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## 1. Introduction

Dixon.Brosnan was commissioned by Arup to conduct a bat survey at Dunbrody Bridge as part of the Greenlink proposed onshore electrical cable route. Should the cable be routed along the bridge, these works may result in significant changes to the existing bridge and thus it has been determined that a bat emergence survey be conducted to establish the likely negative impacts, if any, that the proposed development will have on bats. DixonBrosnan have recommended any necessary mitigation measures to ensure that bats, if present, are protected during and subsequent to the proposed works.

## 2. Site location and description

The Greenlink project will provide an electrical interconnector between the UK National Grid and Irish EirGrid Networks. It is currently proposed that the Greenlink interconnector will connect to the UK network at Pembroke power station in Wales and to the Irish network at Great Island power station in County Wexford, Ireland.

As part of the proposed project a number of routes have been considered, most of which will be laid within the local road networks. However, the laying of the cable will necessitate the crossing of the Campile River Estuary. It is proposed that the cable crossing will be drilled under the river bed, with no effect on the river or river banks. Launch and reception pits for the drilling operations will be located outside the curtilage of the river banks.

Dunbrody Bridge, extant 1840, is a large three arche old masonry bridge. It is located on regional road R733 (**Photographs 1 – 2**) and the bridge lays over a tidal section of the Campile River. The bridge is approximately 55m in length and roughly 15m in height. Over time the grout and mortar in the old masonry bridge has been slowly eroded by both tidal waters and by surface water seeping through the structure creating crevices and gaps. A covering of old render exists under each arch of the bridge, but this has largely been eroded or flaked away. The bridge contains a light to moderate covering of vegetation e.g. Ivy (*Hedera helix*), Ivy-leaved Toadflax (*Cymbalaria muralis*) and Polypody (*Polypodium agg.*) with seaweed-covered triangular cutwaters. A large narrow band of mixed broadleaved/conifer woodland was recorded to the northeast of the bridge. A number of large mature Scots Pine (*Pinus sylvestris*) were noted growing within this habitat. The majority of the area surrounding the bridge is composed of agricultural grassland. Dunbrody Abbey exists to the southwest of the Dunbrody Bridge within an agricultural field.



**Photographs 1-2: Dunbrody Bridge**

### **3. Bats and Bridges**

Prior to significant human alteration of the natural landscape it is probable that bats roosted in caves and in old trees; however old trees which have sufficient age and structural complexity (i.e. cavities, hollows, decay holes etc.) are now largely absent from the Irish countryside. In the absence of such traditional roosting sites bats have adapted to man-made structures such as buildings and bridges. The grout and mortar in old masonry bridges in particular may be slowly eroded by water constantly seeping through the structure creating crevices and gaps where stones have become dislodged. Where such crevices and gaps develop they may provide extremely valuable roosting sites for bats. Bats may also roost in fissures which develop in old bridges usually caused by the impact of heavy traffic. Where bridges cross running water there may be protection from predators, lack of human disturbance and relatively constant temperature and humidity. In the UK, the Bat Conservation Trust considers crevices that are at least 400mm deep and between 17mm and 35mm wide are probably optimal (BCT, 2008). However, almost any crevice greater than 50mm deep and 12mm wide can be used as a roost or to gain access to a bigger chamber behind. Newer concrete bridges, which lack suitable crevices, are less likely to be of value for bats.

Bats may be found in bridges year-round. Deep crevices in bridges provide nursery roost sites where large numbers of females can congregate and also provide hibernation sites if they are sufficiently isolated from external temperature fluctuations. Male bats may use bridges as mating stations in the autumn months (Russ, 1995). Smiddy (1991) concluded that bridges provide very important sites for bat species, particularly Daubenton's, with 25% of bridges surveyed either holding bats or having evidence of being used by bats, and a further 26% providing suitable roost sites. A comprehensive study of bridge usage by bats in Cumbria, England (Billington and Norman, 1997) revealed 12.5% of bridges confirmed as bat roosts and a further 41% had suitable crevices. An account of literature relating to bat usage of bridges is included in section 4 of this report. To date, five species of bat have been recorded

roosting under bridges in Ireland namely, Daubenton's bat, Natterer's bats, Brown long-eared bat, Whiskered bat and Pipistrelle species.

