the study are considered to be very low. The single Whooper Swan recorded on Lough Corran on the 19th January 2012 was roosting on the lake and was then chased by Mute Swans onto the shoreline of the lake. Shortly after dawn the bird took flight but flew in the general direction of Lough Arrow. The flight path was parallel to the corridor of the *Proposed Road Development*. Mute swans observed commuting to and from this lake also flew parallel to, rather than rising over the elevated lands upon which the *Proposed Road Development* is located.

3.2.2 Amber listed species (medium conservation concern)

Coot *Fulica atra* is a common year-round resident of lakes, coastal estuaries and river systems throughout Ireland. They nest in large shallow water bodies that are rich in nutrients and have abundant bottom vegetation for food and some emergent vegetation for nest anchorage. This species is Amber-listed (Lynas *et al*, 2007) due to a decline in the breeding population, as well as the localised wintering range. The European population is considered to be Secure. During the current study, 1-2 Coots were recorded intermittently in Toberscanavan Loughs. This species was recorded on one occasion at Lough Corran (November, 2011) where eight Coots were recorded. Coot was also recorded occasionally, in small numbers in Lough Mehart (Riverstown), Ardloy & Aghalenane Loughs and Loughmeenaghan during the 2011/2012 wintering bird survey. This species only occurs intermittently in the vicinity of the *Proposed Road Development* and numbers are nowhere near the nationally threshold number for this species i.e. 410. The study area is considered to be of insignificant importance with regard to this species.

Cormorant *Phalacrocorax carbo* is a large resident seabird. It breeds on cliffs and islands on sheltered coasts with some birds breeding inland in trees. In winter, Cormorant is seen on estuaries, reservoirs and rivers. This species is Amber-listed (Lynas *et al*, 2007) due to its localised breeding population. The European population has been evaluated as Secure. The species is listed under Appendix III of the Bern Convention. During the 2011/2012 wintering bird survey, a single Cormorant was recorded at Toberscanavan Loughs in December, Lough Corran in January and Ardloy & Aghalenane Loughs in March. The national threshold number for this species is 150. Taking into account the sparse and infrequent distribution of this species in wetlands in the vicinity of the *Proposed Road Development*, the study area is not deemed to be particularly important for Cormorant.

Little Grebe *Tachybaptus ruficollis* is resident on ponds and lakes throughout Ireland. Pairs nest mostly on floating plant material hidden in dense vegetation at the margins of shallow, freshwater rivers, streams, loughs and ponds. Their wintering habitat includes ephemeral wetlands, sheltered coasts, estuaries, and coastal lakes and lagoons. This species is Amber-listed (Lynas *et al*, 2007) due to a contraction in the breeding range. The European population is regarded as Secure. During the 2011/2012 wintering bird survey, a single Little Grebe was recorded on Toberscanavan Loughs in November 2011. Two Little Grebes were recorded at Lough Mehart (Riverstown) in February 2012. This species was not recorded at any other survey location. The national threshold number for this species is 40. Considering the limited distribution of this species, the study area is not thought to be of significant importance to Little Grebe.

Mute Swan *Cygnus olor* is a resident and widespread species throughout Ireland. They can be found breeding and wintering on lakes, ponds and rivers. They also winter on estuaries and sheltered coasts. This species is Amber-listed (Lynas *et al*, 2007), as more than 20% of the European population winter in Ireland. The European population is considered to be Secure. During the 2011/2012 wintering bird survey, Mute Swan was recorded at all survey locations with the exception of Boathole Lough. This species was most frequently recorded at Lough Corran, seen in four of the five survey months; November/December (N=6) and January/February (N=2). This species generally occurred in pairs within the study area e.g. Ardloy & Aghalenane Loughs in November and December, Swallow Hole Complex in November. The national threshold number for this species is 210. Numbers of Mute Swan in the study area are low with respect to the national threshold. Mute Swan occurs and probably resides throughout the year in the waterbodies occurring in the vicinity of the *Proposed Road Development*. The study area, however, is not significant for this species given the small numbers that occur.

Pochard *Aythya farina* is a scarce summer visitor and widespread winter migrant from its breeding grounds in eastern Europe and Russia, with most occurring in Ireland between October and February. The species show a preference for large shallow eutrophic waters, particularly those with well-vegetated marshes and swamps and slow flowing rivers. Nesting occurs on the ground among waterside vegetation. This species is Amber-listed (Lynas *et al*, 2007), due to its small breeding population, as well as its localised wintering (<10 sites). The European population has been evaluated as 'Declining' due to a moderate ongoing decline. During the 2011/2012 wintering bird survey, a pair of Pochard was seen at Loughmeenaghan in February 2012. This species was not recorded at any other site during this survey. The national threshold number for this species is 580. Considering that only two Pochard were recorded during the current survey, the study area is not rated as being important for this species.

