## Appendix A.8.15

# The status of Barn Owls within the study area for the proposed N6 Galway City Ring Road

# A.8.15 - Part 1

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# The status of Barn Owls within the study area for the proposed N6 Galway City Ring Road (2014 – 2016)

*This study was designed and implemented by BirdWatch Ireland under contract to Scott – Cawley Limited.*

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Address for Correspondence:
John Lusby
BirdWatch Ireland, 31 Gleann na Coille, Barna Road, Galway, Ireland
Phone: +353-(0)85-7201892 e-mail: jlusby@birdwatchireland.ie

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**SUMMARY**

The Barn Owl *Tyto alba* is a *Red-listed Bird of Conservation Concern in Ireland* due to extensive declines in their breeding population over recent decades (Colhoun and Cummins, 2013). The Breeding Birds Atlas (2007-2011) highlighted a decline of 39% in the breeding range of Barn Owls in Ireland over the 40-year period since the original Breeding Birds Atlas of Britain and Ireland (1968 – 1972) (Sharrock, 1976; Balmer *et al.,* 2013). In parts of Europe and North America, declines in Barn Owl populations have been linked to the increase in major road networks (Illner, 1992; Ramsden, 2003; Boves and Belthoff, 2012). The development of road networks has the potential to affect the quality and quantity of available habitat for Barn Owls (Glista *et al.,* 2012), cause displacement through loss of nest sites and result in direct mortalities through vehicle collisions. Due to their hunting behaviour, low flight and poor peripheral vision Barn Owls are particularly susceptible to collision with vehicles (Illner, 1992; DeBruin, 1994; Massemin and Zorn, 1998; Ramsden 2003; Boves and Belthoff, 2012). Vehicle collisions have been recorded as a major cause of mortality for Barn Owls in Ireland (BirdWatch Ireland, unpublished; Lusby *et. al.,* 2013). However, the impact of road networks on the Barn Owl population and the requirement and direction for mitigation in Ireland is not fully understood.

The objective of this study is to determine Barn Owl distribution and abundance within a 5km radius of the proposed N6 Galway City Ring Road between 2014 and 2016 to inform the environmental impact assessment of the proposed road development.

The Barn Owl survey area comprising 225km$^2$ was informed by Barn Owl home range ecology to include all building and quarry sites potentially used by Barn Owls which may be impacted by the proposed road development. A Barn Owl survey was carried out in June 2014 to determine Barn Owl distribution and abundance within the survey area. The suitability of all buildings and quarries were assessed and the presence of Barn Owls was determined by a combination of inspections during the day to record evidence of Barn Owl occupancy in addition to dusk watches and nocturnal surveys. A total of 77 sites were surveyed, of which the most common site type was derelict cottages (27), followed by stone barns (13) and castles (11). A total of 46 (60%) sites were considered unsuitable for Barn Owls, 11 (14%) offered potential for roosting, though were not suitable for nesting, six (8%) were classed as having potential roosting and/or nesting opportunities and the remaining 14 (18%) sites provided suitable nesting opportunities.

The presence of Barn Owls was confirmed at five sites within the survey area in 2014, which included breeding pairs in two castles (identified as Castle A and Castle B) and three non-breeding sites, which included a derelict mansion (Derelict Mansion A), a derelict farmhouse (Derelict Farmhouse A) and a Quarry (Quarry A). Monitoring of breeding pairs in 2014 confirmed that both failed to successfully fledge young. All sites which were considered potentially suitable for breeding Barn Owls within the survey area (20 sites) were re-visited between June and August in both 2015 and 2016 to determine suitability and occupancy. Two buildings previously classed as suitable in 2014 had been demolished prior to the nesting season in 2015 and were no longer suitable for Barn Owls. All other sites (18) were considered to be suitable for Barn Owls. Evidence of Barn Owl occupation was recorded at two sites in 2015 (Castle B and Derelict Mansion A), which were both classed as non-breeding sites in that year. Evidence of Barn Owl occupation was confirmed at a single site in 2016 (Derelict Mansion A), although breeding activity was not recorded.

Therefore, during the monitoring period between 2014 and 2016 there were two breeding pairs recorded within the survey area, both in 2014. There were no successful breeding attempts recorded within the survey area between 2014 and 2016. Recorded Barn Owl activity in the survey area declined over the monitoring period from two breeding sites and three non-breeding sites confirmed in 2014 to two non-breeding sites in 2015 and to a single non-breeding site in 2016. The highest level of activity recorded for each individual site where evidence of Barn Owl occupancy was confirmed within the survey area over the period 2014 to 2016 was; two breeding sites (Castle A and Castle B), one non-breeding roost (Derelict Mansion A), a non-breeding likely temporary roost (Derelict

Farmhouse A) and a non-breeding potential roost (Quarry A). Based on the changing patterns of occupancy and breeding status throughout the study period, in addition to the fact that these sites remain suitable for Barn Owls, it is possible they may be used in future years.

A total of 21 other raptor and owl sites were confirmed in the survey area during the monitoring period. These included ten Kestrel sites, of which breeding was confirmed at four, and six were used as roosts; five Peregrine sites, of which breeding was recorded at three; three Sparrowhawk territories at which breeding was recorded at two, with a displaying pair also recorded, and three Long-eared Owl breeding sites.

# 1. BACKGROUND

## *1.1 The impacts of road networks on Barn Owls*

Extensive declines in the distribution and abundance of the Barn Owl *Tyto alba* population in Ireland have been recorded in recent decades. The Breeding Birds Atlas (2007-2011) highlighted a decline of 39% in the breeding range of Barn Owls in Ireland over the 40-year period since the original Breeding Birds Atlas of Britain and Ireland (1968 – 1972) (Sharrock, 1976; Balmer *et al.,* 2013). The 2007-2011 atlas coincided with increased monitoring efforts for Barn Owl coordinated by BirdWatch Ireland, and therefore the extent of the long-term declines is likely to be even more substantial than indicated through the atlas surveys. The Barn Owl is categorised as a Red-listed *Bird of Conservation Concern in Ireland* as the population is considered to have suffered losses of over 50% in the last 25 years (Colhoun and Cummins, 2013). The specific factors which influence the status and trends of Barn Owls in Ireland, and which have brought about these widespread declines are not fully understood. The population in Ireland is not limited by the availability of suitable nest sites to the same extent as has been recorded in Britain and in other parts of its range (Petty *et al.,* 1994; Taylor, 1994; Newton, 2004; Lusby et al., 2009, 2010 & 2011). The intensification of agriculture, particularly the reduction of prey rich foraging habitat has been implicated as a main driver of long-term Barn Owl population declines (Shawyer, 1998). Vehicle collisions can be an important cause of mortality and several studies have also linked the increase in major road networks to Barn Owl declines (Illner, 1992; De Bruin, 1994; Ramsden, 2003; Boves and Belthoff, 2012). Barn Owls have been routinely recorded as road casualty victims in Ireland, which is the most frequent recorded cause of death (BirdWatch Ireland, unpublished; Lusby *et al.,* 2013). The significant expansion of the road infrastructure has led to concern that major roads may be a contributing factor in the Barn Owl decline in Ireland due to direct mortality. In addition, the developments of road networks can also affect the quality and quantity of available habitat for Barn Owls (Glista *et al.,* 2012), and may cause local displacement of birds through loss of nest sites during the construction phase. However, to date the impact of road networks on the Barn Owls population has not been determined.