### 3.1 Threats to bats in bridges

Most bridges in Ireland belong to and are maintained by local authorities. In Ireland, many of the older bridges were built during the 19th century and were designed for horses and carts. Due to the weight and frequency of modern traffic these older bridges often require strengthening or repair works which can significantly impact on bat roosts if bat issues are not actively considered in the planning of such works. For example, pressure grouting, pointing and infilling of arches can entomb bats within crevices or exclude them from roost sites. The greatest threat is posed to young or hibernating bats present within crevices as these animals are unable to escape.

Smiddy (1991) considered that the greatest threat to bats in bridges was the danger of encasement during bridge repairs. McAney (1992) concluded that greater cooperation is needed between local authorities, engineers and wildlife officials to enable important bat roosts in bridges to be conserved during bridge maintenance works.

## 4. Desktop review and legislation

In Ireland, ten species of bat are currently known to be resident. These are classified into two Families: the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats). The lesser horseshoe bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: common *Pipistrellus pipistrellus*, soprano *P. pygmaeus* and Nathusius' *P. nathusii*, four *Myotis*: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, whiskered *M. mystacinus*, Brandt's *M. brandtii*, the brown long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri* bats.

Whiskered and Natterer's bats are listed as 'Threatened in Ireland', while the other species are listed as 'Internationally Important' in the Irish Red Data Book 2: Vertebrates (Whilde, 1993). The population status of both Whiskered and Natterer's bats was considered 'indeterminate' because of the small numbers known of each, a few hundred and approximately a thousand respectively. Ireland is considered to be an international stronghold for Leisler's bat, whose global status is described as being at 'low risk, near threatened' (LR; nt) by the IUCN (Hutson, *et al.*, 2001).

Near threatened status is applied to those taxa that are close to being listed as vulnerable (facing a high risk of extinction in the wild in the medium-term future on the basis of a range of criteria defined by the IUCN). The Irish population of the Lesser Horseshoe Bat is estimated at 14,000 individuals and is considered of International Importance because it has declined

dramatically and become extinct in many other parts of Europe. Data collected shows that the species increased significantly between from the early 1990's to present.

A review of existing bat records within a 10km radius of the study site (sourced from BC Ireland's National Bat Records Database) showed that the following Irish bat species have been recorded locally, **Table 1**. It is noted that other species which have not been included within this database are also likely to occur. The lesser horseshoe bat (*Rhinolophus hipposideros*) is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC) and that can be a qualifying interest of cSACs in Ireland. There are no known records of Lesser horseshoe bat occurring within the wider Wexford area.

**Table 1: Presence of Irish bat species within a 10km radius**

Common name	Scientific name	Presence
Lesser Noctule	<i>Nyctalus leisleri</i>	Present
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	Present
Daubenton's Bat	<i>Myotis daubentonii</i>	Present
Natterer's Bat	<i>Myotis nattereri</i>	Present
Whiskered Bat	<i>Myotis mystacinus</i>	Present

While the remaining Irish bat species; Nathusius' pipistrelle *P. nathusii*, Natterer's Bat *Myotis nattereri*, Whiskered *M. mystacinus*, Brandt's *M. brandtii* and lesser horseshoe bats have not been recorded in the local area to date, whiskered bats has the potential to occur as the species is widespread in the Irish countryside and the local deciduous woodland habitats are highly favourable for these species. Nathusius' pipistrelle, Natterer's bat and Brandt's bat, are rarer Irish species, may occur in the area occasionally and the lesser horseshoe bat, which is found in west and mid-County Cork, may yet be discovered further east.

## 5. Protection of bats

All bat species are protected under the Wildlife Acts (1976 & 2000) which make it an offence to wilfully interfere with or destroy the breeding or resting place of all species; however, the Acts permit limited exemptions for certain kinds of development. All species of bats in Ireland are listed in Schedule 5 of the 1976 Act and are therefore subject to the provisions of Section 23 which make it an offence to:

- Intentionally kill, injure or take a bat
- Possess or control any live or dead specimen or anything derived from a bat
- Wilfully interfere with any structure or place used for breeding or resting by a bat
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.

All bats are listed on Annex IV of the EU Habitats Directive. The domestic legislation that implements this Directive gives strict protection to individual bats and their breeding and resting places. It should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be



carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

Furthermore, on 21st September 2011, the Irish Government published the European Communities (Birds and Natural Habitats) Regulations 2011 which include the protection of the Irish bat fauna and further outline derogation licensing requirements. **Table 2** summarises the protection given to bats by national and international legislation and conventions.

