

## **6. BIODIVERSITY**

### **6.1 Introduction**

This chapter of the EIAR has been prepared by Padraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has over 20 years experience working in the environmental field and in 2007 was awarded an MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA).

This chapter has been prepared with regard to the EIA Directive as well as best practice methodology from the EPA, under which, the analysis of impacts to biodiversity is an essential component of the EIA process, and so is a required chapter in any EIAR.

Under Article 6(3) of the Habitats Directive an 'appropriate assessment' of projects must be carried out to determine if significant effects are likely to arise to the integrity of Natura 2000 sites. An Appropriate Assessment Screening Report has been prepared as a separate stand-alone report.

### **6.2 Research Methodology**

The assessment was carried out in accordance with the following best practice methodology: 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Institute of Ecology and Environmental Management (IEEM, 2016) and 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' by the Environmental Protection Agency (EPA, 2017).

A site visit was carried out on the 4<sup>th</sup> of December 2018 and the 28<sup>th</sup> of November 2019. The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000). A botanical species list for each habitat was compiled and these are presented in Appendix B. Species abundance was determined using the DAFOR scale (D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare). This is a subjective form of habitat description commonly used in conjunction with habitat classifications. Sample digital photos were also taken. Data were then uploaded to the ArcView 9.2 GIS software suite.

The nomenclature for vascular plants is taken from The New Flora of the British Isles (Stace, 2010) and for mosses and liverworts A Checklist and Census Catalogue of British and Irish Bryophytes (Hill et al., 2009).

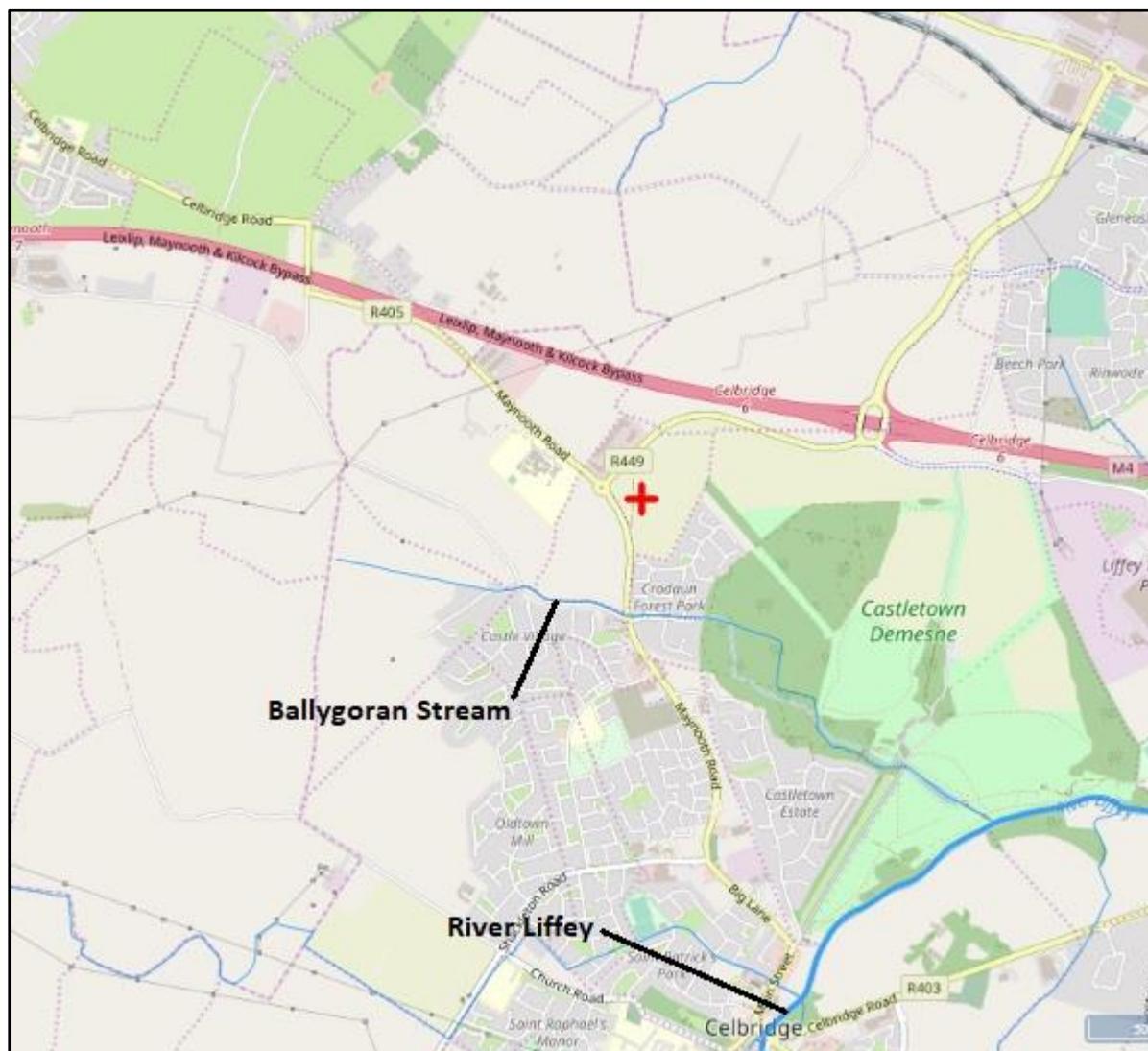
November/December lies outside the optimal period for general habitat surveys (Smith et al., 2010). It was nevertheless possible to classify all habitats on the site to Fossitt level 3. It is also outside the optimal season for bats and so a dedicated bat survey was not carried out. November/December lies outside the optimal season for breeding birds and amphibians but is within the ideal season for surveying larger mammals (especially Badgers).

