6 BIODIVERSITY

6.1 Introduction

Scott Cawley Ltd. was commissioned to undertake an assessment of impacts on biodiversity for the proposed residential development located at Kilcarbery, Clondalkin, Dublin 22 (centroid grid reference O 05260 30724). In brief, the proposed development includes construction of 1034no. housing units, ancillary uses including the provision of 1 no. retail unit (c. 178 sq. m), community building (c. 785 sq. m), 1no. temporary childcare facility (c. 557 sq. m gross floor area in lieu of 7no. ground floor apartment units in Block 7 pending construction of permanent creche at Grange Square), 1no. permanent childcare facility at Grange Square (c. 909 sq. m gross floor area) together with internal access roads and associated waste water and surface water infrastructure.

The aims of this assessment were to: -

- Establish baseline ecological data for the proposed development and adjacent lands;
- Determine the ecological value of the identified ecological features;
- Assess the impact of the proposed development on ecological features of value (flora and fauna);
- Apply mitigation measures to avoid, reduce, remedy or compensate impacts; and,
- Identify any residual impacts after mitigation.

6.2 Assessment Methodology

6.2.1 Relevant Legislation, Policy and Guidelines

The assessment of the likely impacts of the proposed development on ecological resources has considered legislation, policy documents, and guidelines outlined in Appendix 6.1 of this EIAR, where relevant.

6.2.2 Desk Study

In addition to those listed in the reference section, key resources included Ordnance Survey Ireland mapping[1] and rare/protected/threatened species and designated sites data held online by the National Park and Wildlife Service (NPWS)[2] and the National Biodiversity Data Centre (NBDC)[3].

6.2.3 Consultation

A consultation letter was sent to the Development Applications Unit (DAU), Department of Culture, Heritage and the Gaeltacht, on the 14 January 2019, an acknowledgment of receipt was received but no formal consultation response.

6.2.4 Field Survey Methodology

6.2.4.1 Habitats and Flora

Habitats within the subject lands were surveyed in detail by Doherty Environmental in May, August and September 2017 to inform the Kilcarbery/Grange Masterplan (Doherty Environmental, 2017).

[1] Available online at http://map.geohive.ie/mapviewer.html Accessed on the 2nd January 2019
[2] Available online at http://www.npws.ie/mapsanddata/ Accessed on the 2nd January 2019
[3] Available online at www.biodiversityireland.ie Accessed on the 2nd January 2019

Scott Cawley carried out update surveys, on 29th November 2018, to identify any changes in land use or habitat type from that recorded in 2017. All habitats were classified using the *Guide to Habitats in Ireland* (Fossitt, 2000), recording dominant species, indicator species and/or species of conservation interest. Plant nomenclature follows *the Checklist of the Flora of Britain & Ireland* (BSBI, 2007).

6.2.4.2 Fauna

Detailed fauna surveys were carried out within the subject lands by Doherty Environmental between May and July 2016, and May and October 2018 to inform the Kilcarbery/Grange Masterplan (Doherty Environmental, 2017). These surveys included mammal surveys, bird surveys and bat surveys which included identification of potential bat roosts, manual foraging activity surveys and automatic static bat detector surveys.

Scott Cawley carried out update mammal surveys, on 29th November 2018. Fauna were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats on site were assessed for signs of usage by protected/red-listed fauna species, including suitability for breeding birds, and potential to hold these species.

There are no buildings within the proposed site, however, trees within the proposed development site were assessed from ground level for their suitability for roosting bats and having regard to the following guidelines: *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2016); *Bat Mitigation Guidelines for Ireland* (Kelleher and Marnell, 2006); and, *Best Practice Guidelines for the Conservation of Bats in the Planning National Road Schemes* (NRA, 2006). A number of trees located along field boundary hedgerows were assessed based on the presence of features commonly used by bats such as: natural holes; woodpecker holes; hazard beams; cracks/splits in major limbs; loose bark; hollows/cavities; and, partially detached ivy or dense ivy cover.