Roads are a source of considerable wildlife mortality, which may have significant implications for specific populations (Trombulak and Frissell, 2000). The increases in traffic and expansions to road infrastructures which have occurred throughout the world have coincided with the continued escalation in the number of wildlife casualties on roads (Newton *et al.,* 1997; Seiler et *al.,* 2004). Due to their hunting behaviour, low flight and poor peripheral vision, Barn Owls are particularly susceptible to collision with vehicles (Illner, 1992; DeBruin, 1994; Massemin and Zorn, 1998; Ramsden 2003; Boves and Belthoff, 2012). Several studies to assess avian mortality on roads have recorded Barn Owls as the most frequently affected among raptors and owls (Baudvin, 1997; Massemin and Zorn, 1998; Shawyer and Dixon, 1999) or the most frequently affected bird species (Boves and Belthoff, 2012). However, there are numerous constraints when assessing the relative importance of road traffic accidents as a cause of mortality and determining the impact of road networks on Barn Owls at the population level. The potential to overestimate vehicle collisions as a cause of death due to methodological bias in recording causes of mortality must be taken into consideration (Illner, 1992). The probability of finding a road casualty is likely to be greater compared with a bird which died of natural causes, and therefore the ratios of recorded causes of death may not be representative. Deaths caused by man, and especially road deaths are routinely over estimated in bird mortality studies (Newton, 1979). Sampling bias related to locating and recording wildlife road casualties can be influenced by search effort, removal of carcasses by scavengers, habitat conditions and other site specific factors (Santos *et al.,* 2015). Boves and Belthoff (2012) showed that Barn Owl road casualties were under-recorded by standard search methods, and when the numbers of Barn Owl casualties were adjusted for search and removal bias this significantly increased estimates of casualty rates on a route which was regularly surveyed in Idaho.

Newton *et al,* (1997) showed that recorded Barn Owl road fatalities increased dramatically in the UK since the early part of the last century, from 6% in 1910 – 54, to 15% in 1955 – 69, to 35% in 1963 – 70 and 50% in 1991- 96. Illner (1992) assessed the overall effect of road casualties on Barn Owl population trends and estimated that collision with vehicles accounted for approximately 10 – 15% of adult Barn Owl deaths in Germany, suggesting that these losses were likely to have a significant impact on the population. An intensive study over an eighteen-year period in Liemers in the Netherlands, also linked long term Barn Owl population declines in the region to increases in major road networks (De Bruin, 1994). Ramsden (2003) studied the effects of road developments on Barn Owl displacement, distribution and mortality over a fifteen-year period in Devon in the UK. The findings revealed that 72% of Barn Owls which encounter a major road are likely to be killed. Ramsden (2003) also showed that the risk of mortality to Barn Owls from motorways increased dramatically with proximity to nest and roost sites. This study indicated that new major road developments caused the loss of all Barn Owls within 0.5km, and severe depletion of populations within 0.5 to 2.5km of the route. An examination of body weights of carcasses and the time of year casualties were recovered also showed that there was no indication that owls killed by traffic were predominantly weak or underweight individuals. Ramsden (2003) estimated that the presence of major roads in rural England has removed Barn Owls from an area of between 8,100 and 16,200km$^2$ and depleted the population over an area of roughly 48,600km$^2$ which corresponds to 40% of the total area of rural England.

Many studies have employed systematic searches of motorways for avian road casualties. In Switzerland, seven Barn Owl casualties per 100km were estimated on an annual basis along a 36.9km stretch of motorway (Bourquin, 1983). Two other studies, both in north-eastern France, estimated an annual casualty rate of 65 Barn Owls per 100km along a 259km stretch of motorway (Baudvin, 1997) and 25 Barn Owl casualties per 100km per year on a 150km stretch of motorway (Massemin & Zorn, 1998). In Britain, a 50km stretch of major road, with single and dual carriageway sections, was searched intensively over two years, and the casualty rate for Barn Owls calculated at 68 per 100km per year (Shawyer and Dixon, 1999). Counts of dead animals from surveys can be underestimated due to variation in search effort, removal of carcasses by scavengers and habitat and local conditions. Boves and Belthoff (2012) assessed causes of sampling bias to adjust numbers of recorded Barn Owls on a major road in Idaho, which resulted in a significantly higher estimate of up to 5.99 Barn Owls killed per kilometer each year, compared to the unadjusted mortality rate of 1.64 owls per kilometer each year.

Although these studies are not directly comparable to Ireland due to differences in local population densities, road types and characteristics, the combined results illustrate the importance of road deaths as a cause of mortality for Barn Owls and the potential impacts of major roads on Barn Owl populations. A long-term study through BirdWatch Ireland provides the only data on the extent of road mortalities relative to other causes of death in the Irish context. Over a nine-year period (2006 - 2014) a total of 279 Barn Owl mortality incidents were recorded, of which the majority (64%) were vehicle collision victims. The majority of road casualties were recovered from Motorways or National routes (76%), which is similar to findings from other studies which suggest that motorways and dual carriageways, due to their design and high vehicle speeds, present a greater threat to Barn Owls than other road types (Ilner 1992; Shawyer and Dixon, 1999; Ramsden 2003). A total of 61 Barn Owl collision victims were recorded on the M8 motorway in north Cork and south Tipperary over a seven-year period, indicating that specific routes and certain sections may present a higher risk of collision, which was also demonstrated on routes in England and France (Massemin and Zorn, 1998; Shawyer and Dixon, 1999). Similar to other studies, peaks in the number of road casualties were observed outside of the breeding season, with highest numbers recovered in February, October and

November (Masssemin and Zorn, 1998; Shawyer and Dixon, 1999). Of 34 Barn Owl carcasses which were retrieved and reliably aged, the majority were first calendar year or second calendar pre-breeding season birds and therefore were unlikely to have been recruited to the breeding population prior to being killed on the road. The weight at death of 23 Barn Owl road casualties assessed was also significantly lower than the weight of a representative sample of twenty-five live adult males trapped over the study period, which indicates that while adults and breeding birds are killed on the roads, it is predominantly birds which have not yet reached breeding age or which are in poor condition that are affected. This study also analysed thirty-three Barn Owl ringing recoveries between 2006 and 2013, to determine the relative importance of vehicle collisions as a cause of death from ringed birds alone, which showed that one third of Barn Owl recoveries were attributed to road traffic accidents (BirdWatch Ireland, unpublished).