### **6.3 Receiving Environment**

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors

further from the project footprint may need to be considered as this assessment progresses. This is shown in Figure 6.1 below.

**Figure 6.1 Site location showing local water courses**



Source: [www.epa.ie](http://www.epa.ie)

NOTE: There are no areas designated for nature conservation within this zone

### 6.3.1 Literature Review

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Special Protection Areas (SPA – Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. Proposed NHAs (pNHA) are areas that have yet to gain full legislative protection. They are generally protected through the relevant County Development Plan. There is no system in Ireland for the designation of sites at a local, or county level. Within 2km of the site there are no areas designated for nature conservation.

The NPWS web site ([www.npws.ie](http://www.npws.ie)) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The Crodaun site is located

within the square N93 and three protected plant or species are recorded. It must be noted that this list cannot be seen as exhaustive and a lack of records should not be interpreted as an absence of protected species.

**Table 6.1 Known records for protected species within the N93 10km square**

Species	Status and habitat <sup>6 7</sup>
Red hemp nettle <i>Galeopsis angustifolia</i>	Tilled fields and waste places. Records pre-1970. Leixlip.
<i>Hypericum hirsutum</i> Hairy St. John's-wort	Woods and shady places. Current. Carton Estate.
<i>Viola hirta</i> Hairy Violet	Sand dunes, grasslands, limestone rocks. Records pre-1970. Carton Estate.

Water quality is monitored on an on-going basis by the Environmental Protection Agency (EPA). They assess the pollution status of a stretch of water by analysing the invertebrates living in the substrate as different species show varying sensitivities to pollution. They arrive at a 'Q-Value' where Q1 = grossly polluted and Q5 = pristine quality (Toner et al., 2005). The Crodaun site is within the catchment of the River Liffey. Mapping from OSI and the EPA show no water courses on these lands. A small stream, the Ballygoran, flows approximately 250m south of the site boundary. There are no EPA monitoring points along this stream. The nearest monitoring point along the River Liffey is at Leixlip Bridge, most recently (2016) showed Q4 conditions (unpolluted).

The EU's Water Framework Directive (WFD) stipulates that all water bodies were to have attained 'good ecological status' by 2015. In 2018 the second River Basin Management Plan was published to address pollution issues and includes a 'programme of measures' which are to be completed. This has identified 190 'areas for action' where resources are to be focussed over the 2018-2021 period.

The status of the River Liffey through Celbridge, including the Ballygoran Stream, is 'poor' and this status prevails until Leixlip, where after the freshwater portion of the Liffey is not assessed.

### 6.3.2 Stakeholder Consultation

Because of the relatively low ecological sensitivity of the subject lands no third parties were contacted for nature conservation observations.

### 6.3.3 Plans or Policies Relating to Natural Heritage

#### 6.3.3.1 Convention on Biological Diversity (CBD)

The protection of biodiversity is enshrined in the CBD to which Ireland is a signatory. As part of its commitment to this international treaty Ireland, as part of a wider European Union initiative, was committed to the halt in loss of biodiversity by the year 2010. This target was not met but in 2010 in Nagoya, Japan, governments from around the world set about redoubling their efforts and issued a strategy for 2020 called 'Living in Harmony with Nature'. In 2011 the Irish Government incorporated the

<sup>6</sup> Preston et al., 2002

<sup>7</sup> Parnell et al., 2012

goals set out in this strategy, along with its commitments to conservation biodiversity under national and EU law, in the second national biodiversity action plan (Dept. of Arts, Heritage and the Gaeltacht, 2011). A third plan was published in 2017.