**Table 2. Legislative protection for bats in Ireland**

Legislation/Convention	Relevance to Irish bats
Irish Wildlife Act (1976) & Irish Wildlife (Amendment) Act 2000.	It is an offence to wilfully interfere with or destroy the breeding or resting place of bats, (with some exemptions for certain kinds of construction development). Provides for the creation of NHAs.
EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive 92/43/EEC), commonly known as the 'Habitats Directive'	Lists all the vesper bats in Annex IV as in need of strict protection and also encourages Member States to conserve landscape features such as river corridors, field boundaries, ponds and woodlands. It also requests that Member States establish a system to monitor the incidental capture and killing of the animals listed in Annex IV.  The lesser horseshoe bat is further listed in Annex II of the EU Habitats Directive. The level of protection offered to lesser horseshoe bats effectively means that areas important for this species are designated as Special Areas of Conservation.
The Convention on the Conservation of European Wildlife and Natural Habitats, commonly known as the 'Berne Convention'.	It obliges states to protect and conserve animals and their habitats, especially those listed as endangered or vulnerable. Also obliges parties to promote national policies for the conservation of wild fauna and natural habitats

<p>The Convention on the Conservation of Migratory Species of Wild Animals, commonly known as the 'Bonn Convention'.</p>	<p>This led to the European Bats Agreement (EUROBATS), which lists a wide range of objectives, including promoting research programmes relating to the conservation and management of bats, promoting bat conservation and public awareness of bats, and identifying and protecting important feeding areas of bats from damage and disturbance.</p>
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The first aim of the developer should be to entirely avoid or minimise the potential impact of a proposed development on bats and their breeding and resting places. Current NPWS advice is that there should be no net loss in local bat population status considering factors such as population size, viability and connectivity. Hence when it is unavoidable that a development will affect a bat population the mitigation should aim to maintain a population of equivalent status in the area.

## 6. Bats found within bridges

Irish Bat Species Five bats species have been recorded in Irish bridges to date. The ecology of these species, Daubenton's, Long-eared, Natterer's, Whiskered and Pipistrelle i.e. Common and Soprano, are discussed below.

### 6.1 Daubenton's Bat (*Myotis daubentonii*)

Daubenton's bat is strongly associated with waterways and is widespread in Ireland and for this reason is sometimes referred to as the "water bat" They are adapted to feeding low over slow moving water and catch insect from the water's surface using their enlarged feet. Daubenton's bats hibernate in caves, mines and other underground sites. The majority of individuals will hibernate towards the end of January and February and remain in hibernation until late March/early April. The Irish Red Data Book (Whilde, 1993) categorises the Irish population of Daubenton's bats as being of international importance. During the National Bat Survey 1985-88 (O'Sullivan, 1994) 213 roosts of Daubenton's bats were recorded and the majority of these were in bridges. Smiddy (1991) found that Daubenton's was the commonest species roosting in the bridges surveyed, recorded in 38 of the 364 bridges surveyed (10.4%). The mean number of bats per bridge was 1.76 (Smiddy, 1991).

### 6.2 Brown Long-eared Bat (*Plecotus auritus*)

Although quite common in Ireland, Long-eared Bats are rarely seen in flight due to their preference for foraging in woodland where they fly amongst the foliage, picking moths and other insects off leaves. Larger prey items such as noctuid moths are taken to a feeding perch, often in a porch or outhouse. These perches are recognisable by the piles of insect remains, such as moth wings, which collect under them. The Long-eared Bat roosts in buildings such



as houses with large attic spaces, churches, outbuildings and in tree holes. This was the second commonest species in a study by Smiddy (1991), recorded in eight of the 364 bridges surveyed.

### **6.3 Natterer's Bat (*Myotis nattereri*)**

Natterer's Bat is one of the rarer Irish bat species, found mainly in woodland and mature hedgerow habitats. This species has broad wings so can fly with great manoeuvrability among trees and catch insects from foliage. Its usual roost sites are in tree holes, old stone buildings such as churches and barns, and under bridges. Natterer's bats hibernate underground usually in caves and mines. They arrive at hibernation sites in December with peak numbers recorded in January and February. The Irish Red Data Book (Whilde, 1993) lists Natterer's bat as a species which is considered to be threatened in Ireland. Its true status is listed as indeterminate - a taxa known to be 'endangered' or 'vulnerable' or 'rare' but there is not enough information to say which of these categories is appropriate. In the 1985-88 National Bat Survey (O'Sullivan, 1994) 44 roosts were located in the Republic of Ireland, and of these 20 roosts held only single bats. Based on these results, Natterer's bats were classified as widely distributed in Ireland but with low population levels. Just four single bats were recorded by Smiddy (1991) in a survey of east Cork and west Waterford.