### **1.2** *Mitigation measures for Barn Owls*

Understanding the factors that influence roadway mortality is vital for mitigating the impact of roads on avian populations and for making appropriate management recommendations (Clevenger *et al.,* 2003). The speed of road traffic has been shown to be an important factor in relation to the risk of Barn Owl mortality on major roads (Illner, 1992). Road types also have a significant bearing on the risk and level of Barn Owl road casualties. In one study in Devon, it was found that, although owls were often seen crossing minor roads, they were rarely seen to hunt along them, most likely because of the lack of suitable wide verges of grassland habitat over which to hunt (Ramsden, 2003). Several studies have linked high Barn Owl road casualties to sections of dual-carriageway and motorway where wide verges of open grassland habitat occur, thus encouraging owls to hunt along the road verges (Taylor, 1994; Baudvin, 1997; Shawyer & Dixon, 1999). In a study on a 50km section of the A303 in southern England, it was found that Barn Owl road casualties were more likely to occur where the road traversed linear habitat features along which the birds might hunt (Shawyer and Dixon, 1999). However, there is also evidence to suggest that many owls are struck while crossing major roads and not hunting along them. In two studies, more Barn Owl casualties were found along raised (embanked) and level sections of motorway than excavated (sunken) sections (Baudvin, 1997, Massemin and Zorn, 1998) and that, in the latter case, most owls were killed along embanked stretches which also lacked roadside hedges and/or which crossed open fields.

To reduce wildlife mortality on roads a range of mitigation measures have been developed, which primarily focus on altering motorist behavior and/or altering the behavior of wildlife including animal crossing signs, construction of wildlife crossings, and the use of fences to prevent wildlife from encountering the road (Glista *et al.,* 2009; Santos, *et al.,* 2015). Since mitigation measures are generally expensive, economic factors often dictate the choice of road mortality mitigation measures that are implemented (Glista *et al.,* 2009). In addition, evaluations of the effectiveness of mitigation measures for wildlife have been limited (Forman *et al.,* 2003). This is particularly the case for birds, which present significant challenges in terms of development of effective mitigation on roads compared with mammals (Glista *et al.,* 2009). Mitigation measures for Barn Owls have been proposed but these have not been regularly implemented, and the effectiveness of these measures have not been effectively determined.

One of the main mitigation recommendations from studies undertaken involves the use of natural or artificial screens to deflect the flight path of Barn Owls that encounter major roads away from the high-risk areas as proposed by Ramsden (2003). This may be achieved by planting the areas adjacent to the road with scrub, hedges or trees, or by installing high screens that force birds to rise above passing traffic when traversing the road. It has been proposed in other studies that this mitigation is likely to be particularly effective on embanked sections of motorway where Barn Owls may be most susceptible to collision (Massemin and Zorn, 1999). There is conflicting opinion as to whether

natural vegetation or artificial barriers to flight are the most appropriate. It has been suggested that planting natural vegetation on areas adjacent to the road may have an adverse effect on other avian populations. There are however health and safety and engineering considerations which may conflict with the practical application of this mitigation measure on a site specific basis, and the effectiveness of this measure has not been adequately assessed.

Another recommended mitigation measure from studies undertaken is aimed at discouraging Barn Owls from coming into contact with major roads or from hunting along road sides. The methods require limiting the quality and quantity of suitable foraging habitat in the form of rough grassy areas. This can be achieved by intensive mowing or by allowing dense vegetation such as bramble or gorse to prosper and dominate (Ramsden, 2003). Again, there is conflicting opinion as to the validity of this measure in terms of its benefits for wildlife in general. In the UK, roadside areas have been increasingly recognised for their importance as wildlife habitats (Spellerberg and Gaywood, 1993), particularly for small mammal populations. It has been suggested that the presence of small mammals on road sides may be more beneficial to some predator populations than the impacts of road mortality (Garland, 2002). Planting areas adjacent to the roadside with dense shrubs would serve to conceal small mammals from foraging Barn Owls (Baudvin, 1997), and therefore birds may be less likely to be attracted to the roadside. However, alternatively, such vegetation may also increase passerine mortality, encourage deer and result in a reduction in the plant and invertebrate species associated with rough grassland. An alternative, which could benefit Barn Owls, small mammals and biodiversity in general, is to allow rough grassland habitat to flourish along the roadside but provide continuous screens adjacent to the road surface so that Barn Owls can forage along these areas without high risk of collision (Ramsden, 2003). It is clear that further research is required to develop effective mitigation for Barn Owls on major roads which takes account of local conditions and all relevant environmental considerations as well as health and safety, engineering and economic considerations.

## 2. INTRODUCTION

The objective of this study is to determine Barn Owl distribution and abundance within the defined survey area to inform the environmental impact assessment of the N6 Galway City Ring Road on the local Barn Owl population. The extent of the survey area is based on available information on Barn Owl home range ecology and incorporates the study area for the proposed N6 Galway City Ring Road.

### 2.1 *The Barn Owl survey area*

The Barn Owl survey area extends from the existing N6 near Doughiska, at its eastern end, to west of Bearna Village, west of the city, and is bounded by Lough Corrib to the north and Galway Bay to the south. The survey area comprises approximately 225km$^2$ as shown in the map below (Figure 2.1).

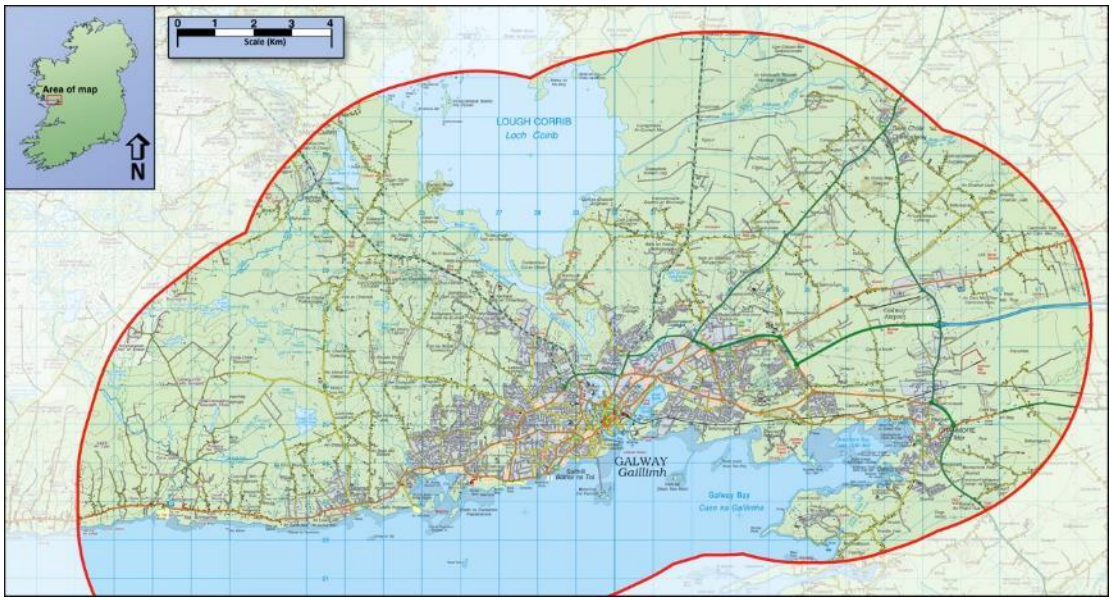


**Figure 2.1** *The Barn Owl survey area.*

The most recent Barn Owl population estimate for the Republic of Ireland derived through density specific survey work is 400 – 500 pairs (Birdlife International, in prep.) however there is significant geographical variation in the distribution of the population, with the south-west being the main stronghold. In 2013, of the 132 Barn Owl sites registered nationally, 14 were in County Galway (Lusby, 2013). Of the sites registered in Galway in 2013, two traditional nest sites and a single roost site were within the current Barn Owl survey area for the proposed N6 Galway City Ring Road. A map showing the distribution of all known sites in 2013 (Fig 2.2) and all active sites in County Galway (Fig 2.3) prior to the initiation of the current study is shown below.