### 6.3.3.2 Celbridge Local Area Plan (LAP) 2017-2023

Chapter 10 of the LAP discusses 'heritage and amenity' including the natural heritage (section 10.4). The following policy is particularly relevant to the current proposal:

*Policy NH1 Natural Heritage: It is the policy of the Council to support the protection of species and habitats that are designated under the Wildlife Acts 1976 and 2000, the Birds Directive 1979 and the Habitats Directive 1992 as well as areas of high local biodiversity value and to ensure development with potential to impact the integrity of the Natura 2000 network will be subject to Appropriate Assessment.*

Under the plan, the subject lands are zoned for 'new residential'. The Local Authority carried out an Appropriate Assessment of the plan and concluded that its implementation would not result in effects to the integrity of the Natura 2000 network of protected sites. A Strategic Environmental Assessment was also carried out.

### 6.3.3.2 2<sup>nd</sup> River Basin Management Plan

Under the Water Framework Directive (Directive 2000/60/EC) all Irish waters must achieve 'good ecological status' by 2027. This has highlighted 190 'priority areas for action' which will focus resources between the 2018-2021 period. The Liffey at Celbridge is assessed as of 'poor' status.

### 6.3.4 Site Survey

Aerial photography and historic mapping from the OSI show that this region has remained in agricultural use since historic times. It is close to the town of Celbridge and there have been some land use changes in recent decades which has seen conversion of farming land to built development. The lands are currently surrounded on three sides by residential housing or public roads.

#### 6.3.4.1 Flora

The site was first visited on 4<sup>th</sup> December 2018 and again on 28<sup>th</sup> November 2019. Identified habitats are described here with reference to the standard classification system (Fossitt, 2000). It was found that the lands comprise a series of agricultural fields with traditional field boundaries. There are no water courses or drainage ditches associated with these boundaries.

There are three fields of **improved agricultural grassland – GA1** which are grazed by cattle and horses. To the east, near the R405 road, there are the remains of buildings: **buildings and artificial surfaces – BL3**. The small field in which this is located is not grazed and so this has reverted to a **dry meadow – GS2**. There are rough grasses such as Cock's-foot *Dactylis glomerata* along with Creeping Thistle *Cirsium arvense*, Ribwort Plantain *Plantago lanceolata* and occasional saplings of Grey Willow *Salix cinerea*. Remnants of another building is located in the field to the south. These habitats are of low local value to wildlife.

Field boundaries are either **hedgerows – WL1**, **treelines – WL2** or **stone walls – BL1**. Hedgerows and treelines can be similar in species composition and differ in that treelines are dominated by tall trees over 5m in height. Methodology is available from the Heritage Council which evaluates the quality of field boundaries based upon their age, species diversity and structure (Foulkes et al., 2013). One stretch of hedgerow is associated with a **drainage ditch – GW4**. Most of these field divisions appear on historic

OSI maps from 1888-1913 and so are of significant age. The northern (road) boundary appears as a townland boundary however this has since been replaced as part of the construction of the R449 road in the early 2000s. The boundaries to the south and south-east are also townland boundaries and so may be of ancient origin (8<sup>th</sup> Century). Nevertheless, it is likely that little of the original boundaries remain, as the north-east is now a stone wall and the south-east is a line of mature Oak *Quercus sp.* These trees are valuable in their own right but are not structurally diverse or species rich in the way an old hedgerow is. The hedgerow of recent origin is evaluated as of 'lower significance'. Elsewhere, hedgerows and treelines are evaluated as 'higher significance' due to their age and species diversity. Trees and woody species typically comprise Ash, Hawthorn *Crataegus monogyna*, Spindle *Euonymus europaeus*, Holly *Ilex aquifolium*, Elder *Sambucus nigra* and Field Rose *Rosa arvensis*. Ground flora includes Herb Robert *Geranium robertianum*, Cow Parsley *Anthriscus sylvestris* and Primrose *Primula vulgaris* along with the ferns: Hart's-tongue *Asplenium scolopendrium*. These hedgerows and hedgerows are dense and well-structured, providing excellent habitat for a range of plants and animals, and are of high local value to biodiversity. The stone wall has little vegetation apart from some Ivy *Hedera helix*, although there are some scattered trees along this stretch.