6.2.5 Ecological Evaluation and Impact Assessment Methodology

6.2.5.1 Site Evaluation Criteria

The criteria used to assess the ecological value (Appendix 6.2) and significance of habitats follows *Guidelines for assessment of Ecological Impacts of National Road Schemes* (NRA, 2009) and is consistent with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018).

6.2.5.2 Impact Assessment Criteria

In accordance with NRA guidelines (2009), impact assessment is only undertaken of Key Ecological Receptors (KERs). KERs are within the zone of influence[4] of the development and are '*both of sufficient value to be material in decision making and likely to be affected significantly*'. To qualify as KERs, features must be of local importance (higher value) or higher as per the criteria in Appendix 6.2. Features of lower ecological value are not assessed. The highest levels of impact significance for each KER 'value' rating are shown in Table 6.1.

[4] In accordance with NRA (2009) Guidelines, the Zone of Influence is an important term to define the receiving environment for the activities associated with the project and the biophysical changes that are likely to occur. The Zone of Influence is the 'effect area' over which change is likely to occur. This differs for different species and habitats due to varying sensitivities to potential impacts.

Key Ecological Receptor 'Value' Rating	Highest Possible Significance Level
International Importance	Significant Positive/ Negative impact at International level
National Importance	Significant Positive/ Negative impact at National level
County Importance	Significant Positive/ Negative impact at County level
Local Importance (higher value)	Significant Positive/ Negative impact at Local level

Table 6.1: Maximum level of impact significance for Key Ecological Receptors (KERs).

6.3 Receiving Environment

The proposed site is a greenfield site which comprises largely of dry meadows with hedgerows, treelines and drainage ditches forming the field and site boundaries. The Camac River is located *c.* 100m south of the proposed site. To the north and east of the proposed development site, existing residential developments prevail, to the northwest lies Grange Castle Business Park, and to the south and west lands are occupied by amenity and recreational greenspaces, Corkagh Park and Grange Castle Golf Club.

Under South Dublin County Council Development Plan 2016-2022, the subject lands are currently zoned as 'Objective RES-N – to provide for new residential communities in accordance with approved area plans' (SDCC, 2016). Lands to the south and west of the proposed site are zoned under 'Objective OS – to preserve and provide for open space and recreational amenities'. To the east and north of the proposed site, lands fall under the zoning 'Objective RES – to protect and/or improve residential amenity', while to the northwest lands occupied by Grand Castle Business Park have been zoned as 'Objective EE – to provide for enterprise and employment related uses'.

Figure 6.1: Proposed development in the context of its surroundings.

6.3.1 Protected Areas

Special Areas of Conservation (SAC) are designated under the EC Habitats Directive (92/43/EEC), which is transposed into Irish law through a variety of legislation including the Birds and Habitats Regulations and the Planning and Development Acts. The legislation enables the protection of certain habitats (listed on Annex I of the Directive) and/or species (listed on Annex II). Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC). This allows for the protection of protected bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

Natural Heritage Areas (NHAs) are designations under the Wildlife Acts in order to protect habitats, species or geology of national importance. Many of the NHAs in Ireland overlap with Natura 2000 sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning legislation which requires that planning authorities give due regard to their protection in planning policies and decisions.[5]

The proposed site is not within any designated site. The nearest European sites are the Rye Water Valley/Carton SAC located 6.4km northwest and the Glenasmole Valley SAC located 7.1km southeast of the proposed site. No hydrological or other connectivity has been identified between these sites and the subject lands. There is potential connectivity between the subject lands and European sites in Dublin Bay, the nearest being South Dublin Bay SAC located *c.* 13.6km east, through surface and foul waters arising from the proposal which will ultimately discharge to Dublin Bay. However, the Screening Statement for Appropriate Assessment assessed Qualifying Interests (QIs) and Special Conservation Interests (SCIs), their threats, and their underpinning conditions for all European sites potentially affected by the proposed development, and concluded that significant effects on European sites arising from the proposed development, either alone or in combination with other plans or projects, can be excluded (Scott Cawley, 2019). A full list of designated sites occurring within the vicinity of the subject lands as shown on Figures 6.2 and 6.3 are included in EIAR Appendix 6.3.