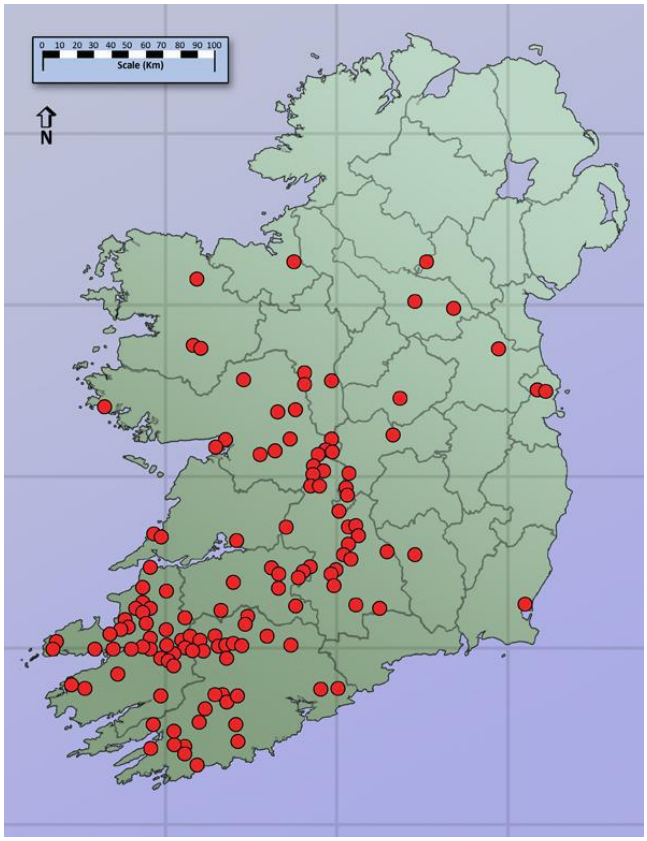


**Figure 2.2** *All registered Barn Owl sites in the Republic of Ireland in 2013 (n = 132)*

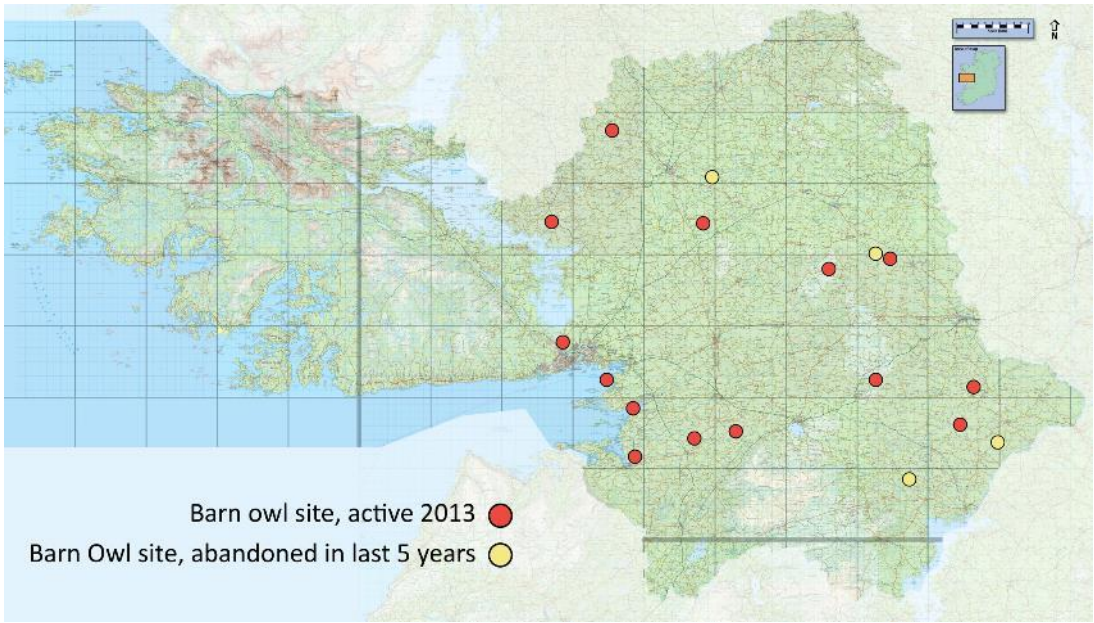


***Figure 2.3*** *All active Barn Owl sites in County Galway registered in 2013*

### *2.2 Objectives*

The primary objective of the study is to determine Barn Owl distribution and abundance within the defined survey area, to inform the environmental impact assessment for the proposed N6 Galway City Ring Road.

The specific objectives of this study are as follows;

- To undertake a comprehensive Barn Owl survey within the defined survey area, according to best practice methods, to identify all active nest and roost sites within buildings and quarries in the survey area
- To collate all available Barn Owl records from within the survey area to determine potential areas where tree nesting Barn Owls may occur.

## 3. METHODS

### 3.1 *Barn Owl Survey and monitoring 2014*

A desktop study in combination with field assessment was conducted in June 2014 to determine the extent of the survey area potentially suitable for Barn Owls. This initial assessment identified an area of c.30km$^2$ within Galway City and surrounds as largely unsuitable for nesting Barn Owls, which was based on knowledge of nest site selection and requirements in Ireland. Although Barn Owls may use urban areas for foraging, nesting within built up areas is not common (Copland and Lusby, 2012). In addition, survey work is less effective due to difficulties in accessing buildings in built up areas and for these reasons this area was excluded from further survey work. Therefore, the overall survey area considered as potentially suitable and which was the focus for further survey work comprised an area of c.195km$^2$. A map of the survey area is shown in the map below (Figure 3.1).


***Figure 3.1*** *The Barn Owl survey area (highlighted in green within the red survey boundary)*

The Barn Owl survey was undertaken in June and July 2014. Field surveyors were equipped with official BirdWatch Ireland identification, a copy of the BirdWatch Ireland insurance policy, Authorisation of Access letter from the local authority and Health and Safety Statement from Scott Cawley Ltd. and appropriate health and safety equipment including a torch, hard hat, first-aid kit, whistle and mobile phone.