No plant species were found which is listed as alien invasive under Schedule 3 of S.I. 477 of 2011. No rare or threatened plant species was recorded.

There are no habitats which are examples of those listed in Annex I of the Habitats Directive while there is no evidence that species listed in Annex II of that Directive are present. All habitats described are shown as a habitat map in Figure 6.2 below.

**Figure 6.2 Habitat Map**



### 6.3.4.2 Fauna

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. Table 6.2 details those mammals that are protected under national or international legislation in Ireland.

**Table 6.2 Protected mammals in Ireland and their known status within the zone of influence (Harris & Yalden, 2008)<sup>8</sup>** Those that are greyed out indicate that there are no records of the species from the 10km square, N93 National Biodiversity Data Centre.

Species	Level of Protection	Habitat <sup>9</sup>	Red List Status <sup>10</sup>
Otter <i>Lutra lutra</i>	Annex II & IV Habitats Directive;	Rivers and wetlands	Near Threatened
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Wildlife (Amendment) Act, 2000	Disused, undisturbed old buildings, caves and mines	Least Concern
Grey seal <i>Halichoerus grypus</i>	Annex II & V Habitats Directive;	Coastal habitats	-
Common seal <i>Phocaena phocaena</i>	Wildlife (Amendment) Act, 2000		-
Whiskered bat <i>Myotis mystacinus</i>	Annex IV Habitats Directive;	Gardens, parks and riparian habitats	Least Concern
Natterer's bat <i>Myotis nattereri</i>	Wildlife (Amendment) Act, 2000	Woodland	Least Concern
Leisler's bat <i>Nyctalus leisleri</i>		Open areas roosting in attics	Near Threatened
Brown long-eared bat <i>Plecotus auritus</i>		Woodland	Least Concern
Common pipistrelle <i>Pipistrellus pipistrellus</i>		Farmland, woodland and urban areas	Least Concern

<sup>8</sup> Excludes marine mammals

<sup>9</sup> Harris & Yalden, 2008

<sup>10</sup> Marnell et al., 2009

Species	Level of Protection	Habitat <sup>9</sup>	Red List Status <sup>10</sup>
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>		Rivers, lakes & riparian woodland	Least Concern
Daubenton's bat <i>Myotis daubentonii</i>		Woodlands and bridges associated with open water	Least Concern
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>		Parkland, mixed and pine forests, riparian habitats	Least Concern
Irish hare <i>Lepus timidus hibernicus</i>	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats	Least Concern
Pine Marten <i>Martes martes</i>		Broad-leaved and coniferous forest	Least Concern
Hedgehog <i>Erinaceus europaeus</i>	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows	Least Concern
Pygmy shrew <i>Sorex minutus</i>		Woodlands, heathland, and wetlands	Least Concern
Red squirrel <i>Sciurus vulgaris</i>		Woodlands	Near Threatened
Irish stoat <i>Mustela erminea hibernica</i>		Wide range of habitats	Least Concern
Badger <i>Meles meles</i>		Farmland, woodland and urban areas	Least Concern
Red deer <i>Cervus elaphus</i>		Woodland and open moorland	Least Concern
Fallow deer <i>Dama dama</i>		Mixed woodland but feeding in open habitat	Least Concern
Sika deer		Coniferous woodland and adjacent heaths	-

Species	Level of Protection	Habitat <sup>9</sup>	Red Status <sup>10</sup>	List
Cervus nippon				

The site survey found no direct evidence of any mammal. No evidence of Badger activity was recorded, and no setts are present on the lands. There are no records of Badger from this site from the National Biodiversity Data Centre although recent records (many roadkill from the M4 motorway) are available from the wider area.

Irish Hare was not noted but is widespread on agricultural land. While limited data are available on the distribution of Hedgehog, Pygmy Shrew and Irish Stoat, they are considered ubiquitous in the Irish countryside and suitable habitat is available for them (Lysaght & Marnell, 2016). There is no suitable habitat for Otter.

Features on the site are considered to be of moderate value to roosting Bats (Hundt, 2012) with a number of old trees. Because of the timing of this study a detector-based study was not feasible.

December is not a suitable time for surveying breeding birds. Hedgerows and treelines provide breeding habitat for a number of common countryside and woodland species. A Wren *Troglodytes troglodytes* was the only species noted. During the November 2019 survey Song Thrush *Turdus philomelos*, Blackbird *T. merula* and Blue Tit *Parus caeruleus* were recorded. These are common and widespread birds and are listed on BirdWatch Ireland's 'green' list, i.e. it is of low conservation concern (Colhoun & Cummins, 2013)<sup>11</sup>.