The nearest nationally designated site is the Grand Canal pNHA which is located *c.* 1.2km north of the subject lands. No connectivity has been identified between the two sites as treated surface waters generated from the proposal will discharge to the Camac River. The Liffey Valley pNHA is located *c.* 4.6km north and no connectivity has been identified as the Camac River converges with the River Liffey *c.* 4km downstream of the pNHA.

[5] Available online at http://www.npws.ie/protected-sites/nha. Accessed 2nd January 2019

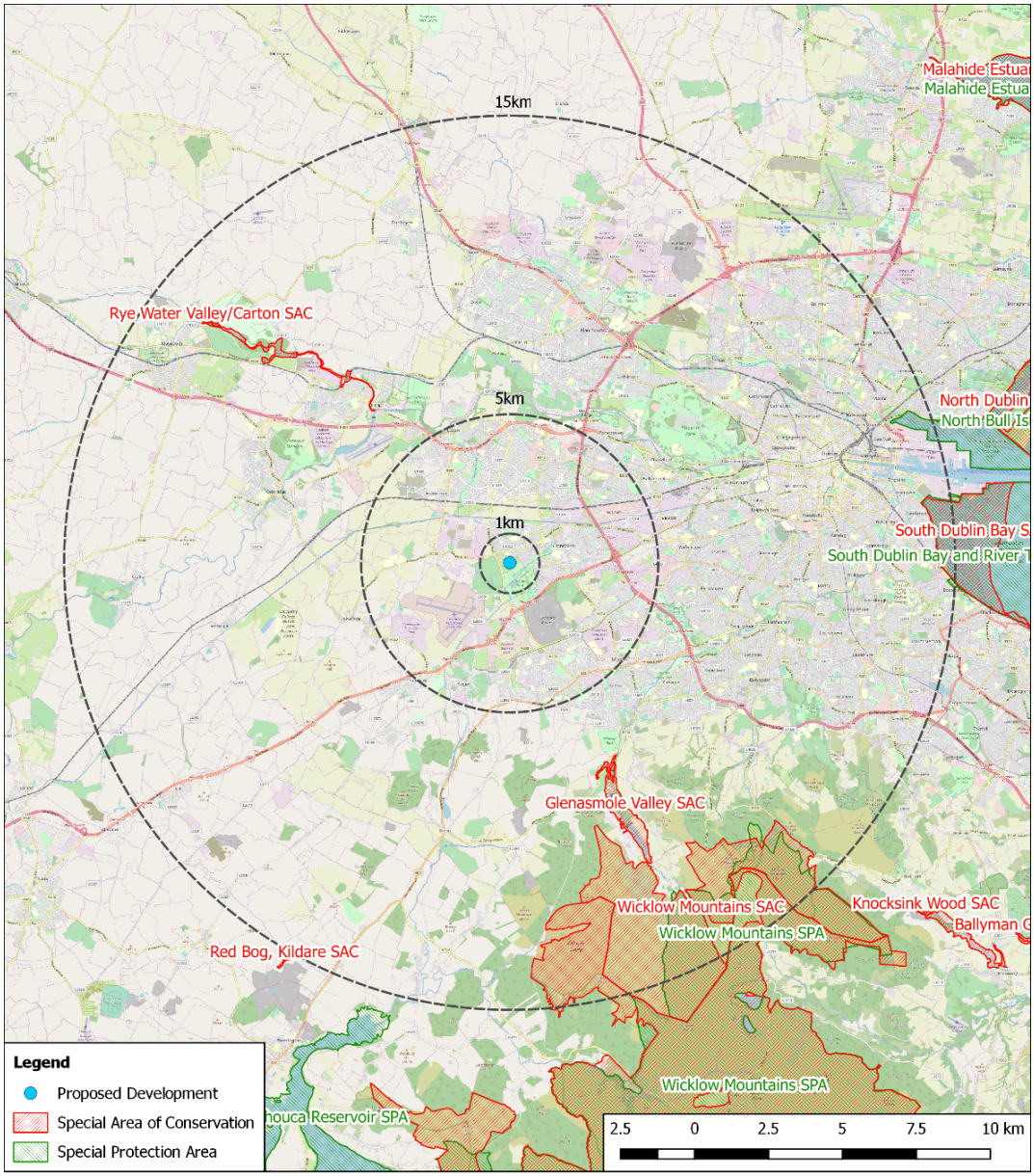

Figure 6.2: European Sites in the vicinity of the Proposed Development.