Prior to initiating fieldwork all relevant information on existing and previously active Barn Owl sites and sightings from within the survey area for the period 2008 to 2013 were extracted from relevant BirdWatch Ireland databases including the Barn Owl registered site and sightings database and the Breeding Birds Atlas (2007 – 2011) database. All data was collated and the details included on suitable large-scale Ordnance Survey maps.

A detailed survey sheet for use in the field was used to record the following aspects for each site

surveyed; date, county, grid reference, site type, site name, suitability rating (0 – 3), status, nesting opportunities, signs, and whether a roost watch was required and/or carried out. Additional information was recorded relating to the suitability and presence of other raptors, corvids, or other species of note.

All roads within the survey boundaries were systematically travelled and the suitability of all buildings and quarries within the survey area was assessed. Sites that were considered to be potentially suitable were comprehensively searched for signs to indicate the presence of Barn Owls. All sites were categorised on a scale of 0 – 3 based on potential nesting and roosting opportunities for Barn Owls, 0 for unsuitable; 1 representing potentially suitable sites for roosting but unlikely to be suitable for nesting; 2 being suitable roosting and potentially suitable for nesting, and 3 representing sites considered to be very suitable for nesting.

At each site, a thorough inspection was conducted during the day both inside and outside of the building or within quarries, to locate signs indicating the presence of Barn Owls, such as pellets, evidence of whitewash splashings and moulted feathers. Adjacent buildings and potential perches in the immediate vicinity of the site were also assessed. At certain active Barn Owl sites, due to the concealed nature of the nest and/or roost sites (i.e. blocked chimneys, deep cavities etc.), signs of Barn Owl occupation may not be obvious or accessible. Therefore, at sites where this was judged to be a factor, a dusk watch was conducted to confirm the activity status of the site. Dusk watches were initiated prior to sun set on calm and dry nights and lasted a minimum of one hour. Watches were conducted from a suitable and discrete vantage point to allow observations and vocalisations of Barn Owls associated with the site to be recorded. A site was confirmed to be 'active' if calls from an adult or owlets were heard, or if a Barn Owl was observed either within the site or entering or exiting the site. At all active or potentially active sites additional dusk watches or nocturnal surveys were carried out as necessary to establish the breeding status of the site. Nocturnal surveys were carried out to the same methods as dusk watches but were initiated after dark. Sites were confirmed to be a 'breeding site' based on confirmation of; a pair present at the site via observation or vocalisation; a female attending a nest, or confirmation of pre-laying, incubation or brooding behavior; defensive behavior by one or both adults; confirmation of a prey delivery or if young were observed or heard.

These methods were designed to locate all Barn Owl sites in buildings and quarries within the study area. All tree sites were not assessed as part of this study. However, information on Barn Owl activity was sought whenever landowners were encountered over the course of survey work and on an opportunistic basis during fieldwork. Interviews with landowners have been successfully used to assess Barn Owl occupation in previous Barn Owl surveys (Toms *et al.,* 2001). Landowners were asked a series of standardized questions, shown images of Barn Owls and played vocalisations of the species for identification purposes. An assessment was made as to the reliability of each individual report, based on the account, the observer's description and their relevant level of knowledge. Reports that were considered to be potentially unreliable based on professional judgment of the surveyor were discarded. Reliable reports were divided into two categories, "breeding season" which consists of the period March to July and "non-breeding season" which comprises the remainder of the year. Greater importance was afforded to those sightings which originated from within the defined breeding season period as these are likely to represent birds which are resident in the area, as opposed to non-breeding season sightings which could represent dispersing juveniles. Sightings and information on Barn Owls within the survey area received from all other sources (members of the public, birdwatchers etc.) were recorded in the same manner.

Although the methods of this survey were specifically designed to confirm Barn Owl distribution within the survey area, all signs and sightings of other raptors encountered during fieldwork were

also recorded.

### 3.2 *Barn Owl survey and monitoring 2015 - 2016*

The methods for Barn Owl survey and monitoring in 2015 and 2016 were informed by the findings of the survey and monitoring in 2014. All sites which were classed as suitable for nesting Barn Owls (category 2 and 3 sites) in the study area in 2014 were re-visited between June and August in 2015 and 2016 to determine suitability and occupancy. The same survey methods were employed as in 2014 whereby each site was inspected during the day to assess suitability and to check for signs of occupancy by Barn Owls. Where the status of a site could not be accurately determined by a day time inspection, a dusk watch was conducted. At all sites where evidence of Barn Owls was confirmed, dusk watches and/or nocturnal surveys were conducted as necessary to establish breeding activity. As in 2014, all raptor species which were encountered during survey work were also recorded.

## 4. RESULTS

### 4.1 *Barn Owl survey and monitoring*

#### ***4.1.1*** *Existing knowledge of Barn Owls within the study area*

Collation of existing data on Barn Owl sites within the survey area which were active between 2008 to 2013 highlighted three sites; two of which were regarded as traditional breeding sites; Castle A and Castle B, and one classed as a non-breeding roost; Derelict Mansion A. Collation of information on Barn Owl sightings received by BirdWatch Ireland between 2008 to 2013 revealed six sightings of Barn Owls within the survey area, of which one was within the breeding season period (March to July). The distribution of sightings and active sites (2008 – 2013) is shown below in Figure 4.1.


***Figure 4.1****. The distribution of all Barn Owl sites and sightings recorded in the study area between 2008 and 2013*

***4.1.2*** *Barn Owl status in the survey area in 2014*

Barn Owl survey and monitoring was carried out in June and July of 2014. A total of 77 sites were comprehensively surveyed for the presence of Barn Owls. Of these the most common site type was derelict cottages (27), followed by stone barns (13), castles (11), derelict two-story farmhouses (8), disused metal-roofed barns (5), quarries (3), derelict mansions (3) and derelict or disused churches (2). Other sites included a derelict mill, a priory, a round tower, a derelict school and a derelict warehouse. Details of site types surveyed is shown below in Figure 4.2.