Of those species listed by BirdWatch Ireland as being of high conservation concern Grey Partridge *Perdix perdix*, Corncrake *Crex crex*, Barn Owl *Tyto alba* and Yellowhammer *Emberiza citrinella* were recorded as breeding in Kildare during the 2007-11 Bird Atlas project (Balmer et al., 2013). Barn Owl has been recorded as 'possibly breeding' within this 10km square. The buildings were inspected for their activity, but none was found. There are no recent records for Corncrake and Grey Partridge. Yellowhammer are typically recorded from arable fields.

Common Lizard *Zootoca vivipara* is protected under the Wildlife Act 1976 and may be present on this site. Suitable habitat for spawning Common Frog *Rana temporaria* is not present. There are no open ponds which are suitable for Smooth Newt *Lissotriton vulgaris*.

There are no water courses on the site which could provide habitat for fish or aquatic invertebrates. The drainage ditch is of minimal fisheries value as it is prone to drying out. The River Liffey meanwhile is of salmonid value with a run of Atlantic Salmon *Salmo salar* and Brown Trout *S. trutta*.

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia*, and this is not to be found on this type of farmland. Other protected invertebrates are confined to freshwater and wetland habitats and so are not present on this site.

<sup>11</sup> Colhoun & Cummins, 2013. Birds of Conservation Concern in Ireland. Green = Low; Amber = Medium; Red = High

### 6.3.4.3 Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

In summary, the application site is not within any area that has been designated for nature conservation at a national or international level. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There are no plants which are listed as alien invasive species. Boundary features are of local significance for a range of wildlife, including protected species (birds).

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in Table 6.3 below.

**Table 6.3 Evaluation of the importance of habitats and species on the Crodaun site**

Habitats	Evaluation
Hedgerows – WL1 (higher significance) with Drainage ditch – FW4 Treelines – WL1 (higher significance)	Local Importance (High Value)
Dry meadows – GS1 Hedgerows – WL1 (lower significance) Stone walls – BL1	Local Importance (Low Value). Sites containing small areas of semi-natural habitat that are of some local importance for wildlife
Artificial surfaces -BL3 Improved agricultural grassland – GA1	Negligible ecological value.

## 6.4 Characteristics of the Proposed Development

The project will require clearance of land within the red line boundary, including 860m of internal hedgerows. The construction phase will include the construction of the homes, installation of surface water, foul wastewater and water mains infrastructure, followed by building of the internal roads with standard materials and methods. Post-construction the proposed open spaces within the site will be landscaped, to include artificial lighting.

**Figure 6.3 Hedgerow removal and replacement**

## 6.5 Potential Impact of the Proposed Development

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation. Methodology for determining the significance of an impact has been published by the EPA. This is based on the valuation of the ecological feature in question and the scale of the predicted impact.

### 6.5.1 Construction Phase

The following potential impacts are likely to occur during the construction phase in the absence of mitigation:

1. The removal of habitats including agricultural grassland, dry meadow and hedgerows. The total loss of higher significance hedgerow is calculated at 860m. The treeline to the west is to be retained and is outside the development boundary. Approximately 2,030m of new hedgerow is to be planted (see mitigation section).
2. The direct mortality of species during land clearance. This impact is most acute during the bird breeding season which can be assumed to last from March to August inclusive. Bat roosts may be present in older trees. All bat species and their resting places are protected under the Wildlife Act.
3. Pollution of water courses through the ingress of silt, oils and other toxic substances. There are no water courses on the site although the land is within the catchment of the River Liffey, which is of significant fisheries value. The risk of pollution however is low and this effect is therefore

considered not to be significant. Nevertheless, best site management practice should be followed to avoid pollution.

### 6.5.2 Operational Phase

The following potential impacts are likely to occur during the operational phase in the absence of mitigation:

4. Impacts to species through the disruption of ecological corridors/green infrastructure. The site context is suburban in nature with existing built development and roads. These features can contribute to habitat fragmentation however this is something which affects some species more than others. Large mammals, for instance, can find it difficult to move through such a landscape although birds and flying insects are less affected. Bats may be impacted through the loss of foraging routes (hedgerows and treelines) and many species are known to follow these routes closely. The loss of hedgerow habitat will result in a loss of potential breeding grounds for bird species as well as smaller mammals such as Hedgehog, Irish Stoat, Irish Hare and Pygmy Shrew. Although the recorded species on the site are not of special conservation concern, this aspect of the project will result in an overall diminishment of local habitat features.
5. The subject development will result in additional volumes of foul wastewater. Wastewater from the development will be treated at the Osberstown wastewater treatment plant. This is licenced by the EPA to discharge treated effluent to the River Liffey (licence no. D0002-01). The plant is licenced to discharge treated effluent to the River Liffey by the EPA. It has a capacity to treat wastewater for a population equivalent (P.E.) of 130,000. The Annual Environmental Report (AER) for 2018 shows that the average loading was well within this capacity while the standard of effluent was fully compliant with emission limit values set under the Urban Wastewater Treatment Directive. Monitoring of the receiving water (i.e. the River Liffey) takes place at points upstream and downstream of the discharge point. The AER states that "The discharge from the wastewater treatment plant does not have an observable negative impact on the water quality" and that "the discharge from the WWTP has no observable negative impact on the Water Framework Directive status". This development will increase demand on the treatment plant however sufficient capacity exists to treat this effluent to a high standard.
6. Pollution of water from surface water run-off. The Greater Dublin Strategic Drainage Study (2005) identified issues of urban expansion leading to an increased risk of flooding in the city and a deterioration of water quality. This arises where soil and natural vegetation, which is permeable to rainwater and slows its flow, is replaced with impermeable hard surfaces. Various SUDS features have been incorporated into the proposed development as part of the sustainable urban drainage design. These include attenuation storage followed by controlled release to the local surface water sewer. This ultimately enters the Ballygoran Stream and the River Liffey.
7. Disturbance to species from increased human activity (including vehicle traffic, noise, artificial light, pets etc.). This effect must be considered in the context of the existing environment, which is already close to high density residential areas and transport infrastructure, which are either existing or underway. This brings with it noise and light pollution, which will both increase with this development. Artificial lighting is known to have impacts on animal activity through both attractive and repellent forces. The effects are species and location specific, for instance some Bats are attracted to lights as prey items become concentrated around light sources (Rich &

Longcore, 2006 eds). However other species may be deterred. Impacts are also related to the type of lighting used and so the ultimate impact is dependent on the species of Bat that may be present within the zone of influence and the final design of lighting for the project. Brown Long-eared Bat, Whiskered bat, Natterer's bat, Daubenton's bat and Lesser Horseshoe Bat are considered by Bat Conservation Ireland as being most susceptible to lighting effects. It is not known what species are using the site. A lighting plan has been prepared by Fallon Design.

There has been little study meanwhile on the effects of noise on terrestrial animals however it is believed that many species can adapt to elevated ambient noise levels. Given the site location it is considered that the species present are not especially sensitive to this type of disturbance.

The introduction of household pets, particularly cats, has been a cause of concern given the degree to which they prey on wild mammals and birds. There is no known research on this issue from Ireland. However, the UK's Royal Society for the Protection of Birds states on its website that *"despite the large numbers of birds killed [estimated at up to 55 million per annum in the UK], there is no scientific evidence that predation by cats in gardens is having any impact on bird populations UK-wide."*<sup>12</sup>

8. Creation of landscaped areas including areas of open space and landscaping of the road margin. This will consist of native species and non-native species (but will avoid any that are considered alien invasive<sup>13</sup>) and will create additional habitat for birds and invertebrates.
9. Impacts to protected areas. There are no areas protected for nature conservation within the vicinity of the site. Treated wastewater passes to the River Liffey, and although the river is not designated for nature conservation, the point at which it enters the Irish Sea, at Dublin Bay, is subject to a number of such designations. An AA Screening has been carried out and this found that significant negative effects to these areas are not likely to occur.

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<sup>12</sup> <http://www.rspb.org.uk/advice/gardening/unwantedvisitors/cats/birddeclines.aspx>

<sup>13</sup> Listed on Schedule 3 of S.I. 477 of 2011 or as 'most unwanted' by Invasive Species Ireland

**Figure 6.4 Landscaping Master Plan**



Table 3.3 of the EPA guidance note sets out the criteria for determining the significance of impacts.