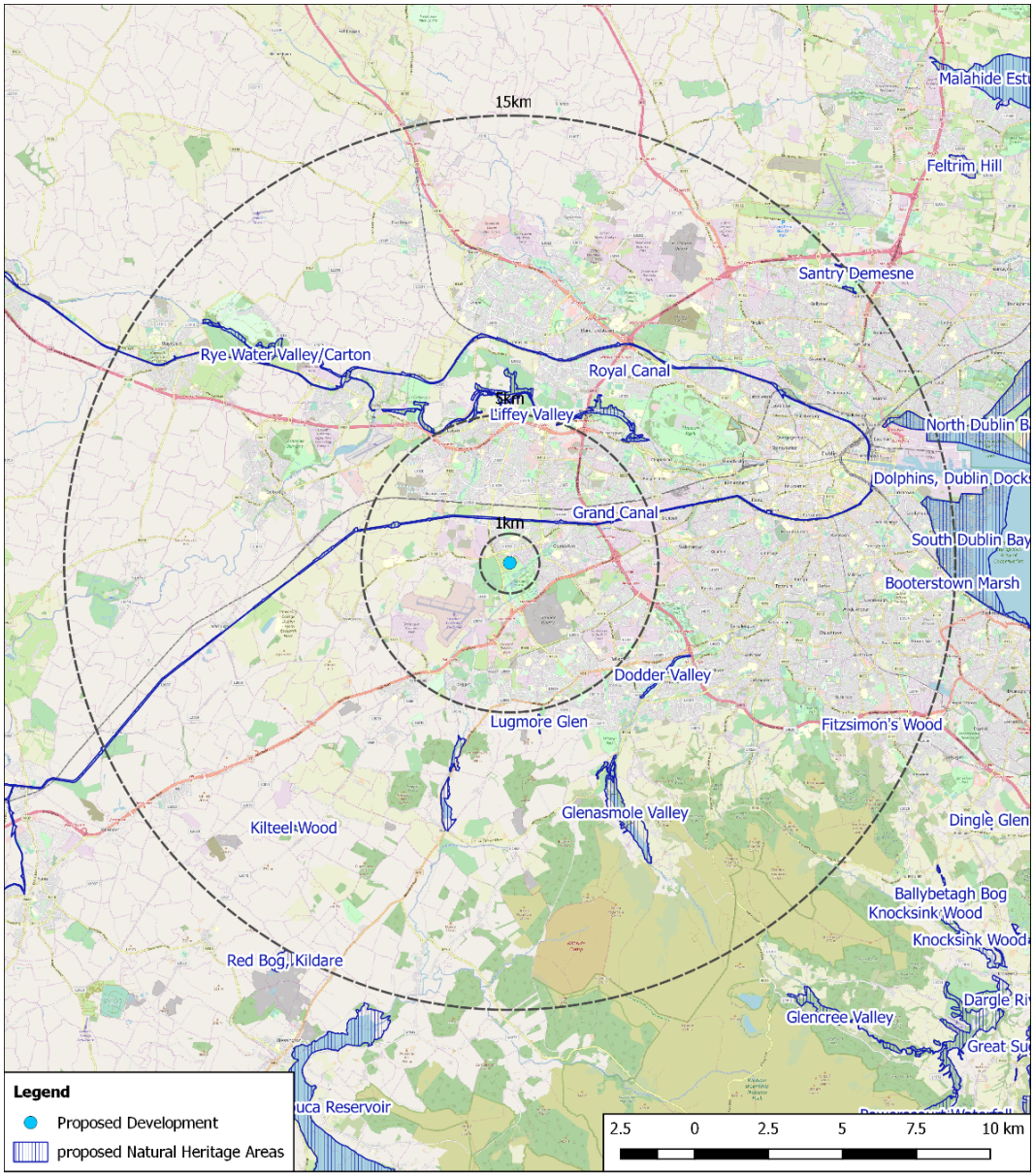

Figure 6.3: Proposed Natural Heritage Areas in the vicinity of the Proposed Development.

