

# Ecological Impact Statement for development at Patrickswell, Co. Limerick

Compiled by OPENFIELD Ecological Services

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For Limerick City and County Council



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July 2018

## **1 INTRODUCTION**

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

## **2 STUDY 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).

A site visit was carried out on the 9<sup>th</sup> of February 2018 in fair weather. 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).

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).

February lies outside the optimal survey period for general habitat surveys (Smith et al., 2010). Nevertheless, it was possible to classify all habitats on the site to Fossitt level 3. February lies outside the optimal season for surveying breeding birds but is within the optimal period for surveying large mammals and amphibians.

## **3 RECEIVING ENVIRONMENT**

### **3.1 Zone of Influence**

Accepted methodologies suggest that for non-linear projects a radius of 2 km is an appropriate zone of influence (IEA, 1995). This area is shown in figure 1. This is an arbitrary radius however and may be widened depending on the presence of pathways to other protected areas or features of interest.

The site is located in Patrickswell, to the west of Limerick City. It is situated to the north of the town centre while the surrounding lands are primarily used for a combination of urban and agricultural uses. Historic maps from the OSI show this area to have been open farmland for many centuries while the eastern boundary is associated with a townland boundary, many of which date to the 8<sup>th</sup> Century (Foulkes et al., 2013).

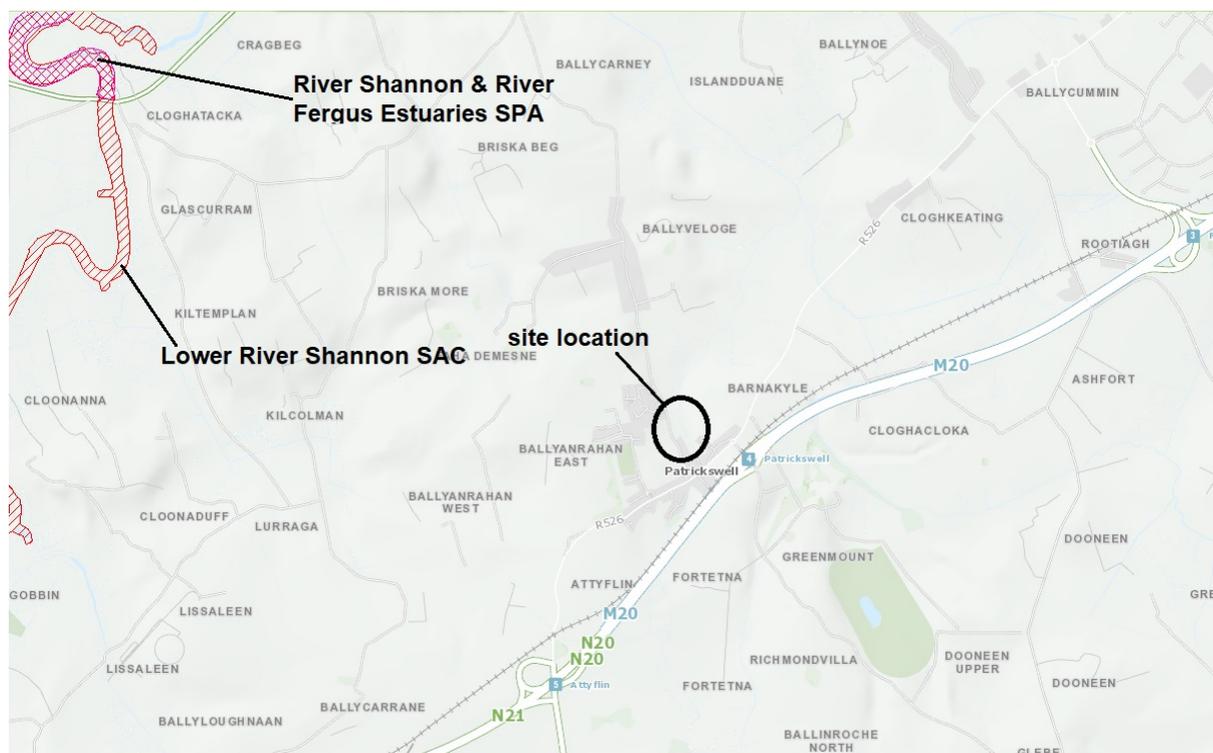


Figure 1. Approximate 2km radius of the development site showing areas designated for nature conservation within this zone (from [www.npws.ie](http://www.npws.ie) )