**Table 6.4 Nature of predicted impacts in the absence of mitigation**

Impact		Direct/ Indirect	Cumulative	Duration <sup>14</sup>	Reversible?	Positive/ Negative
<b>Construction Phase</b>						
1	Habitat loss	Direct	Yes	Permanent	No	Negative
2	Species Mortality	Direct	No	Permanent	No	Negative
3	Pollution of water courses	Indirect	Yes	Temporary	Yes	Negative

<sup>14</sup> Temporary: up to 1 year; Short-term: 1-7 years; Medium-term: 7-15 years; Long-term: 15-60 years; Permanent: >60 years (NRA, 2006)

Impact		Direct/ Indirect	Cumulative	Duration <sup>14</sup>	Reversible?	Positive/ Negative
<b>Operation Phase</b>						
4	Habitat fragmentation incl. loss green infrastructure	Indirect	Yes	Permanent	Yes	Negative
5	Wastewater	Indirect	Yes	Permanent	Yes	Neutral
6	Surface water run-off	Indirect	Yes	Permanent	Yes	Neutral
7	Disturbance to species during operation	Indirect	Yes	Permanent	Yes	Negative
8	Landscaping	Direct	Yes	Permanent	Yes	Positive
9	Impacts to protected areas	Indirect	No	Temporary	Yes	Negative

Table 6.5 below assesses the scale and likelihood of the predicted impacts of the proposed development in the absence of mitigation.

**Table 6.5 Scale and likelihood of predicted impacts in the absence of mitigation.**

Impact		Magnitude	As proportion of resource	Likelihood
<b>Construction Phase</b>				
1	Habitat loss	860m of higher significance hedgerow	100%	Certain
		Remaining areas of meadow, agricultural grassland	100%	
2	Mortality to animals during construction	Not possible to quantify	N/A	Likely but magnitude depends on timing of works.
3	Pollution of water	Not possible to quantify but the River Liffey is a sensitive water course	N/A	Unlikely

Impact		Magnitude	As proportion of resource	Likelihood
<b>Construction Phase</b>				
<b>Operation Phase</b>				
4	Loss of ecological corridors	Approximately 860m of higher significance hedgerow habitat are to be removed however this will be offset to some extent by new landscaping.	Will affect all the species using these hedges	Certain
5	Wastewater pollution	Not possible to quantify	N/A	No impacts are likely
6	Surface water pollution	Not possible to quantify	N/A	No impacts are likely
7	Disturbance to species from increased human activity (incl. noise/lighting/ pets)	The level of bat activity is currently unknown. Lighting effects will be minimised at the lighting design stage	Could impact upon much of the remaining biodiversity off the site although many species considered to be resilient	Possible
8	Creation of new landscaped areas	New planting will provide habitat for nesting birds and/or invertebrates	Open space and road margin will incorporate new biodiversity features	Certain.
9	Impacts to protected areas	No effects	NA	No impacts are likely

Tables 6.4 and 6.5 are combined to determine the level of significance of any given impact. This is shown in Table 6.6.

**Table 6.6 Significance level of likely impacts in the absence of mitigation**

Impact		Significance
<b>Construction phase</b>		
1a	Habitat loss of features of negligible or local value (lower importance): dry meadow, buildings, agricultural grassland.	Not significant
1b	Habitat loss of features of high local value: higher significance hedgerows.	Significant – permanent loss of high local value features
2	Mortality to animals during construction	Significant – permanent impacts to species with legal protection (nesting birds and mammals)
3	Pollution of water during construction phase	Imperceptible
4	Loss of ecological corridors	Significant
5	Wastewater pollution	Neutral
6	Surface water pollution	Neutral
7	Disturbance to species from human disturbance	Significant – possible loss of sensitive bat species
8	Landscaping	Positive effect over the long term through additional planting and habitat creation
9	Protected areas	Neutral

Overall it can be seen that a number of potentially significant impacts are predicted to occur as a result of this project in the absence of mitigation.

### 6.5.3 Do Nothing Impact

There are no immediate threats to the hedgerow habitats or species of interest assuming current agricultural management practices continue.

Water quality may improve in the Liffey catchment with the implementation of the Water Framework Directive over the 2018-2021 period.

## 6.6 Remedial and Reductive Measures

These measures include avoidance, reduction and constructive mitigation measures as set out in Section 4.7 of the Development Management Guidelines. Under the EIA Directive, where significant negative effects are predicted to arise from a project then mitigation measures are required.

This report has identified a number of impacts that were assessed as 'moderate negative' and therefore mitigation is needed to reduce the severity of these potential effects, which are summarised below in Table 6.7.