Teal *Anas crecca* is a resident and winter migrant. Most of the Iceland population winter in Ireland, and also some from Fennoscandia and northern Russia. They are a local and rather scarce breeding species but a widespread winter visitor from September to April. They usually nest near small freshwater lakes or pools and small upland streams away from the coast, and also in thick cover. The species are widespread during winter on wetlands with good cover, such as reedbeds. A wide variety of habitats, both coastal and inland, are utilised including coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs. This species is Amber-listed (Lynas *et al*, 2007), due to a decline in the breeding population. The European population is considered to be Secure. During the 2011/2012 wintering bird survey, Teal were recorded at Toberscanavan Loughs in November, January and February (mean count = 3). This species was also recorded from Lough Corran and Boathole Lough in February when six and two Teal were seen respectively. Three Teal were recorded from the Swallow Hole Complex in December. This species was not recorded at other survey locations. The national threshold number for this species is 570. Numbers of Teal in the study area were low and distribution was limited to three Loughs. Overall, the study area is not considered important for this species.

Tufted Duck *Aythya fuligula* is a resident and winter visitor to Ireland. The species is a widespread and common year-round resident. The species show a preference for large open lakes in lowland areas, where nests are built in waterside vegetation. They are also often seen on town lakes, canals and slow-moving rivers. This species is Amber-listed (Lynas *et al*, 2007), due to its localised wintering range. The European population has been evaluated as 'Declining' due to several key populations undergoing moderate ongoing declines. During the 2011/2012 wintering bird survey, Tufted Duck were recorded at Toberscanavan Loughs in January (N=6) and February (N=4) and from Lough Corran in November (N=6). This species was not recorded at other survey locations. The national threshold number for Tufted Duck is 550. Distribution of Tufted Duck in the study area was confined to Lough Corran and Toberscanavan Loughs and only small numbers of the species were recorded at these locations. The study area is not considered to be significantly important for this species.

Wigeon *Anas penelope* is a scarce breeding species but a common winter visitor from its breeding grounds in northern Russia to wetlands throughout Ireland from September to April. They breed on shallow freshwater marshes, or under tussocks adjacent to lakes and lagoons, or on lake islands. Wintering populations are widespread, occurring on coastal marshes, freshwater and brackish lagoons, estuaries and bays. Many are found on inland wetlands, lakes and turloughs. This species is Amber-listed (Lynas *et al*, 2007), as the majority of the population winters at less than ten sites. The European population is regarded as Secure. Wigeon was recorded occasionally at Toberscanavan Loughs, Lough Corran, Boathole Lough, the Swallow Hole Complex and Cleavry Lough during the 2011/2012 wintering bird survey. The maximum count was at Cleavry Lough during February 2012, with nine Wigeon recorded. The maximum count for this species at sites within the study area was 6. Wigeon was one of the most commonly recorded species during the current study but numbers were still deemed low, taking into account that the national threshold number for this species is 900.

3.2.3 Green listed species (not considered threatened)

Grey Heron *Ardea cinerea* is a large resident wetland bird found throughout Ireland. The species are found in the same wetland habitats during the winter as in the breeding season. The European population is considered to be secure. During the 2011/2012 wintering bird survey, Grey Heron (N=1) was recorded on one occasion at Toberscanavan Loughs (December). A single Grey Heron was recorded at Lough Corran in December and January. This species was not recorded at other survey locations. The national threshold number for this species is 105. This species had sparse distribution within the study area. The study area is of no particular importance to this species.

Mallard *Anas platyrhynchos* is a resident and widespread species. They occur in almost all available wetland habitats in Ireland. The European population is regarded as Secure. Mallard was recorded at all survey locations with the exception of Loughmeenaghan during the 2011/2012 wintering bird survey. This species was most frequent and most common at Lough Corran, ranging in number from 4-6 between November and February inclusive. The national threshold number for this species is 840. Considering the relatively small numbers of Mallard recorded during the current study, wetland areas in the vicinity of the *Proposed Road Development* are deemed to be only of local importance for Mallard.