Within 2km of the site there are no areas designated for nature conservation. The lands fall within the catchment of the Barnakyle River and this in turn flows toward the Mouth of the River Shannon. At this point it falls within the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. These areas largely, but not entirely, overlap with one another. There are no Natural Heritage Areas (proposed or otherwise), National Nature Reserves, UNESCO Biosphere reserves, or RAMSAR sites within this radius. The Island Duane Stream flows along the western site boundary and this is a tributary of the Barnakyle.

*The Lower River Shannon SAC (site code: 2165)*

This is a very large SAC that stretches from Killaloe to Loop head/Kerry head and is over 720km<sup>2</sup> in area. The reasons why this area falls under the SAC designation are set out in its qualifying interests. They are either habitat types listed in Annex I or species listed in Annex

II of the Habitats Directive. This information is provided by the National Parks and Wildlife Service (NPWS) and is shown in table 1 below along with the status of the feature at a national level (NPWS, 2013). This status refers to the most recent reporting period to the European Commission under Article 17 of the Habitats Directive.

**Table 1 – Qualifying interests for the Lower River Shannon SAC (from NPWS)**

Code	Habitats	Status
1130	Estuaries	Intermediate
1140	Mudflats and sandflats not covered by seawater at low tide	Intermediate
1150	Coastal lagoons	Bad
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Intermediate
1310	Salicornia and other annuals colonizing mud and sand	Intermediate
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )	Intermediate
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	Intermediate
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	Intermediate
1110	Sandbanks which are slightly covered by sea water all the time	Good
1160	Large shallow inlets and bays	Intermediate
1170	Reefs	Bad
1220	Perennial vegetation of stony banks	Intermediate
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )	Bad
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )	Bad
1099	<i>Lampetra fluviatilis</i> River lamprey	Good
1096	<i>Lampetra planeri</i> Brook lamprey	Good
1095	<i>Petromyzon marinus</i> Sea lamprey	Bad
1106	<i>Salmo salar</i> Atlantic salmon	Intermediate
1349	<i>Tursiops truncatus</i> Bottle-nosed dolphin	Good
1355	<i>Lutra lutra</i> Otter	Good
1029	<i>Margaritifera margaritifera</i> Freshwater pearl mussel	Bad

*The River Shannon and River Fergus Estuaries SPA (site code: 4077)*

This SPA collectively forms the largest expanse of intertidal mudflats in Ireland. SPAs are designated for their internationally important species (listed on Annex I of the Birds Directive) or population sizes (>1% of the global population or >20,000 individuals). Most recent available data indicate that a mean of 10,235 birds utilised the area during the winters from 2006-11 (Crowe et al., 2012). This includes internationally important numbers of Mute swan *Cygnus olor* and Whooper swan *C. cygnus* and nationally important numbers of Shelduck *Tadorna tadorna*, Wigeon *Anas penelope*, Teal *A. crecca*, Cormorant *Phalacrocorax carbo*, Dunlin *Charadrius alpina*, Black-tailed godwit *Limosa limosa* and Curlew *Numenius arquata*. The SPA's features of interest (analogous to qualifying interests for SACs) are given in table 2. The status given is from a national assessment and does not infer status within the SPA itself.