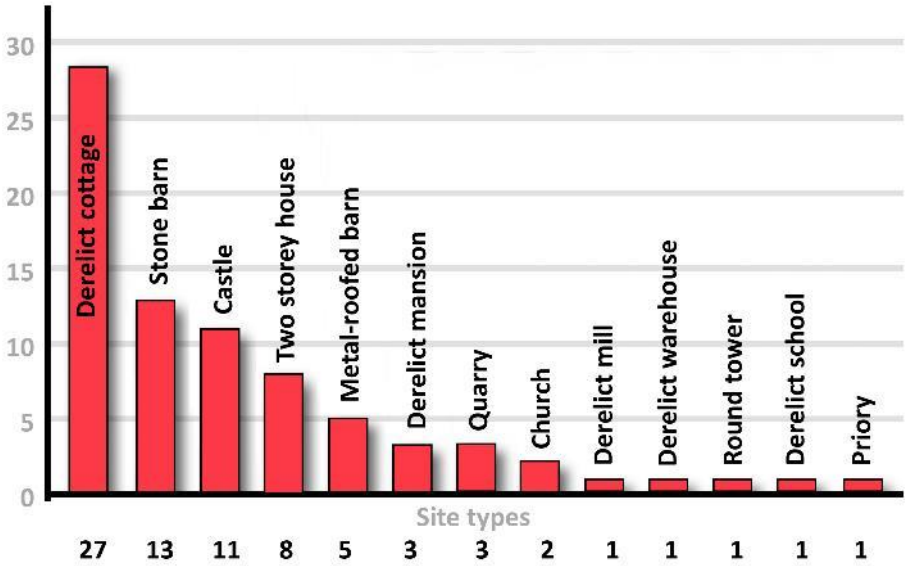


***Figure 4.2*** *Variation in all site types surveyed (n=77).*

***Image 4.1*** *An example of a derelict cottage which were the most common site type within the survey area.*

***Image 4.2.*** *Round Tower and Castle, a Category 1 and Category 3 site respectively.*

A total of 46 (60%) sites were assigned to category 0 as they were considered entirely unsuitable for Barn Owls, 11 (14%) were assigned to Category 1, offering potential for roosting, though not suitable for nesting. Six (8%) sites were assigned to Category 2, having likely roosting and/or nesting opportunities. The remaining 14 (18%) sites were Category 3, as they offered suitable roosting and nesting opportunities (Figure 4.3 and 4.4 below). Therefore, a total of 20 building and quarry sites were classed as potentially suitable for breeding Barn Owls in the survey area in 2014.

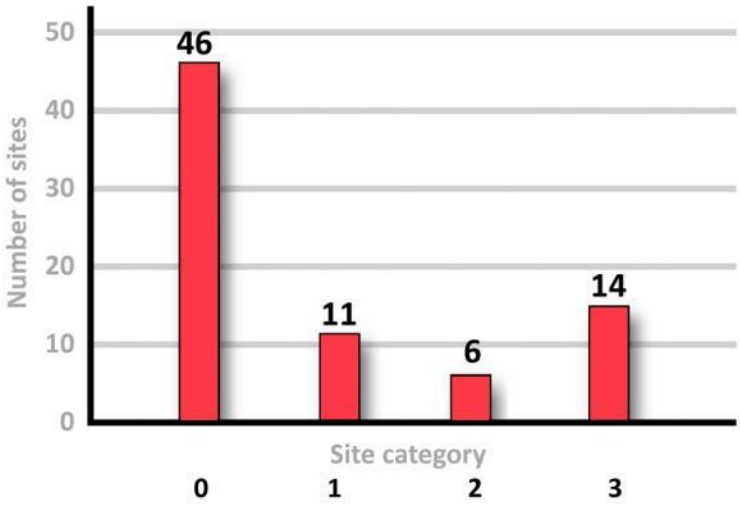


***Figure 4.3*** *The variation in suitability (categories 0 – 3) across all sites surveyed (n = 77)*


***Figure 4.4*** *The distribution and suitability of all sites surveyed in 2014 (n = 77)*

Inspections of all 77 sites in combination with dusk watches and nocturnal surveys (n = 21) confirmed evidence of Barn Owl occupation at five sites within the survey area in 2014. All three sites previously known to BirdWatch Ireland were active in 2014, in addition to two sites which were previously undocumented. The five sites included two castles, a ruined mansion, a derelict two-story farmhouse and a quarry. The distribution of all sites where evidence of Barn Owls was confirmed in 2014 is shown in Figure 4.5 below.


***Figure 4.5*** *The distribution of all sites where evidence of Barn Owl were recorded in 2014*

Monitoring of all five sites where evidence of Barn Owl occupation was recorded , confirmed that two castles were breeding sites (Castle A and Castle B). Three sites were classed as non-breeding sites, which included a regular roost in a ruined mansion (Ruined Mansion A) which is likely associated with a nearby nesting pair (Castle A), and a derelict two-storey farmhouse (Derelict Farmhouse A) which was considered a temporary roost site. A single Barn Owl was recorded in a quarry (Quarry A) during survey work which was classed as a potential roost site, and no breeding evidence was recorded. Monitoring via dusk watches and nocturnal surveys revealed that both nesting sites failed to breed in 2014.

A single sighting of Barn Owl observed in the breeding season 2014 in the western part of the study near Cushmaigmore between Barna and Na Forbacha was recorded.

A map showing the location and status of sites where Barn Owl evidence was recorded and Barn Owl sightings is shown below (Figure 4.6).


***Figure 4.6*** *The location and status of all Barn Owls sites within the survey area in 2014*

***4.1.3*** *Barn Owl status in the study area in 2015*

All sites which were classed as potentially suitable for nesting Barn Owls (category 2 and 3; n = 20), including all sites where evidence of Barn Owls were recorded in 2014 were inspected in July 2015 to determine suitability and occupancy. Two sites (a derelict two-storey farmhouse and a derelict cottage) which were previously recorded as suitable (both category 3) in 2014 were no longer suitable in 2015, as both had been demolished. All remaining sites (n = 18) were considered potentially suitable for nesting Barn Owls.

Evidence of Barn Owls was recorded at two sites during day time inspections (n = 20) in combination with dusk watches and nocturnal surveys (n = 15). Pellets were recorded at Castle B and Derelict Mansion A, both of which had been active in 2014. There were no signs to indicate recent use of

Castle A, Derelict Farmhouse A or Quarry A where evidence of Barn Owls had been recorded in 2014. In addition, a derelict cottage with adjacent outbuildings at Ballard where a Barn Owl had been reported by a member of the public in the winter of 2015 did not reveal any signs to indicate recent use in July 2015. Monitoring did not record Barn Owl activity at either Castle B or Derelict Mansion A during July 2015.

A single sighting was received from the non-breeding season at an outbuilding beside a derelict cottage at Ballard in the western side of the study area. Figure 4.8 below shows the distribution, activity and breeding status of sites and Barn Owl sightings in the survey area in 2015.