### **6.4 Whiskered Bat (*Myotis mystacinus*)**

Another uncommon and little-known bat, Whiskered bats typically forage along forest tracks or near water adjoining mature trees. It is sometimes found roosting in attics of old buildings or in crevices under stone bridges but there are very few confirmed roosts in Ireland. Whiskered bat has been infrequently recorded in Ireland and is considered to be a threatened species in the Irish Red Data book (Whilde, 1993). Their diet has not been ascertained in Ireland although in England and Europe the diet consists of mainly nematoceran Diptera with large quantities of Tipulidae which may indicate foraging in woodland (Vaughan, 1997). During the 1985-88 survey in the Republic of Ireland (O'Sullivan, 1994) only 34 roosts were recorded, most of which contained only 1-10 bats. Smiddy (1991) recorded just three single individuals. Whiskered bat is the rarest bat species in Ireland.

### **6.5 Common pipistrelle (*Pipistrellus pipistrelles*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*)**

Ireland's two smallest and commonest bat species, the Common and Soprano Pipistrelles are the bats most likely to be seen flying around soon after dusk in both urban and rural areas. Both have a rapid, twisting flight as they pursue tiny prey of midges, mosquitoes and small moths. Pipistrelles are frequently found roosting in houses, although they also roost in other locations such as tree holes. In houses they prefer to occupy confined spaces such as behind hanging tiles and soffit boards or between roofing felt and roof tiles, rather than the main attic space. Smiddy (1991) recorded Common Pipistrelle at just three bridges during his survey.

## 7. Methodology

This report presents the results of an onsite bat emergence survey undertaken on the 18<sup>th</sup> of September 2018. Bat species were identified in real time in the field using the heterodyne detector and Echo Meter Touch 2 PRO bat detector and recordings on the Echo Meter Touch 2 PRO were reviewed and identified subsequent to the survey. This survey followed the guidelines set out in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*' (Collins, J. (ed.), 2016). Surveys were carried out by Carl Dixon MSc and Ian McDermot MSc.

Prior to the emergence survey an external inspection of the bridge was conducted during daylight hours on the 20<sup>th</sup> of April 2018 to look for possible emergence points and bat presence. The presence of bats is often shown by grease staining, droppings, urine marks, corpses, feeding signs such as invertebrate prey remains and/or the presence of bat fly *Nycteribiidae* pupae, although direct observations are also occasionally made. Bat droppings are often identifiable to species-level based on their size, shape and content.

Potential roost sites in cavities, cracks, crevices, and joints on the underside of bridges etc. were examined from the ground and aided by close focusing binoculars for the potential presence of bats at higher elevations. A ladder was used where possible. Where necessary an endoscope was used to examine voids, cracks or crevices deep enough to house bats. A high-powered torch was also used to view crevices and other spaces potentially used by resting bats.

The survey was carried out during near suitable weather conditions for bats (air temperature of  $\geq 8^{\circ}\text{C}$ , little wind and dry (**Table 3**). Any visual observations of bats were recorded as part of the assessment, with notes made where possible relating to the activity of the bat, or bats observed. The site survey was also supplemented by reviews of Bat Conservation Ireland's (BCIreland) National Bat Records Database.

**Table 3: Dates, times and weather conditions.**

Date	Time	Sunset	Dusk	Weather
18/09/2018	18.55 – 22.45	19.36	20.10	Partly cloudy to nearly overcast at times, 14° to 16°C, Rain 0 mm. Visibility good. Gentle breeze to strong breeze.
<b>Notes</b>	<p>Wind varied throughout survey with strong gusts of up to 30mph at times, however as night progressed wind strength died down. Low tide at start of survey and raised throughout.</p> <p>Otter noted foraging and commuting within Campile River, travelling in an east to west direction.</p>			

## 8. Bat Activity Survey Results

The focus of the survey was primarily to determine if bats were roosting in the bridge to be affected by adjacent site works. The site was deemed to be of 'Moderate' suitability as a

roosting habitat based on the The Bat Conservation Trust Guidelines (Collins, J. (ed.) (2016)) and categorised as Code 2 (Ideal roost crevices in bridge, but no bats or bat evidence seen and crevices generally greater than 100mm deep, clean and offering good shelter.) based on protocol used for coding bridges developed by Billington and Norman (1997). The site in relation to the surrounding landscape was deemed to be of 'high' suitability as a commuting and foraging habitat overall based on the 'The Bat Conservation Trust Guidelines' (Collins, J. (ed.) (2016)) due to the continuous high-quality habitat that is well connected to the wider landscape.