**Table 2 – Features of interest for the River Shannon and River Fergus SPA**

Species	Status <sup>1</sup>
Light-bellied Brent Goose <i>Branta bernicla hrota</i>	Amber (Wintering)
Pintail <i>Anas acuta</i>	Red (Wintering)
Scaup <i>Aythya marila</i>	Amber (Wintering)
Shoveler <i>Anas clypeata</i>	Red (Wintering)
Ringed Plover <i>Charadrius hiaticula</i>	Green
Golden plover <i>Pluvialis apricaria</i>	Red (Breeding & Wintering)
Grey Plover <i>Pluvialis squatarola</i>	Amber (Wintering)
Lapwing <i>Vanellus vanellus</i>	Red (Breeding & Wintering)
Knot <i>Calidris canutus</i>	Amber (Wintering)
Dunlin <i>Calidris alpina</i>	Red (Breeding & Wintering)
Bar-tailed Godwit <i>Limosa lapponica</i>	Amber (Wintering)
Black-tailed Godwit <i>Limosa limosa</i>	Amber (Wintering)
Redshank <i>Tringa totanus</i>	Red (Breeding & Wintering)
Greenshank <i>T. nebularia</i>	Green
Black-headed Gull <i>Croicocephalus ridibundus</i>	Red (Breeding)
Whooper Swan <i>Cygnus cygnus</i>	Amber (Wintering)
Shelduck <i>Tadorna tadorna</i>	Amber (Breeding & Wintering)

<sup>1</sup> Colhoun & Cummins, 2013. *Birds of Conservation Concern in Ireland 2014-2019*

Wigeon	<i>Anas penelope</i>	Red (Wintering)
Teal	<i>Anas crecca</i>	Amber (Breeding & Wintering)
Cormorant	<i>Phalacrocorax carbo</i>	Amber (Breeding & Wintering)
Curlew	<i>Numenius arquata</i>	Red (Breeding & Wintering)
Wetlands & Waterbirds		

The NPWS maintains a database that indicates the recorded presence of protected species within 10 km squares. The proposed development site is located within the square R55 and five protected species of plant are recorded. These are detailed in table 3. This list is indicative only and in no way infers and absence of protected species not listed.

**Table 3 – Records of protected species from the R55 square**

Species	Habitat (Parnell et al., 2012)	Record status (Preston et al., 2002)
<i>Colchicum autumnale</i> Autumn crocus	Meadows and river banks	pre-1970
<i>Groenlandia densa</i> Opposite-leaved pondweed	Ditches, streams and canals [aquatic]	Current
<i>Hordeum secalinum</i> Meadow barley	Damp places, chiefly near the sea	Current
<i>Mentha pulegium</i> Penny royal	Damp sandy places	pre-1970
<i>Scirpus triqueter</i> Triangular club rush	Tidal mud	Current

As can be seen there are current records for three of the five species. The *Flora of County Limerick* provides further detail on the status of these species (Reynolds, 2013).

- Opposite-leaved Pondweed is described as “locally abundant around Limerick city” including “the Limerick canal, tidal rivers and on tidal mud by the upper Shannon Estuary.”
- Meadow Barley - “Locally common along and near the Shannon Estuary, and by creeks and a river off the estuary”
- Triangular Club-rush - “fairly common by and near the Shannon Estuary. On tidal mud by the upper Shannon Estuary, often forming dense stands”

The EU's Water Framework Directive (WFD) stipulates that all water bodies were to attain 'good ecological status' by 2015 or, with exemptions, by 2027 at the latest. In 2010 the first River Basin Management Plan (RBMP) was published to address pollution issues and this included a 'programme of measures' which was to be completed. The Shannon Estuary, and portions of the River Maigue, are tidal in nature and these areas have most recently been assessed by the Environmental Protection Agency (EPA) as being 'unpolluted' and 'intermediate' respectively. In WFD terms however the estuary is of 'moderate' status. The Barnakyle River meanwhile is of 'poor' status.

In 2018 a second RBMP was published which highlights 190 'priority areas for action' where resources are to be focussed over the 2018-2021 period. The Barnakyle is not among these however other waterways leading to the Mouth of the Shannon are included.

## 3.2 Stakeholder and consultees

The Department of Culture, Heritage and the Gaeltacht was contacted for nature conservation observations (reference: G Pre00061/2018). A response to this had not been received at the time of writing.