Moorhen *Gallinula chloropus* is a resident and widespread species throughout Ireland. The species can be found on any freshwater habitat with abundant emergent vegetation, including town canals, muddy ditches, and large lakes. They nest near water, usually in emergent vegetation or on a floating raft. It winters close to its breeding areas. The European population is considered to be Secure. During the 2011/2012 wintering bird survey, Moorhen was recorded at Toberscanavan Loughs, Ardloy & Aghalenane Loughs and Cleavry Lough. This species was seen at Toberscanavan Loughs only once, in January (N=2). A single Moorhen was recorded at Ardloy & Aghalenane Loughs in November with three seen at this location in January. A single Moorhen was recorded at Cleavry Lough in February. The national threshold number for this species is 20 (not strictly based on population size). The small numbers of moorhen are most likely a reflection of the small size of the waterbodies in the study area. The wetlands and waterbodies in the study area are not deemed particularly important for moorhen.

3.3 Breeding bird survey results 2013

The breeding bird survey was undertaken over two days during June 2013. A full list of the breeding bird species recorded is presented in Table 8 below. Almost all of the resident bird species that one might expect to find in mixed farmland with small lakes were recorded. Fifty three (53) species is a very respectable total in the breeding season and reflects the variety of habitats in the study area.

The only Red listed species (Lynas *et al*, 2007) found within the study was Black-headed gull. A flock of gulls, including Black-headed, Lesser Black-backed and Common Gulls were feeding on slurry which had been spread on agricultural grassland fields near Castlebaldwin, adjacent to the existing N4. These birds almost certainly came from breeding colonies on nearby Lough Arrow. None of these gulls were recorded on the small lakes in the study area.

The small lakes within the study area, including Cleavry Lough, Ardloy & Aghalenane Loughs, Loughmeenaghan, Boathole Lough and Lough Corran, were all found to support breeding populations of Mute Swan, Moorhen, Coot, Mallard and Water Rail. Of the small lakes surveyed during the 2013 breeding season Boathole Lough was most important in terms of breeding pairs of waterbirds. It was the only small lake identified supporting breeding pairs of Tufted Duck.

With regard to wetland habitats surveyed, Lackagh Fen did not appear to have any substantial open water habitat and no waterbirds, with the exception of Water Rail, were recorded.

Table 8 Bird species recorded between Collooney and Castlebaldwin, Co. Sligo, June 2013. Birds of conservation concern are identified according to Lynas *et al*. (2007).

Species	Conservation Status	Hedgerow / Scrub	Lakes	Open fields
Mute Swan	Amber		*	
Mallard	Green		*	
Tufted Duck	Green		*	
Grey Heron	Green		*	
Little Grebe	Amber		*	
Sparrowhawk	Green	*		
Kestrel	Amber	*		*

Species	Conservation Status	Hedgerow / Scrub	Lakes	Open fields
Pheasant	Green			*
Moorhen	Green		*	
Water Rail	Amber		*	
Coot	Amber		*	
Common Snipe	Amber			*
Black-headed Gull	Red			*
Common Gull	Amber			*
Lesser Black-backed Gull	Amber			*
Wood Pigeon	Green	*		*
Collared Dove	Green	*		*
Long-eared Owl	Green	*		
Sand Martin	Amber		*	*
House Martin	Amber		*	*
Swallow	Amber		*	*
Meadow Pipit	Green			*
Pied Wagtail	Green		*	*
Wren	Green	*		
Dunnock	Green	*		
Robin	Green	*		
Stonechat	Green			*
Blackbird	Green	*		
Song Thrush	Green	*		
Mistle Thrush	Green	*		
Chiffchaff	Green	*		
Willow Warbler	Green	*		
Blackcap	Green	*		
Whitethroat	Green	*		
Grasshopper Warbler	Amber	*	*	
Sedge Warbler	Green	*	*	
Common Starling	Amber			*
Coal Tit	Green	*		
Blue Tit	Green	*		
Great Tit	Green	*		
Skylark	Amber			*
Magpie	Green	*		*
Jackdaw	Green			*

Species	Conservation Status	Hedgerow / Scrub	Lakes	Open fields
Rook	Green	*		*
Hooded Crow	Green	*		*
House Sparrow	Amber	*		
Chaffinch	Green	*		*
Linnet	Amber	*		*
Goldfinch	Green	*		*
Lesser Redpoll	Green	*		
Siskin	Green	*		*
Bullfinch	Green	*		
Reed Bunting	Green	*	*	*

It is clear from Table 8 that the majority of amber listed species are associated with the small lakes and, to a lesser extent, the wet grassland. The only wader recorded was Snipe, which was near Boathole Lake. There were no Lapwing or Curlew recorded within the study area. A flock of 100 starlings roosted overnight in the reeds beside Boathole Lough.