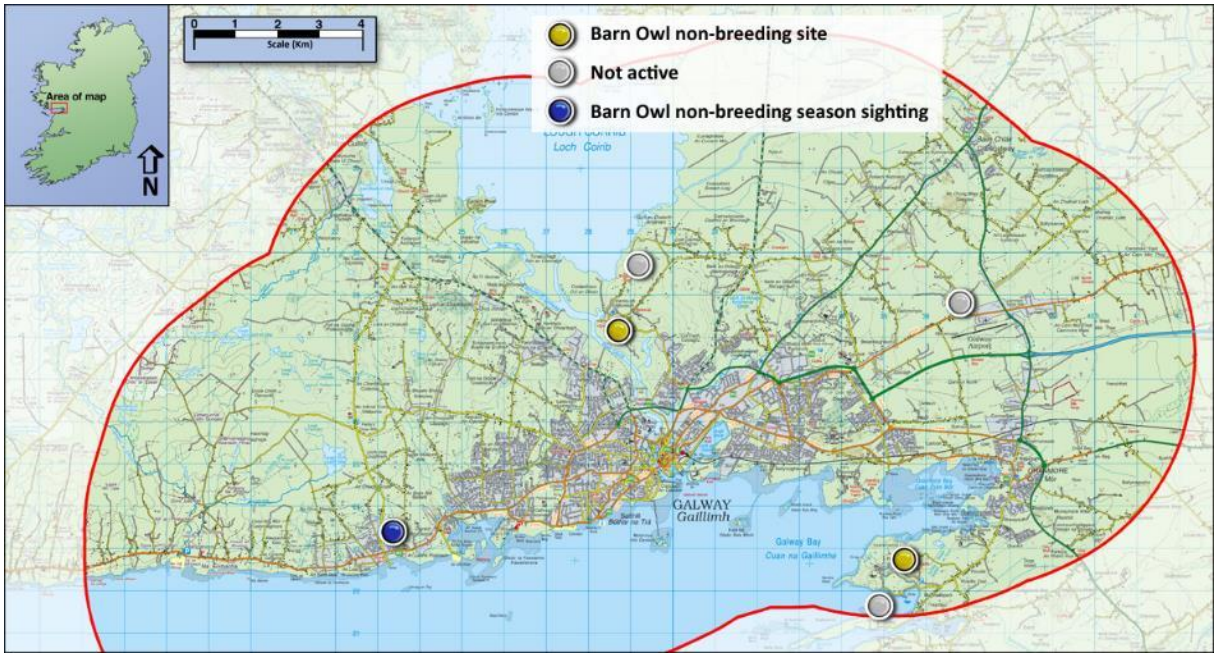


***Figure 4.7*** *Status of known Barn Owl sites in the survey area (n = 5) in 2015*

***4.1.4*** *Barn Owl status in the study area in 2016*

All sites which were classed as suitable for Barn Owls (category 2 and 3; n = 18) in previous years of the survey (2014 & 2015), including all sites where evidence of Barn Owls were previously recorded in 2014 and 2015 were monitored between June to August 2016. All sites (n = 18) were considered to be potentially suitable for nesting Barn Owls.

Evidence of Barn Owls was recorded at single site within the study area in 2016, Derelict Mansion A. Pellets (n = 3) were recorded within the building on the first inspection in June 2016. There were no indications of Barn Owl occupation at other sites monitored (n = 17), which included Castle A and Castle B which both held breeding pairs in 2014.

Monitoring at Derelict Mansion A during June to August 2016 did not confirm Barn Owl activity and this site is classed as a non-breeding site in 2016.

A single Barn Owl was observed in flight along the edge of Lough Corrib in proximity to Quarry A while conducting a nocturnal survey in August 2016.

Figure 4.8 and Table 4.1 shows the distribution and status of active sites and Barn Owl sightings in 2016.


***Figure 4.8*** *The distribution and status of Barn Owl sites (n = 5) in the survey area in 2016*

### ***4.1.4*** *Barn Owl status in the study area between 2014 and 2016*

During the monitoring period between 2014 and 2016 there were two breeding pairs recorded, both of which were in 2014. There were no successful breeding pairs recorded within the survey area between 2014 and 2016. Recorded Barn Owl activity in the survey area declined over the monitoring period from two breeding sites and three additional non-breeding sites confirmed in 2014, to two active non-breeding sites in 2015, to a single active non-breeding site in 2016.

The highest level of activity recorded across the monitoring period for all sites where evidence of Barn Owls was confirmed is; two breeding sites (Castle A and Castle B), one regularly used roost at Derelict Mansion A, a temporary roost site at Derelict Farmhouse A and a possible roost at Quarry A. Figure 4.9 shows the distribution and highest level of activity recorded for each site where evidence of Barn Owl was recorded during the monitoring period between 2014 and 2016. Information and recorded activity status of individual sites are detailed below.


***Figure 4.9*** *The distribution and highest level of breeding status for all Barn Owl sites (n = 5) in the survey area between 2014 to 2016.*

***Table 4.1*** *The location and status of all sites where evidence of Barn Owls were recorded between 2014 and 2016*

| Site Name | Site Type | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| Castle A | Castle | Pair – failed | Roost | No activity |
| Castle B | Castle | Pair – failed | No activity | No activity |
| Ruined Mansion A | Ruined mansion | Roost | Roost | Roost |
| Ruined Farmhouse A | Derelict farmhouse | Roost | No activity | No activity |
| Quarry A | Quarry | Roost | No activity | No activity |

**Castle A**

**Status:** Castle A is traditional Barn Owl site known to be active since 2008. The last recorded successful breeding attempt at this site was 2011. A pair was confirmed in 2014 but did not breed successfully. No evidence of Barn Owls was recorded in 2015 and 2016. In the past, it is likely this site has been associated with Ruined Mansion A which is situated less than 1.5km away, as activity has alternated between the two sites at different stages. Castle A remains suitable and may be used by Barn Owls in the future.

Raven were present at Castle 1 in 2014 and 2015. Kestrel have also previously nested within the building with the last recorded nesting in 2012. In 2016 Kestrel were recorded roosting within the building but breeding activity was not recorded.

**Castle B**

**Status:** Castle B has been a traditional breeding site, with records of Barn Owl occupancy extending as far back as the early 1970's (Fairley and Clark, 1972, Clark, 1974). A pair was recorded in 2014 and breeding activity was confirmed but they did not breed successfully. The site was active in 2015, as determined by a small number of fresh pellets in June 2015. However a breeding attempt was not recorded and use of the site was sporadic during the breeding season of 2015 despite extensive monitoring (six nocturnal visits). In 2016, there was no indication of Barn Owl occupancy at Castle B and no breeding attempt recorded. Successful breeding has not been recorded at this site for the past six years. Disturbance may be an issue which has affected breeding success. Aside from possible disturbance, the site remains suitable and provides nesting and roosting opportunities.

Kestrel also use this site and were recorded roosting in the building in 2015.

**Derelict Mansion A**

**Status:** Derelict Mansion 1 is a regularly used site which is located <1.5km from Castle A. Breeding activity has been confirmed at Derelict Mansion A in the past but successful breeding has not been recorded over the past six years. This site has been recorded as an active non-breeding site in all years of the monitoring period (2014 – 2016) due to the presence of fresh signs. However, no breeding activity was recorded at this site. The site remains suitable and provides nesting and roosting opportunities.

Kestrel use this site and were recorded roosting in this building in 2016.

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**Derelict Farmhouse A**

**Status:** This site was inspected for the first time as part of survey work in 2014. Four Barn Owl pellets were found in July 2014, however these were not deemed to be fresh (> 2 months old). Subsequent nocturnal surveys in July 2014 confirmed that the site was not active and therefore it was classed as a non-breeding site in 2014. No evidence of Barn Owls were recorded in 2015 and 2016.