## 3.3 Site Survey

### 3.3.1 Flora

Recent aerial photography indicates that this area is open grassland although close to built-up, residential development. The site was visited on February 9<sup>th</sup> 2018 and this found that the subject lands are largely composed of **improved agricultural grassland – GA1** which is grazed by horses. This is a habitat of low biodiversity value. Near the river this was wet, with some stands of *Iris pseudacorus*. There are areas which are subject to lower grazing intensity and these habitats have developed into a **dry meadow – GS2** or **scrub – WS1**. The latter is apparent with dense growths of Brambles *Rubus fruticosus agg.* and occasional Hawthorn *Crataegus monogyna*. Field boundaries are composed of native **hedgerows – WL1** with Hawthorn and Elder *Sambucus nigra* accompanying a stone wall. Methodology for evaluating hedgerows is available from the Heritage Council (Foulkes et al., 2013). This is based upon age, structure and species diversity. The field boundaries on this site appear on original OSI maps showing that they date from at least the early 1800s. The eastern boundary, meanwhile, is a townland boundary and so this may be significantly older still.

Based on this score system, the hedgerows and treelines can be evaluated as being of 'higher significance'.

The Island Duane Stream flows from south to north in this location. It is narrow and fast flowing, an **eroding river – FW1**, and lined with a tall **treeline – WL1**. This treeline is well-developed, with tall Willow *Salix sp.*, Ash *Fraxinus excelsior*, Aspen *Populus tremula*, and Beech *Fagus sylvatica*. Hazel *Corylus avellana* and Crab Apple *Malus sylvestris* are also present. The stream is a tributary of the Barnakyle River, which in turn meets the River Maigue, and at this point (within the Lower River Shannon SAC) the river is tidal in character. The ground is wet near the river.

Access to the site will be via the L1401 road and a track is already in place and is an **artificial surface – BL3**. This crosses the stream via an existing culvert.

There are no suitable habitats for the plants listed on table 3, which are all associated with intertidal areas. There are no habitats on, or directly adjacent to the site which are examples of those listed on Annex I of the Habitats Directive. There are no plants growing which are listed as alien invasive on Schedule 3 of SI 477 of 2011.



Figure 2 – Map of habitats on the subject site (aerial photo from [www.bing.com](http://www.bing.com))

### 3.3 Fauna

The presence of various species is deduced from the existence of suitable habitat. Incidental sightings on the day were also recorded, as were proxy signs such as tracks, trails, droppings and burrows.

#### 3.3.1 Mammals

Table 4 lists those mammals which are of conservation value.

**Table 4 – Protected mammals in Ireland. Cells are greyed out where there are no records from the site (or vicinity) from the National Biodiversity Data Centre ([www.biodiversityireland.ie](http://www.biodiversityireland.ie))**

Species	Level of Protection	Habitat
Otter <i>Lutra lutra</i>	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Disused, undisturbed old buildings, caves and mines, west of Ireland only
Whiskered bat <i>Myotis mystacinus</i>	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats
Natterer's bat <i>Myotis nattereri</i>		Woodland
Brown long-eared bat <i>Plecotus auritus</i>		Woodland
Leisler's bat <i>Nyctalus leisleri</i>		Woodlands and buildings
Common pipistrelle <i>Pipistrellus pipistrellus</i>		Farmland, woodland and urban areas
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>		Rivers, lakes & riparian woodland
Daubenton's bat <i>Myotis daubentonii</i>		Woodlands and bridges associated with open water
Nathusius' pipistrelle		Parkland, mixed and pine

<i>Pipistrellus nathusii</i>		forests, riparian habitats
Irish hare <i>Lepus timidus hibernicus</i>	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats
Pine Marten <i>Martes martes</i>		Broad-leaved and coniferous forest
Hedgehog <i>Erinaceus europaeus</i>	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows
Pygmy shrew <i>Sorex minutus</i>		Woodlands, heathland, and wetlands
Red squirrel <i>Sciurus vulgaris</i>		Woodlands
Irish stoat <i>Mustela erminea hibernica</i>		Wide range of habitats
Badger <i>Meles meles</i>		Farmland, woodland and urban areas
Red deer <i>Cervus elaphus</i>		Woodland and open moorland
Fallow deer <i>Dama dama</i>		Mixed woodland but feeding in open habitat
Sika deer <i>Cervus nippon</i>		Coniferous woodland and adjacent heaths

Beyond this list it is likely that ubiquitous species that have adapted to disturbed environments such as the Fox *Vulpes Vulpes*, Rabbit *Oryctolagus cuniculus* and Brown rat *Rattus norvegicus* are present. There was abundant evidence of Rabbit activity with many burrows within hedgerows.