6.3.2 Records of Protected, and Red-listed Flora and Fauna Species

Distribution records for rare / protected species within 10km of the proposed site were obtained from the online National Parks and Wildlife Service database. Records within 2km of the subject lands were obtained from the online database of the National Biodiversity Data Centre. Bat roost records were obtained from Bat Conservation Ireland (BCI) for the site and environs to a distance of *c.* 10km. Records held by Bat Conservation Ireland show that the nearest roost was located *c.* 3.3km to the north, in Lucan (Pipistrelle species *Pipistrellus spp.*). See Appendix 6.4 for detailed records.

6.3.3 Field Survey Results

6.3.3.1 Habitat and Flora

The following habitat types (following Fossitt 2000) were identified within the proposed development site (also see Figure 6.4 for habitat map): -

- Dry meadows and grassy verges (GS2);
- Spoil and bare ground (ED2);
- Drainage ditches (FW4);
- Treelines (WL2);
- Hedgerows (WL1); and,
- Scrub (WS1).

Fields across the proposed site are dominated by dry meadow habitat. They are currently ungrazed/unmanaged and have largely developed a rank sward with the exception of frequently used paths around the perimeter of some fields. Dominant grass species recorded include False Oat-grass *Arrhenatherum elatius*, Fescue *Festuca sp.*, Perennial Rye-grass *Lolium perenne*, Cock's-foot *Dactylis glomerata*, Yorkshire-fog *Holcus lanatus*, Creeping Bent *Agrostis stolonifera* and Common couch *Elytrigia repens*. Herb species recorded across this habitat type represent typical species of this condition and include Clover *Trifolium sp.,* Creeping Buttercup *Ranunculus repens*, Meadow Buttercup *Ranunculus acris*, Common Knapweed *Centaurea nigra*, Common Sorrel *Rumex acetosa*, Common Mouse-ear *Cerastium fontanum*, Common Chickweed *Stellaria media*, Daisy *Bellis perennis*, Rosebay Willowherb *Chamerion angustifolium*, Hogweed *Heracleum sphondylium*, Ribwort Plantain *Plantago lanceolata*, Greater Plantain *Plantago major*, Common Nettle *Urtica dioica*, Creeping Thistle *Cirsium arvense* and Spear Thistle *Cirsium vulgare*.

Plate 6.1: Example of dry meadows and grassy verges habitat within the proposed site

Fields are bordered by mature hedgerows and treelines with most comprising a wet or dry drainage ditch. These boundary linear habitats are currently unmanaged and there is evidence of scrub encroachment from the hedgerow/treeline edge into the dry meadow habitat, encroachment generally comprising Blackthorn *Prunus spinose*. Hedgerows are dominated by Blackthorn, Ash *Fraxinus excelsior*, Hawthorn *Crataegus monogyna*, Willow *Salix sp*., Holly *Ilex aquifolium*, Dog-rose *Rosa canina,* Hazel *Corylus avellana* and Bramble *Rubus fructicosus agg.* Treelines include Sessile Oak *Quercus petraea*, Common Whitebeam *Sorbus aria*, Ash and Sycamore *Acer pseudoplatanus*. The understorey of hedgerows and treelines includes a range of herb species typical of this habitat.

Plate 6.2: Example of treeline within the Proposed Development site

Drainage ditches were on average 2-3m wide. Vegetation in wet drainage ditches includes Bulrush *Typha latifolia*, Common Reed *Phragmites australis* and Yellow Iris *Iris pseudacorus* in places. Where drainage ditches were dry, no vegetation or a continuation of hedgerow/treeline understorey was recorded. A small area of scrub in the northeast of the site was recorded were scrub encroachment from the adjacent hedgerows now dominates the area.