3.4 Bird habitat assessment

3.4.1 Wintering bird habitat

The study area comprised the *Proposed Road Development* corridor, extending to 500m or more each side of the route, and the wider zone of influence of the proposed development with regard to wintering birds. It is noted that initially, only Boathole Lough and Lough Corran were to be included within the study area. To gain a better understanding of the use of habitats by waterbirds in the vicinity of the proposed works however, Toberscanavan Loughs, Lough Mehart (Riverstown), the Swallow Hole Complex, Ardloy & Aghalenane Loughs, Loughmeenaghan and Cleavry Lough Arrow were also included as part of the study area. Regular surveys of Lough Arrow were also completed.

Whooper Swan, an Annex I listed species had been previously recorded in the study area by Cotton (2000). The occurrence of Whooper Swan in the study area was confirmed during the current 2011/2012 wintering bird survey, being recorded from Lough Corran (N=1) and Loughmeenaghan (N=3). A flock of 11 Whooper Swans was recorded near Hollybrook House on the shoreline of Lough Arrow on the 27th January 2012. This was only flock seen during the survey.

Lough Corran, Boathole Lough and the other wetland areas in the immediate vicinity of the proposed realignment are not considered to be of significant importance to Whooper Swan. During current field survey work, over 15 hours at the peak of the wintering bird season (January) was dedicated to searching for Whooper Swan/Geese using fields as foraging areas in the study area. No sightings of such birds were recorded however, with the exception of the flock near Hollybrook House which is over 2km away from the southern end of the proposed realignment. In general, the fields in the study area are considered to be of little importance to foraging Whooper Swan or other large birds such as Geese. This evaluation is based on the small size of the fields in this part of County Sligo. Whooper Swans/Geese prefer large fields that are prone to flooding/partial inundation so that they can forage and leave/enter the field easily, taking account of the distance required for these large birds to gain altitude to negotiate hedgerows and treelines. The surveys also included the lowland peat land areas along the line of the *Proposed Road Development* and no swans or geese were seen utilising these areas. The study area is rated as being sub-optimal and insignificant for wintering birds in terms of roosting and daytime feeding.

3.4.2 **Breeding bird habitat**

From an ornithological point of view, the main habitats in the study area of the survey were a series of small lakes with reed beds, small fields of wet grassland, hedgerows, some bog and some small forestry plantations in the vicinity. The section of the Unshin River within the study area was surveyed and did not appear to be suitable for breeding Kingfisher with regard to bankside / riparian habitat. During the breeding bird survey Tobercanavan Lough was found to hold almost no waterbirds. Additionally, none of the bogs within the study area were sufficiently large to hold peatland-specialist birds such as Red Grouse.

4 Conclusions and Recommendations

From the results of the wintering bird survey (winter 2011/2012), the study area of the *Proposed Road Development* (500m each side) and zone of influence, is rated as being sub-optimal and not of significant importance for wintering birds in terms of roosting and daytime feeding.

Significant numbers of wintering birds were not recorded from Lough Corran and Boathole Loughs; the main focus of the study. Only a single Whooper Swan was recorded on one occasion during the current study.

Three Whooper Swans were recorded on two occasions on Loughmeenaghan. This number is also evaluated as not being significant and it is noteworthy that the *Proposed Road Development* is located further away from Loughmeenaghan than the existing N4 road.

From the results of the breeding bird survey (June 2013) the only Red listed species recorded in the study area was Black-headed Gull; which was feeding in the Castlebaldwin area. It is considered that this species almost certainly came from breeding colonies on Lough Arrow. The majority of Amber listed species were associated with the small lakes in the area, the most important of which is Boathole Lough. The breeding bird communities recorded within the study area are of local importance. The predicted impacts of the *Proposed Road Development* on the breeding bird community would not be significant.

From the perspective of bird conservation, it is considered that mitigation with regard to summer breeding birds would be more important than for wintering birds with specific reference to site clearance and disturbance works which should be carried out outside of the bird nesting season (March-August inclusive), as per the Wildlife Acts (1979 and Amendment 2000).

5 References

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6 Plates



Plate 1 Surveying at dawn near Lough Corran (December 2011).