The lands are considered suboptimal for use by Otter or any of the deer species. There was no evidence that Badgers are using the site. There are no structures on the site which are suitable for roosting bats. There are no trees in the treelines which provide cracks or holes which could be used for this purpose. The treelines do however provide suitable foraging opportunities for bat species, a number of which are recorded from the locality.

Although not recorded from this area Irish stoat, Irish hare, Pygmy shrew and Hedgehog are considered ubiquitous in the Irish countryside (Hayden & Harrington, 2000) and can assumed to be present. There is no suitable woodland habitat for Red Squirrel or Pine Marten.

### 8.3.3.2 Birds

February is outside the suitable season for surveying breeding birds. Wood Pigeon *Columba palumbus*, Starlings *Sturnus vulgaris*, Dunnock *Prunella modularis*, Greenfinch *Carduelis chloris*, Blackbird *Turdus merula*, Wren *Troglodytes troglodytes*, Rook *Corvus frugilegus*, and Snipe *Gallinago gallinago* were recorded during the survey. These are likely to be breeding within the areas of scrub, hedgerow or treeline (with the exception of Snipe, which is likely to have been a winter visitor as it does not nest in intensively grazed farmland). With the exception Snipe, which is of medium conservation concern, these species are of low conservation concern (Colhoun & Cummins, 2013).

### 3.3.3 Amphibians and Reptiles

There are no suitable habitats for Common Frog *Rana temporaria* or Smoot Newt *Lissotriton vulgaris*. February is within the spawning season and no evidence of their presence was recorded. Viviparous lizard *Lacerta vivipara* is found in a variety of habitats including grassland and artificial surfaces. It is protected under the Wildlife Act and can assumed to be present.

### 3.3.4 Fish

There are no fish monitoring points maintained by Inland Fisheries Ireland along the Barnakyle River. It may be suitable for salmonid species, particularly Brown Trout *Salmo trutta*. It may also harbour European Eel *Anguilla anguilla*, a critically endangered species, or Lamprey *Lampetra sp.*, which are listed on the Habitats Directive Annex II. The river is part of the OPW's arterial drainage programme, however, and this diminishes the value of the water course for biodiversity.

### 3.3.5 Invertebrates

A large number of invertebrate species are likely to be present on the site and even disturbed ground can harbour insect life. Protected invertebrate species in Ireland are predominantly aquatic or associated with wetland habitats but are not likely to be present on this site. Ireland's only protected insect, the Marsh Fritillary butterfly *Euphydryas aurinia* is confined to flower-rich meadows or peatlands with the Devil's-bit Scabious *Succisa pratensis* and so will not be present on this site.

### 3.4 Summary

Subsequent to the site survey and a literature review, the subject site was found to contain no current records, or suitable habitat, for rare or protected species of plant. The site provides resources for a number of common, but protected species, such as Irish Hare, Hedgehog, Pygmy Shrew, Irish Stoat and Viviparous lizard.

There are no suitable roosting structures for bats although treelines and hedgerows provide foraging opportunities. The treelines, hedgerows and scrub provide nesting opportunities for common countryside bird species.

The Island Duane stream is likely to be of salmonid potential and leads to the Shannon Estuary, and area of high conservation interest.

No plants listed under the Flora Protection Order, 1999 are present on the site. There are no habitats listed on Annex I of the Habitats Directive. There are no alien invasive species growing on the site.

### 3.5 Determination of Value

Appendix 3 of guidelines from the National Roads Authority (NRA, 2009) outlines a 'site evaluation scheme' that is designed to assign value to ecological features. Table 5 lists the habitats that were recorded and their associated value.

Table 5 – Valuation of habits with reference to Appendix 3 of the NRA guidance.