Hedgerows and treelines within the proposed development site are considered as KERs in this impact assessment due to their ecological value in providing connectivity throughout the site and surrounding area and habitats important to birds and bats.

Figure 6.4: Habitat map for the Proposed Development site.

6.3.3.2 Invasive Species

Japanese Knotweed *Fallopia japonica* was recorded to the north of the proposed development site along the Upper Nangor Road. Although this species exists outside the proposed development boundary it spreads via vegetative rhizomes reaching up to 5m in length and therefore has been considered in this impact assessment. Japanese Knotweed is listed on Schedule 3 of the European Communities (Birds and Natural Habitats) Regulations 2011 which contains specific provisions that govern control of listed invasive species. It is an offence to release or allow to disperse or escape, to breed, propagate, import, transport, sell or advertise species listed on Schedule 3 of the regulations. The two regulations that deal specifically with this scheduled list of species are: Regulation 49: Prohibition of introduction and dispersal of certain species; and, Regulation 50: Prohibition on dealing in and keeping certain species. Hence it is necessary to highlight that the following is prohibited:

- Dumping invasive species cuttings in the countryside;
- Planting or otherwise causing to grow in the wild (hence the landowner should be careful not to cause further spread);
- Disposing of invasive species at a landfill site without first informing the landfill site that the waste contains invasive species material (this action requires an appropriate licence); and,
- Moving soil which contains specific invasive species in the Republic of Ireland requires a licence from National Parks and Wildlife Service (NPWS).

6.3.3.3 Fauna – Mammals

There was no evidence of Badger *Meles meles* recorded within the site. Numerous mammal paths were recorded throughout the site, however these are likely to be used by Red Fox *Vulpes vulpes*. Evidence of Rabbits was recorded throughout the western portion of the site along hedgerows, treelines and drainage ditches.

Although there were no visual sightings of Pygmy Shrew *Sorex minutus* and Hedgehog *Erinaceus europaeus*, it should be noted that sightings of both these protected species would generally be rare and that these species could occur at hedgerow/grassland boundaries.

6.3.3.4 Fauna – Mammals (Bats)

Individual trees and treelines within the proposed site (see Figure 4) were evaluated as having bat roost potential due to features observed that may be utilised by bats. These included features that would be suitable for bats to roost in, such as hazard beams, knot holes, dense Ivy, and splits in the trunk and bark. Treelines and hedgerows within the site were considered to be of high value for foraging and commuting bats.

PRF no. Figure 4	Corresponding no. in tree report (Arborist Associates Ltd., 2019)	Tree Type	PRF	Arborist recommendation (Arborist Associates Ltd., 2019)
1	Hedge No. 1: trees 301-307	Treeline	Dense Ivy, hazard beam, split trunk	Retain. Remove dead/unstable growth and cut ivy at ground level. Trees located along east side of Hedge No. 1 outside the site boundary
2	302	Tree	Dense Ivy	Remove due to condition
3	318-325	Tree	Dense Ivy	Retain
4	345 & 346	Tree	Dense Ivy	Remove due to condition

5	329-338	Tree	Dense Ivy	Retain trees. Cut ivy at ground level where heavy and remove large size dead/unstable growth
6	348	Tree	Crossing branches, split trunk, gaps in bark	Remove
7 and 8	350-352 and 353-370	Treeline – Ash, Sycamore	Dense Ivy	Retain trees. Cut ivy at ground level where heavy and remove/make safe large size dead/unstable growth
9	372	Sycamore	Dense Ivy	Retain
10	385	Tree	Dense Ivy	Most likely need to be removed within a developed area
11	386	Tree	Dense Ivy	Retain. Cut ivy at ground level
12	387	Tree	Dense Ivy	Retain. Cut ivy at ground level
13	374	Tree	Dense Ivy	Retain. Cut ivy at ground level
14	1984-1995	Treeline	Dense Ivy	Retain
15	T14	Tree	Dense Ivy	Management of this tree is outside the control of the site area
16	T10-T12	Tree	Dense Ivy	Retain. Cut ivy at ground level
17	N/A	Tree	Dense Ivy	Management of this tree is outside the control of the site area

Table 6.2: Potential Roost Features within the Proposed Development site.