**Table 6.7 'Significant Effects for Which Mitigation is Required**

No.	Phase	Impact
1	Construction Phase	Loss of habitat
2	Construction Phase	Mortality to animals during construction
3	Construction Phase	Water pollution
4	Operation Phase	Loss of Ecological Corridors
5	Operation Phase	Impacts to Bats from lighting

### 6.6.1 Mitigation Measures Proposed

The following mitigation measures are proposed for the development:

#### 6.6.1.1 Construction Phase

*Mitigation by offset: Loss of habitat and ecological corridors*

To offset the loss of higher significance hedgerow and treelines it is proposed to create new, biodiversity planting within areas of public open space and along both margins of the R405 and R449 roads. A total of 2,030m of new mixed-species hedgerow will be planted on peripheral and common areas of open space within the development. Peripheral hedgerows come to a length of 870m in total and comprises of native species, eight species of which are listed in the proposed planting schedule accompanying the submitted Landscape Masterplan. Soil from the existing hedgerows will be stockpiled and used in these new areas to retain a seed bank for other species. These new hedgerows will retain connectivity through the site for biodiversity, as well as joining up with other hedgerows and green spaces beyond the development site boundary. In addition, six bat boxes will be erected at appropriate locations throughout the site to provide artificial nesting sites for these mammals.

*Mitigation by prevention: Mortality to animals during construction*

The removal of hedgerows should not take place from March to August inclusive as per the Wildlife Act. If this is unavoidable then vegetation subject to removal must first be inspected for signs of breeding birds. It is an offence to destroy or interfere with a bird's nest or eggs (regardless of the time of year). If no nesting is occurring then vegetation can be removed within 48 hours. It is recommended that hedgerows are not to be removed during the period March to August and that in all instances hedgerows and trees be surveyed and inspected for nesting, breeding birds prior to removal. If nesting is found then vegetation can only be destroyed under licence from the NPWS.

It is recommended that a dedicated bat survey be carried out by a suitably qualified bat ecologist prior to the commencement of development and during the appropriate season. This should determine if bats are roosting in any of the features on the site and if the development of this project requires a derogation licence from the NPWS.

*Mitigation by reduction: Pollution to water courses*

Although significant effects to freshwater courses are not predicted it is nevertheless appropriate that best site management practices should be in place to minimise pollution to the greatest degree feasible. As such, guidelines from Inland Fisheries Ireland (IFI, 2016) should be followed. This includes designating storage areas for dangerous substances (oils, fuels etc.) and ensuring that only silt-free run-off enters water courses. To this end, appropriately sized silt traps should be employed. These measures shall be included in the detailed Construction Management Plan that will be prepared and submitted to the Planning Authority prior to commencement of development with input from the appointed main contractor.

### **6.6.1.2 Operational Phase**

*Mitigation by reduction: Disturbance to species from human activity*

The lighting plan has been reviewed and no lighting is directed towards external boundary hedgerows. Lighting is to be limited by the use of directional cowels while LED bulbs are to be used through (these have lower impact on bats than traditional mercury-halide lamps).

## **6.7 Predicted Residual Impacts of the Proposed Development**

This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied.

### **6.7.1 Construction Phase**

There will be some temporary residual impacts to biodiversity arising from this project comprising:

1. The removal of hedgerow habitats will result in some mortality to species. This is predicted to be moderate.
2. There will be a loss of ecological corridors and semi-natural habitats until such time as new planting becomes established. This is predicted to be moderate given that the species recorded from the site are not of conservation concern and can be expected to recolonise the new habitats which will be created.

### **6.7.2 Operational Phase**

1. The design of lighting to minimise effect to bats will ensure that effects will be **slight**.

## **6.8 Interactions and Cumulative Impacts**

A number of the identified impacts can also act cumulatively with other impacts from similar developments in this area of Celbridge. These primarily arise through the urbanisation of the town's

hinterland as provided for by land use zoning and include loss of habitats and species, particularly hedgerows; pollution from surface water run-off and pollution from wastewater generation.

This development can be viewed alongside the proposal to cede the adjoining lands to the north-east to Kildare County Council. It is likely that these lands will retain their open character, as it is not zoned for development and will therefore provide a permanent natural amenity area that will aid in the preservation and enhancement of local biodiversity.

The key environmental interactions with biodiversity are water and landscaping. A series of mitigation measures are proposed in Chapter 8 (Water, Hydrology and Hydrogeology) to ensure the quality (pollution and sedimentation) and quantity (surface run-off and flooding) is of an appropriate standard. With these mitigation measures in place, interaction between Biodiversity and water is considered to be neutral, and the interaction between biodiversity and landscaping is considered to be neutral/positive.

## 6.9 Monitoring

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant. Section 6.7 summarises the likely impacts arising from this project. Mitigation measures are proposed with a high degree of confidence and further monitoring is not proposed.

## 6.10 References

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