Plate 2 Kowa TSN 883 telescope used in the current study.



Plate 3 Lough Corran (November 2011).



Plate 4 Mute swans on boathole Lough (November 2011).



Plate 5 Ardloy and Aghalenane Loughs with the existing N4 in the foreground.



Plate 6 Lough Meenaghan.



Plate 7 Mute swans, Tufted Ducks, and Mallard (foreground) on Lough Corran (November 2011).



Plate 8 Mute swans and Tufted duck on Boathole Lough (November 2011).



Plate 9 Male and Female Widgeon on Boathole Lough (March 2012).



Plate 10 Whooper Swan (and Mute Swan in background) on Lough Corran at dawn (January 2012).



Plate 11 Whooper Swan on Lough Corran at dawn (January 2012).



Plate 12 Whooper Swans on Loughmeenaghan (February 2012).



Plate 13 Whooper Swans grazing beside Lough Arrow (February 2012).



Plate 14 Whooper Swans (*ad hoc* sighting) near Lough Arrow (February 2012).



Plate 15 Whooper swan leaving Lough Corran at dawn (January 2012).



Plate 16 Tufted Duck recorded on Boathole Lough during the Summer 2013 Breeding Bird Survey.



Plate 17 Mute Swan recorded on Lough Corran during the Summer 2013 Breeding Bird Survey.

7 Appendices

7.1 Appendix 1: Wintering Bird Count Data

Table A1.1 Bird records (peak counts) from Toberscanavan Loughs during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>	2	2		1	
Cormorant	<i>Phalacrocorax carbo</i>		1			
Goldeneye	<i>Bucephala clangula</i>					
Grey Heron	<i>Ardea cinerea</i>		1			1
Great Crested Grebe	<i>Podiceps cristatus</i>					
Lapwing	<i>Vanellus vanellus</i>					
Little Grebe	<i>Tachybaptus ruficollis</i>	1				
Mallard	<i>Anas platyrhynchos</i>		6		2	8
Moorhen	<i>Gallinula chloropus</i>			2		
Mute Swan	<i>Cygnus olor</i>	4	2	2		
Pochard	<i>Aythya farina</i>					
Snipe	<i>Gallinago gallinago</i>					
Teal	<i>Anas crecca</i>	2		4	3	2
Tufted Duck	<i>Aythya fuligula</i>			6	4	
Water Rail	<i>Rallus aquaticus</i>					
Whooper Swan	<i>Cygnus cygnus</i>					
Wigeon	<i>Anas penelope</i>	5		6		

Table A1.2 Bird records (peak counts) from Lough Corran during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Oct	Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>	3	8				
Cormorant	<i>Phalacrocorax carbo</i>				1		1
Goldeneye	<i>Bucephala clangula</i>						
Grey Heron	<i>Ardea cinerea</i>			1	1		
Great Crested Grebe	<i>Podiceps cristatus</i>						
Lapwing	<i>Vanellus vanellus</i>		6		2		
Little Grebe	<i>Tachybaptus ruficollis</i>						
Mallard	<i>Anas platyrhynchos</i>	4	7	5	4	6	10
Moorhen	<i>Gallinula chloropus</i>						
Mute Swan	<i>Cygnus olor</i>	6	6	6	2	2	
Pochard	<i>Aythya farina</i>						
Snipe	<i>Gallinago gallinago</i>	1			2	1	1
Teal	<i>Anas crecca</i>					6	
Tufted Duck	<i>Aythya fuligula</i>		6				
Water Rail	<i>Rallus aquaticus</i>						
Whooper Swan	<i>Cygnus cygnus</i>			1			
Wigeon	<i>Anas penelope</i>				3	6	

Table A1.3 Bird records (peak counts) from Boathole Lough during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Oct	Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>						
Cormorant	<i>Phalacrocorax carbo</i>						
Goldeneye	<i>Bucephala clangula</i>						
Grey Heron	<i>Ardea cinerea</i>						1
Great Crested Grebe	<i>Podiceps cristatus</i>						
Lapwing	<i>Vanellus vanellus</i>						
Little Grebe	<i>Tachybaptus ruficollis</i>						
Mallard	<i>Anas platyrhynchos</i>	2		6		7	10
Moorhen	<i>Gallinula chloropus</i>						
Mute Swan	<i>Cygnus olor</i>	2					
Pochard	<i>Aythya farina</i>						
Snipe	<i>Gallinago gallinago</i>	4			3		
Teal	<i>Anas crecca</i>					2	
Tufted Duck	<i>Aythya fuligula</i>	6	10	5			
Water Rail	<i>Rallus aquaticus</i>						
Whooper Swan	<i>Cygnus cygnus</i>						
Wigeon	<i>Anas penelope</i>					6	2