Previous bat activity surveys carried out in 2017 by Doherty Environmental recorded six species of bat using the proposed development site which included Leisler's bats *Nyctalus leisleri*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Common Pipistrelle *Pipistrellus pipistrellus*, *Myotis* sp., Nathusius Pipistrelle *Pipistrellus nathusii* and Brown Long-eared bat *Plecotus auritus* (Doherty Environmental, 2017). However, Leisler's bats and Soprano Pipistrelle were recorded most frequently and activity levels of other species was considered to be very low. Surveys did not identify any confirmed bat roosts in mature trees within the site or in buildings at the northern boundary of the site.

6.3.3.5 Fauna – Birds

All wild birds and their nests are protected under the Wildlife Acts. Hedgerows and treelines within the proposed site are considered to be suitable nesting bird habitat. Grassy meadows with a rank sward within the proposed site is likely to present an opportunity for ground nesting birds such as Meadow Pipits *Anthus pratensis* and Skylarks *Alauda arvensis*. Conservation status in this section follows the *Birds of Conservation Concern in Ireland* (Colhoun & Cummins, 2013) of Green-listed birds (Low Concern), Amber-listed (Medium Concern), and Red-listed (High Concern). There were no Birds Directive Annex 1 listed species recorded within site, and none are expected to regularly occur within the environs.

During winter bird surveys a total of 1 Red-listed bird, 3 Amber-listed birds and 15 Green-listed species were recorded (see Table 6.3). 11 of these species were recorded during breeding bird surveys (BBS) in 2017 and are considered to breed within the proposed site. Breeding birds have been considered as a KER in this assessment.

Species	Status	Description	Recorded during 2017 BBS	Considered to breed within the site?
Meadow Pipit *Anthus pratensis*	Red-listed	Individuals and small flocks recorded flying around grassy meadows	No	Possible
Robin *Erithacus rubecula*	Amber-listed	Individuals recorded in hedgerow habitat across the site	Yes	Yes
Starling *Sturnus vulgaris*	Amber-listed	*c.* 15 recorded perched in hedgerow/treeline habitat	Yes	Possible
Mistle Trush *Turdus viscivorus*	Amber-listed	Individuals (max 3) recorded perched in treeline habitat	No	Possible
Coal Tit *Periparus ater*	Green-listed	Small numbers recorded feeding in hedgerow/treeline habitat	Yes	Yes
Blue Tit *Cyanistes caeruleus*	Green-listed	Small numbers recorded feeding in hedgerow/treeline habitat	Yes	Yes
Goldfinch *Carduelis carduelis*	Green-listed	Flock of *c.* 20 recorded feeding on seed bearing plants in grassy meadows	Yes	Yes
Chaffinch *Fringilla coelebs*	Green-listed	Flock of *c.* 32 recorded feeding and perched in hedgerow/treeline habitat	Yes	Yes
Bullfinch *Pyrrhula pyrrhula*	Green-listed	Flock of *c.* 8 recorded in hedgerow/treeline habitat	No	Yes
Dunnock *Prunella modularis*	Green-listed	Individuals recorded in hedgerow habitat across the site	No	Yes
Wren *Troglodytes troglodytes*	Green-listed	Individuals recorded in hedgerow habitat across the site	Yes	Yes
Blackbird *Turdus merula*	Green-listed	Individuals recorded in hedgerow/treeline habitat	Yes	Yes
Reed Bunting *Emberiza schoeniclus*	Green-listed	Flock of *c.* 15 recorded in hedgerow/treeline habitat	No	Possible
Redwing *Tardus iliacus*	Green-listed	Flock of *c.* 11 recorded in hedgerow/treeline habitat	No	No
Wood Pigeon *Columba palumbus*	Green-listed	Recorded perched in hedgerow/treeline habitat	Yes	Yes
Hooded Crow *Corvus cornix*	Green-listed	Small numbers recorded within the site	Yes	Yes
Magpie *Pica pica*	Green-listed	Small numbers recorded in hedgerow/treeline habitat	Yes	Yes
Pheasant *Phasianus colchicus*	Green-listed	Small numbers flushed from edge of grassy meadows	No	No
Buzzard *Buteo buteo*	Green-listed	Individual perched in west of the proposed site before flying northwest	Yes	No