Habitat	Rating	Criteria
Artificial surfaces – BL3	E – Negligible value	Artificial or highly modified habitats with low species diversity
Improved agricultural grassland – GA1		
Dry meadow – GS2 Scrub – WS2	D – Local importance (lower value)	Sites containing small areas of semi-natural habitat or locally important for wildlife.
Hedgerows – WL1 Treelines – WL2 Island Duane Stream – FW1	C – Local importance (higher value)	Sites containing semi-natural habitat with high biodiversity in a local context

## 4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will see site clearance and a construction phase to include access roads, new homes, and all associated infrastructure as shown in figure 3. The hedgerows, scrub and meadow areas are to be removed, albeit a number of individual trees within the hedgerow are to be retained. The treeline along the river will be retained. A development buffer along the river is to be maintained, with the nearest built element approximately 9m (excepting the access road). The river is to remain in its open in its freely-flowing state. Post construction the land will be landscaped. Storm water from the development will discharge to the existing Barnakyle river located on the west of the site via a new storm water pipelines, attenuation tanks & oil interceptors.

The existing stream culvert is to be replaced with a new box culvert as part of upgrade works to the site entrance.



Figure 3 – Development overview.

## **5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT**

This section provides a description of the potential impacts that the proposed development may have on flora & fauna in the absence of mitigation. Methodology for determining the significance of an impact has been published by the NRA. This is based on the valuation of the ecological feature in question (table 6) and the scale of the predicted impact. In this way, it is possible to assign an impact significance in a transparent and objective way. Any impact that is 'moderate', 'major' or 'severe' will be considered to be significant. Table 6 summaries the nature of the predicted impacts.

### **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, meadow, scrub and hedgerow. These are predominantly of negligible or low local value. Approximately 450m of higher significance hedgerow is to be removed. The loss of these habitats is considered to be moderate negative.
2. The direct mortality of species during demolition. This impact is most acute during the bird breeding season which can be assumed to last from March to August inclusive. This may affect a number of locally common countryside birds.
3. Pollution of water courses through the ingress of silt, oils and other toxic substances. Run-off of sediment and other construction pollutants could affect fish and other aquatic life in the stream. Good site management practices will be required to avoid this impact. These works will include a new stream culvert to provide road and cycle access. Works are to be undertaken 'in the dry' whereby the stream will be temporarily dammed, water pumped around the work area, and the new box culvert inserted. In this way the loss of sediment to the water is minimised. Nevertheless there remains the potential for pollution effects to occur.

### **5.2 Operation Phase**

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

4. Pollution of water from foul wastewater arising from the development. foul effluent from the site will pass to the nearby Bunlicky wastewater treatment plant. This is operated by Irish Water under licence from the EPA (licence no.: D0013-01). The Annual Environmental

Report from the plant for 2017 indicated that there were no exceedences of licence limits for that year. The plant has a design capacity of 130,000 population equivalent (P.E.) while the mean loading is within this. Analysis of water quality in the vicinity of the outfall pipe showed that there was no observable negative impact of the discharge on the receiving environment.

5. Pollution of water from surface water run-off. Urban expansion can lead to an increased risk of flooding 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. A new surface water drainage system is to be installed in accordance with SUDS principles. This will include on-site attenuation and release to the Island Duane stream via an oil/grit interceptor and flow control device.
6. Artificial lighting. This aspect of the project can affect bat species which are using the site for foraging or roosting nearby. Although different bat species exhibit varying degrees of sensitivity to lighting, in a worst-case scenario it would result in all bats permanently avoiding this area. Guidelines are available on minimising this effect and are referred to further in this report.

Impacts to Natura 2000 areas (SACs or SPAs) in the Shannon Estuary are not predicted to occur, principally due to the separation distance between the site and these areas. A full assessment of potential effects to these areas is contained within a separate Screening Report for Appropriate Assessment.

Table 6: Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Loss of habitat <ul style="list-style-type: none"> <li>• Artificial surfaces, agricultural grassland</li> <li>• Lower significance meadow/scrub</li> <li>• Higher significance hedgerow</li> </ul>	Neutral – no effect Minor negative Moderate negative
2	Mortality to animals during construction, including nesting birds	Moderate negative – permanent impacts to species of high local value/or species with legal protection
3	Pollution of water during construction phase	Moderate negative
Operation phase		
4	Wastewater pollution	Neutral

5	Surface water pollution	Neutral
6	Lighting	Moderate negative

Overall it can be seen that four potential moderate negative impacts are predicted to occur as a result of this project in the absence of mitigation.