Table A1.4 Bird records (peak counts) from Lough Mehart (Riverstown) during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>			1	4	2
Cormorant	<i>Phalacrocorax carbo</i>					
Goldeneye	<i>Bucephala clangula</i>					
Grey Heron	<i>Ardea cinerea</i>					
Great Crested Grebe	<i>Podiceps cristatus</i>					
Lapwing	<i>Vanellus vanellus</i>					
Little Grebe	<i>Tachybaptus ruficollis</i>				2	2
Mallard	<i>Anas platyrhynchos</i>	6		4		
Moorhen	<i>Gallinula chloropus</i>					
Mute Swan	<i>Cygnus olor</i>	2	5	5		
Pochard	<i>Aythya farina</i>					
Snipe	<i>Gallinago gallinago</i>					
Teal	<i>Anas crecca</i>					
Tufted Duck	<i>Aythya fuligula</i>					
Water Rail	<i>Rallus aquaticus</i>					
Whooper Swan	<i>Cygnus cygnus</i>					
Wigeon	<i>Anas penelope</i>					

Table A1.5 Bird records (peak counts) from the Swallow Hole Complex during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Oct/Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>					
Cormorant	<i>Phalacrocorax carbo</i>					
Goldeneye	<i>Bucephala clangula</i>					
Grey Heron	<i>Ardea cinerea</i>					
Great Crested Grebe	<i>Podiceps cristatus</i>					
Lapwing	<i>Vanellus vanellus</i>					
Little Grebe	<i>Tachybaptus ruficollis</i>					
Mallard	<i>Anas platyrhynchos</i>	4	5			
Moorhen	<i>Gallinula chloropus</i>					
Mute Swan	<i>Cygnus olor</i>	2				
Pochard	<i>Aythya farina</i>					
Snipe	<i>Gallinago gallinago</i>					
Teal	<i>Anas crecca</i>		3			
Tufted Duck	<i>Aythya fuligula</i>					
Water Rail	<i>Rallus aquaticus</i>					
Whooper Swan	<i>Cygnus cygnus</i>					
Wigeon	<i>Anas penelope</i>	6				

Table A1.6 Bird records (peak counts) from Ardloy & Aghalenane Loughs during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Oct/Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>	1				
Cormorant	<i>Phalacrocorax carbo</i>					1
Goldeneye	<i>Bucephala clangula</i>					
Grey Heron	<i>Ardea cinerea</i>					
Great Crested Grebe	<i>Podiceps cristatus</i>					
Lapwing	<i>Vanellus vanellus</i>					
Little Grebe	<i>Tachybaptus ruficollis</i>					
Mallard	<i>Anas platyrhynchos</i>	2				2
Moorhen	<i>Gallinula chloropus</i>	1		3		
Mute Swan	<i>Cygnus olor</i>	2	2			
Pochard	<i>Aythya farina</i>					
Snipe	<i>Gallinago gallinago</i>					
Teal	<i>Anas crecca</i>					
Tufted Duck	<i>Aythya fuligula</i>					
Water Rail	<i>Rallus aquaticus</i>					
Whooper Swan	<i>Cygnus cygnus</i>					
Wigeon	<i>Anas penelope</i>					

Table A1.7 Bird records (peak counts) from Loughmeenaghan during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Oct/Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>				2	
Cormorant	<i>Phalacrocorax carbo</i>					
Goldeneye	<i>Bucephala clangula</i>					
Grey Heron	<i>Ardea cinerea</i>					
Great Crested Grebe	<i>Podiceps cristatus</i>					
Lapwing	<i>Vanellus vanellus</i>					
Little Grebe	<i>Tachybaptus ruficollis</i>					
Mallard	<i>Anas platyrhynchos</i>					
Moorhen	<i>Gallinula chloropus</i>					
Mute Swan	<i>Cygnus olor</i>			3		
Pochard	<i>Aythya farina</i>				2	
Snipe	<i>Gallinago gallinago</i>					
Teal	<i>Anas crecca</i>					
Tufted Duck	<i>Aythya fuligula</i>					
Water Rail	<i>Rallus aquaticus</i>					
Whooper Swan	<i>Cygnus cygnus</i>			3	3	
Wigeon	<i>Anas penelope</i>					

Table A1.8 Bird records (peak counts) from Cleavry Lough during the 2011/2012 wintering bird survey.