**Quarry A**

**Status:** Quarry A provides many suitable roosting and nesting opportunities for Barn Owls. Although no signs to indicate the presence of Barn Owls were confirmed during the initial daytime inspection in July 2014, a nocturnal visit on the 3rd of July recorded the presence of an adult male Barn Owl calling from within the quarry. A repeat visit on the 18th of July recorded no indications of activity. This site is located approximately 2.3km from Castle B and it is possible that the calling male recorded in 2014 was associated with the latter site. However, it is possible that Quarry A was an independent site, which was occupied by a lone male or pair which had failed prior to initiation of survey work in 2014. In 2015, three nocturnal visits were carried out, which recorded no Barn Owl activity. In 2016, three nocturnal visits recorded no Barn Owl activity. A Barn Owl was observed in proximity to the quarry in August 2016 while conducting a nocturnal survey.

### **4.2** *Other raptor records*

This survey was designed to assess Barn Owl distribution and abundance within the survey area, however information on other raptor species which were encountered during survey work, or via reliable reports received between 2014 and 2016 were also recorded. Specific surveys were not undertaken for these species and therefore these sites should not be assumed to be a complete representation of raptor activity within the Barn Owl survey area, but merely those encountered as part of the Barn Owl survey.

A total of 21 raptor and owl sites (not including Barn Owl) were confirmed in the survey area during the monitoring period, which included ten Kestrel sites, of which breeding was confirmed at four and six were recorded as roost sites; five Peregrine sites, of which breeding was recorded at three and two were used for roosting; three Sparrowhawk territories at which breeding was recorded at two, and a displaying pair was also recorded, and three Long-eared Owl breeding sites. Site details for all raptor sites recorded between 2014 and 2016 within the survey area were provided to inform the planning of the proposed road development.

## 5. CONCLUSIONS

This study provides information on Barn Owl distribution, abundance and nest and roost site locations within the defined survey area to inform the environmental impact assessment and Barn owl mitigation strategy for the proposed N6 Galway City Ring Road. Over the period of the survey (2014 – 2016) two breeding pairs were confirmed, although successful breeding was not recorded. Three traditional sites within the survey area (Castle A, Castle B and Derelict Mansion A) have been regularly used by Barn Owls over the past ten years including during the survey period. Breeding attempts have been recorded at these sites in the past ten years, and were confirmed at both Castle A and Castle B in 2014. Despite the fact that there were no successful breeding attempts recorded during the survey period and no breeding attempts confirmed in 2015 or 2016, it is possible that based on the suitability and history of use of these sites that they may be used for breeding in the future, and it is clear from the survey findings that the occupancy and activity of sites can change over time.

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# A.8.15 - Part 2

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# The status of Barn Owls In Menlo Castle for the proposed N6 Galway City Ring Road 2018

*This study was designed and implemented by BirdWatch Ireland under contract to Scott – Cawley Limited.*

*Lusby, J. (2018). The status of Barn Owls in Menlo Castle for the proposed N6 Galway City Ring Road 2018.*

Address for Correspondence:
John Lusby
BirdWatch Ireland, 31 Gleann na Coille, Barna Road, Galway, Ireland
Phone: +353-(0)85-7201892 e-mail: jlusby@birdwatchireland.ie

**SUMMARY**

The Barn Owl *Tyto alba* is a *Red-listed Bird of Conservation Concern in Ireland* due to extensive declines in their breeding population over recent decades (Colhoun and Cummins, 2013). The Breeding Birds Atlas (2007-2011) highlighted a decline of 39% in the breeding range of Barn Owls in Ireland over the 40-year period since the original Breeding Birds Atlas of Britain and Ireland (1968 – 1972) (Sharrock, 1976; Balmer *et al.,* 2013). In parts of Europe and North America, declines in Barn Owl populations have been linked to the increase in major road networks (Illner, 1992; Ramsden, 2003; Boves and Belthoff, 2012). The development of road networks has the potential to affect the quality and quantity of available habitat for Barn Owls (Glista *et al.,* 2012), cause displacement through loss of nest sites and result in direct mortalities through vehicle collisions. Due to their hunting behaviour, low flight and poor peripheral vision Barn Owls are particularly susceptible to collision with vehicles (Illner, 1992; DeBruin, 1994; Massemin and Zorn, 1998; Ramsden 2003; Boves and Belthoff, 2012). Vehicle collisions have been recorded as a major cause of mortality for Barn Owls in Ireland (BirdWatch Ireland, unpublished; Lusby *et. al.,* 2013). However, the impact of road networks on the Barn Owl population and the requirement and direction for mitigation in Ireland is not fully understood.

The objective of this study is to determine Barn Owl occupancy and breeding status in Menlo Castle in 2018 to inform the Environmental Impact Assessment Report for the proposed N6 Galway City Ring Road, hereafter referred to as the proposed road development. Menlo Castle is a traditional Barn Owl breeding site, with nesting confirmed as recently as 2014 as part of monitoring for the environmental studies for the proposed road development. In 2015, Menlo Castle was recorded as occupied by Barn Owls but there was no evidence of breeding recorded, and the site was classed as unoccupied in 2016 and there has been no indication of occupancy since this time. Monitoring in 2018 revealed that the site is unoccupied, although the building remains suitable for breeding Barn Owls and it is recommended that monitoring continue as required to inform the potential impacts and mitigation in relation to the proposed road development.

## 2. INTRODUCTION

The objective of this study is to determine Barn Owl occupancy and breeding status in Menlo Castle to inform the Environmental Impact Assessment Report for the N6 Galway City Ring Road on the local Barn Owl population. Menlo Castle is a traditional Barn Owl breeding site, with nesting confirmed as recently as 2014 as part of monitoring for the environmental studies for the proposed road development. In 2015, Menlo Castle was recorded as occupied by Barn Owls but there was no evidence of breeding recorded, and the site was classed as unoccupied in 2016 and there as been no indication of occupancy since this time, although the site remains suitable for breeding Barn Owls.

The specific objectives of this study are as follows;

- To undertake a comprehensive Barn Owl survey of Menlo Castle, according to best practice methods, to identify occupancy and breeding status
- To identify the nesting location if relevant.

## 3. METHODS

A Barn Owl survey was undertaken in the breeding season according to best practice methods as defined by 'Barn Owl Surveying Standards for National Road Projects' (http://www.tiipublications.ie/library/RE-ENV-07005-01.pdf).

The survey was undertaken from late May to September 2018, during which time four visits were carried out (28th of May, 20th of June, 15th of August and the 9th of September 2018) to determine occupancy of Barn Owl via searching for signs to indicate presence (all visits) and dusk watches to confirm activity on the first three visits.

## 4. RESULTS

Barn Owl activity was not recorded at Menlo Castle and the site was deemed to be unoccupied during the nesting season of 2018. There was no evidence (signs including pellets, white-wash and moulted feathers) of Barn Owl observed during day time inspections in and around the building and no activity recorded by nocturnal watches. Assessment of the building and potential nesting opportunities within indicate that the site remains suitable and could support a breeding pair.

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