### 5.3 Cumulative impacts

A number of the identified impacts can also act cumulatively with other impacts from similar developments in this area of Patrickswell. These primarily arise through the additional loading to the Bunlickey Wastewater Treatment Plant. It is considered that this effect is not significant due to the available capacity and the high performance standards of this plant.

In this instance, the incorporation of SUDS attenuation measures will result in not negative effect to surface water quality.

Increasing urbanisation of Limerick and its hinterland, and in particular land use change from agricultural to urban uses, is resulting in the loss of habitat for common species of plants and animals. In this case, higher value habitats are to be retained while post-construction landscaping will provide additional resources for wildlife.

## **6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES**

This report has identified four impacts that were assessed as ‘moderate negative’ and therefore mitigation is needed to reduce the severity of this potential effect. This may arise from habitat loss, where clearance works are undertaken during the nesting season, and pollution to the river during construction. All birds’ nests, eggs or hatchlings are protected under the Wildlife Act. Disturbance to any nest can only be done under licence from the National Parks and Wildlife Service (NPWS).

### **6.1 Mitigation Measures Proposed**

The following mitigation measures are proposed for the development

#### **Construction Phase**

##### **1: Habitat loss**

The landscaping plan includes new native tree planting within areas of open space while a minimum 5m buffer zone should be maintained along the river for a meadow-style grassland. This means allowing natural vegetation to develop during summer months and only mowing towards the end of the summer. These measures will not compensate entirely for the loss of habitat but will retain the character of the site and its overall value for wildlife. The species should be native and of local provenance if possible – Alder, Willow and Birch are particularly appropriate for this location. A minimum of 50 trees (not whips) should be planted.

##### **2: Disturbance of birds’ nests**

Deliberate disturbance of a bird’s nest is prohibited unless under licence from the National Parks and Wildlife Service. If possible, site clearance works should proceed outside the nesting season, i.e. from September to February inclusive. If this is not possible, vegetation must first be inspected by a suitably qualified ecologist. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest.

##### **3: Pollution during construction**

To avoid this effect, the developer should follow guidance from Inland Fisheries Ireland (2016) for the protection of fishery habitats during construction projects. This should include

the installation of a durable silt barrier between work areas and the full length of the stream. Run-off should be channelled through a suitably designed silt-trap so that only clean, sediment-free water enters the river. These measures must be inspected on at least a daily basis and records of inspections maintained. Dangerous substances, such as oils and fuels, should be stored in bunded areas at all times. Site personnel should be properly trained on the importance of protecting the river from pollution. The site manager should be responsible for the implementation of these measures.

Works to install the stream culvert should only be undertaken outside the closed season (i.e. works must be carried out from July to September).

These measures should be compiled in a site-specific construction management plan (CMP) which should be submitted to IFI for review prior to the commencement of works.

#### 4: Effects of lighting on bats

Artificial lighting should be minimised while maintaining a 'dark zone' along the river corridor. Lighting should be directed away from trees and targeted to those areas where it is needed only, in order to avoid unnecessary light spill. Bulbs that avoid components which are known to adversely affect bats (e.g. ultra-violet) should be avoided.

## **8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT**

This section allows for a qualitative description of the resultant negative effects as well as which the proposed development may have, assuming all mitigation measures are fully and successfully applied.

After mitigation, no significant residual effects are likely to arise to biodiversity arising from this project.

### *Enhancement measures*

Post-construction, biodiversity-friendly landscaping will provide more resources for wildlife than the existing agricultural grassland.

A bat box scheme should be implemented which will provide new roosting opportunities for these species. It is suggested that three such boxes be erected on trees along the river corridor.

## **9 MONITORING**

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant. In this case no significant negative effects are likely to arise, and so additional monitoring is not required.

## 5.11 REFERENCES AND BIBLIOGRAPHY

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