Common Name	Scientific Name	Oct/Nov	Dec	Jan	Feb	Mar
Coot	<i>Fulica atra</i>					
Cormorant	<i>Phalacrocorax carbo</i>					
Goldeneye	<i>Bucephala clangula</i>					
Grey Heron	<i>Ardea cinerea</i>					
Great Crested Grebe	<i>Podiceps cristatus</i>					
Lapwing	<i>Vanellus vanellus</i>					
Little Grebe	<i>Tachybaptus ruficollis</i>					
Mallard	<i>Anas platyrhynchos</i>		7	5	2	4
Moorhen	<i>Gallinula chloropus</i>	1	1	1	1	
Mute Swan	<i>Cygnus olor</i>			3	3	
Pochard	<i>Aythya farina</i>					
Snipe	<i>Gallinago gallinago</i>					
Teal	<i>Anas crecca</i>					
Tufted Duck	<i>Aythya fuligula</i>					
Water Rail	<i>Rallus aquaticus</i>					
Whooper Swan	<i>Cygnus cygnus</i>					
Wigeon	<i>Anas penelope</i>			6	9	

7.2 Appendix 2: NPWS Natura 2000 site synopses

SITE NAME: UNSHIN RIVER SAC

SITE CODE: 001898

The Unshin River runs from Lough Arrow north to Ballysadare Bay, Co. Sligo. This site consists of a pristine unmanaged, undrained river and its marginal vegetation. Other rivers included within the site are the Owenboy/Owenbeg and a number of smaller tributaries. To protect the river, natural and semi-natural habitats adjacent to its course have been included, many of these are interesting in their own right. The site is a candidate SAC selected for alluvial wet woodlands, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, also listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Atlantic Salmon and Otter.

The Unshin River flows across a number of geological boundaries between sandstone, shales and limestone. This results in unusual physio-chemical qualities which in turn are reflected in the rich and varied plant and animal populations. The river supports an excellent example of floating river vegetation, a habitat listed on Annex I of the E.U. Habitats Directive. The diversity of aquatic macrophytes is exceptional and to an extent the unusual combinations and richness of species can be accounted for by the good quality water being discharged from Lough Arrow upstream. The lake also imparts a stabilising influence on the flow regime and provides a source of lacustrine species (e.g. Long-stalked Pondweed, *Potamogeton praelongus*). Plant species present which indicate base-rich conditions include Lesser Waterparsnip (*Berula erecta*), Blunt-fruited Water-starwort (*Callitriche obtusangula*), Fanleaved Water Crowfoot (*Ranunculus circinatus*) and the internationally rare River Water-dropwort (*Oenanthe fluviatilis*), while Lesser Marshwort (*Apium inundatum*), normally associated with more acidic peat pools, also occurs. Fen and floating mire communities are represented by Bogbean (*Menyanthes trifoliata*), Cowbane (*Cicuta virosa*), Yellow Loosestrife (*Lysimachia vulgaris*) and Water Avens (*Geum rivale*). A rare and unusual alga *Nostoc parmelioides* is also present. Additional interest is gained by the inclusion of marginal woodlands and extensive wetland areas within the site. These latter contain the Red Data Book plant Swamp Meadow-grass (*Poa palustris*).

The Unshin and its tributaries form a very important system for Atlantic Salmon, a species that is listed on Annex II of the E.U. Habitats Directive. The Owenboy/Owenbeg river is the principle spawning and nursery tributary for the system's salmon fishery. The Unshin and its tributaries is the most important salmon producing river in Co. Sligo. The system also supports a good population of trout. Two notable bird species which occur along the river are Whooper Swan, which feeds in the wet grasslands that flank the river, and Kingfisher. Both are listed on Annex I of the E.U. Birds Directive.

The trophic status of the river increases downstream indicating that some enrichment is taking place, however, the quality of the Unshin River and particularly its aquatic macrophyte communities make it rare in both an Irish and European context.