Four species were identified during the emergence survey;

1. Soprano pipistrelle (*Pipistrellus pygmaeus*)
2. Brown Long-eared Bat (*Plecotus auratus*)
3. Daubenton's Bat (*Myotis daubentoni*)
4. Leisler's bat (*Nyctalus leisleri*).

No bats were recorded emerging from the bridge. Observations during the survey period relate to single bats commuting past the bridge, in a north south direction and vice versa. Two recordings of Daubenton's bats were noted. These were of lone individuals, possibly the same bat travelling along the Campile River in an east west direction initially, 2hrs into the survey, and a single bat travelling in a west east direction approximately 55 minutes after the first recording. Generally, the frequency of bat passes over the survey period was low.

Due to the habitats present in proximity to the bridge e.g. woodland bands and Dunbrody Abbey including the number of large mature trees and the times at which bats were first recorded (See **Table 4**), it is possible that the bats are emerging from roost sites in the vicinity of the bridge.

**Table 4: First recordings of each species within the site relative to their approximate emergence times.**

Species	Sunset/Dusk Time	First Recording Time	Approximate emergence times of species.
Leisler's bat	19.36/20.10	20.07	Leisler's bats appear early in the evening, around sunset. Median emergence time is 18 minutes after sunset.
Soprano Pipistrelle	19.36/20.10	19.58	Generally, emerge from their roost around 20 minutes after sunset. Emerge earlier on warmer nights. May emerge in daylight.
Daubenton's bat	19.36/20.10	21.06	Daubenton's bats have been recorded emerging only when it is fully dark rather than at dusk (Walsh et al, 2001) which can range from 30 to 120 minutes after sunset (Swift and Racey, 1983; Warren et al,

			2000; Altringham, 2003). Median emergence time is 84 minutes after sunset (Jones & Rydell, 1994)
Brown Long-eared Bat	19.36/20.10	21.17	Usually only emerge in the dark, around an hour after sunset. May be active and make short flights within the roost prior to emergence.

## 9. Discussion of results.

No bats were recorded emerging from Dunbrody Bridge. However, bridges are known to be used year-round by bats and bats in general can alternate between different roost sites over a number of nights, so it is possible that the bridge is used more extensively as a day roost or during other periods of the year which primarily relates to seasonal factors.

Low numbers of bats were recorded throughout the survey; with equal number of soprano pipistrelle, brown long-eared and leisler's bat being recorded. These findings would suggest the site in immediate proximity to the bridge has low importance for bats, restricted to a site-specific level of importance only. However, to fully establish this an activity survey would be required preferably during the months of May to August, with particular emphasis on the band of woodland to the northwest of the bridge.

While no bats were recorded emerging or re-entering from the bridge, the first contact with all four species recorded was within the typical emergence times for each species, thus indicating that there may be bat roosts located immediately adjacent to the bridge.

It is considered that the site is important in a geographic context at a site level only with respect to bats. However, impacts upon the boundary habitats may confer minor significant adverse effects to the local bat populations utilising the site, as these linear features are valuable in linking roost sites to foraging areas and facilitate the dispersal of bats into the wider landscape. A gap in a treeline of greater than 10m may force some species of bats to seek an alternative commuting route.

## 10. Mitigation measures for the protection of bats

During the construction of the proposed development, general mitigation measures for bats will follow the National Road Authority's 'Guidelines for the Treatment of Bats during the Construction of National Road Schemes' NRA (2005) and 'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that should be met in the pre-construction (site clearance) and construction phases of developments to minimise negative impacts on roosting bats, or prevent avoidable impacts resulting from significant alterations to the immediate landscape. The developer will take all reasonable steps to ensure works do not harm individuals by altering working methods or timing to avoid bats.

If bats were to be recorded roosting within the proposed works site then work would be halted and specific mitigation measures would be implemented including where relevant seasonal restrictions and provision of replacement roosting habitat. The ecologist will also be required to obtain a derogation license from the NPWS, to facilitate licensed exclusion of the roosting site in accordance with a plan approved by the NPWS.

## 11. References

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