SITE NAME: LOUGH ARROW SAC

SITE CODE: 001673

Lough Arrow in Co. Sligo is a large limestone lake that conforms to a type listed on Annex I of the EU Habitats Directive. The lake is sheltered on three sides by hills and is the source of the Unshin River. Lough Arrow is unusual in being a mesotrophic natural lake which has changed little in the last 40 years. It is largely spring-fed and very sheltered for its size, and, as such, is hydrologically different from most lakes. The shores of the lake are for the most part stony; several bays occur in which Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*) are found in abundance. In places the reedbeds extend out into the lake and Bogbean (*Menyanthes trifoliata*) and Yellow Iris (*Iris pseudacorus*) occur. The lakeshore vegetation, which includes sedges (*Carex* spp.), Water Mint (*Mentha aquatica*) and Water Horsetail (*Equisetum fluviatile*), grades into areas of mossy boulders and woodland. The lakes support a diverse submerged aquatic flora. An area of wet woodland in the north-west of the site is dominated by willows (*Salix* spp.) and some Alder (*Alnus glutinosa*). The ground flora is composed of Yellow Iris, Common Reed, rushes (*Juncus* spp.), Marsh-marigold (*Caltha palustris*), sedges and Common Marsh-bedstraw (*Galium palustre*).

Areas of dry woodland to the north and south of the lake are included in the site. The dominant species here are Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*) and Sycamore (*Acer pseudoplatanus*). The ground flora includes Herb-Robert (*Geranium robertianum*), Bramble (*Rubus fruticosus* agg.), Great Wood-rush (*Luzula sylvatica*), Cleavers (*Galium aparine*), Primrose (*Primula vulgaris*), and a variety of fern, moss and liverwort species.

The wooded islands and some areas along the shore are used by nesting Tufted Duck, while the reedbeds are also used by nesting wildfowl. In winter the lake is frequented by flocks of Tufted Duck (226), Coot (325), Little Grebe (35), Wigeon (87), Mallard (27), Pochard (36) and Goldeneye (49) - (data for 2 counts over 1 season, 1984/85 - 1986/87). Lough Arrow supports the highest density of breeding Great Crested Grebe, Merganser and Tufted Duck of any of the large lakes in western Ireland. The lake is notable for its Brown Trout and Eel populations, both of which are fished. Otter, a Red Data Book species which is legally protected under the 1976 Wildlife Act and is listed on Annex II of the EU Habitats Directive, has been recorded at the site. Lough Arrow and its environs incorporate a variety of habitats, including the Habitats Directive Annex I listed habitat, hard water lake, and supports important numbers of birds. The diversity of lakeshore vegetation and the presence of protected species, in particular Otter, adds to the conservation significance of the site.

SITE NAME: LOUGH ARROW SPA

SITE CODE: 004050

Lough Arrow is a large limestone lake sheltered on three sides by hills. It has a small catchment and is fed largely by springs on the lake bed. Average depth is 9 m, to a maximum of 33 m. The lake is classified as a mesotrophic system. There is a well developed submerged aquatic flora, with a notable charophyte community which includes the Red Data Book species *Chara curta*. The shores of the lake are for the most part stony, though several bays occur in which Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*) are found in abundance. In places the reedbeds extend out into the lake and Bogbean (*Menyanthes trifoliata*) and Yellow Iris (*Iris pseudacorus*) occur.

Lough Arrow supports moderate numbers of wintering waterfowl. Diving ducks are well represented, with Tufted Duck (301), Pochard (111) and Goldeneye (132) occurring in numbers of regional importance (figures given refer to the 1997/98 season only). High numbers of other species have been recorded, including Little Grebe (194) and Coot (187), as well as small numbers of Whooper Swan (11) and Mallard (65). The site has been poorly monitored in recent years and regular monitoring may show that some of the species have populations of national importance.

Lough Arrow is an excellent site for breeding Great Crested Grebe, with the population being of national importance (23 pairs). The grebes breed within the swamp vegetation. A range of duck species breed on the lake, including the rare Common Scoter (12 individuals in 1999 - breeding proved), Tufted Duck (c. 50 pairs) and Red-breasted Merganser (26 pairs). Common Gull (84 individuals in 1993) and Lesser Black-backed Gull (110 individuals in 1993) breed on islands in the lake. Lough Arrow is an important game fishery, with good stocks of Brown Trout and Eels. There are no apparent significant threats to the bird populations and the entire site is a Wildfowl Sanctuary. Agricultural intensification within the catchment could have detrimental effects on water quality, which could affect some of the bird species. Feral Mink are a potential threat to nesting birds.

Lough Arrow SPA is at least of regional importance for wintering waterfowl but more regular monitoring of the bird populations is required. It is a prime site for nesting Great Crested Grebe. A range of nesting ducks is found on the lake in summer, including the very rare Common Scoter.