Table 6.3: Birds recorded within the Proposed Development site during November 2018 surveys

Species recorded and considered possible to breed within the proposed site in 2017 include Greenfinch *Carduelis chloris*, Song Thrush *Turdus philomenos* and Stonechat *Saxicola torquata* (Doherty Environmental, 2017).

6.3.3.6 Fauna – Amphibians

No amphibians were observed during surveys in November 2018, this is not surprising given it is outside the active season. At the time of the survey, the majority of drainage ditches were dry and wet drainage ditches had a strong flow of water in them. Conditions were not considered suitable for either breeding Common Frog *Rana temporaria* or Smooth Newt *Lissotriton vulgaris*. The understorey of hedgerows does provide suitable hibernation habitat for both Common Frog and Smooth newt.

6.3.3.7 Fauna – Freshwater, Camac River

Inland Fisheries Ireland (IFI) completed surveys in 2011 along the Camac River at two locations, one upstream of the proposed site at Moneenalion Commons bridge (*c.* 1.3km southwest) and one downstream at Riverside Estate bridge (*c.* 1.9km northeast). A total of four species was recorded in the Camac River and included Brown Trout *Salmo trutta*, Three-spined Stickleback *Gasterosteus aculeatus*, Eel *Anguilla anguilla* and Minnow *Phoxinus phoxinus*.

The Camac River is also known to hold a population of White-clawed Crayfish *Austropotamobius pallipes* which have been recorded by the EPA at two monitoring stations mentioned above, Moneenalion Commons bridge and Riverside Estate bridge, and at a third station further upstream at a bridge 1km southwest of Saggart (*c.* 4.7km southwest of the proposed site)[6]. A survey commissioned by South Dublin County Council in 2018 looked at the macroinvertebrate biodiversity of a section of the River Camac, *c.* 3km downstream and *c.* 1km upstream of the proposed site (Sweeney Consultancy, 2018). Across 11 sites surveyed an average of 3.1 White-clawed Crayfish per 10 refuges were recorded which is assessed as a high population abundance (3-5 individuals average per 10 refuges). In addition, the surveys recorded Q-values ranging from poor to good ecological status upstream of the site and moderate to poor ecological status downstream of the site.

At its nearest point the proposed development is located *c.* 100m north of the Camac River, and is hydrologically connected via the surface water drainage network. For this reason and the Camac River has been considered as a KER in this impact assessment.

6.3.4 Summary of Ecological Evaluation

Table 6.4 below summarises all identified Key Ecological Receptors (KERs). KERs have been identified as at risk of potentially significant impacts via a source-pathway-receptor link. KER's are valued as local importance (high) or above per the criteria set out in Appendix 6.2.

Ecological Feature	Ecological Valuation Level	Key Ecological Receptor
Designated sites (European and National)	International / National	No
Habitats – Hedgerows (WL1) & Treelines (WL2)	Local (high)	Yes
Mammals	Local (low)	No
Bats	Local (high)	Yes
Breeding birds	Local (high)	Yes
Amphibians	Local (low)	No
Camac River	National	Yes

Table 6.4: Summary of Key Ecological Receptors

[6] River Biologists' Database (EPA). Available online at https://maps.biodiversityireland.ie/Map/Terrestrial/Species/17487/DatasetFilter/19 Accessed 9th January 2019

6.4 Characteristics of the Proposed Development

6.4.1 Proposed Development

The proposed development subject of the impending SHD application will generally comprise: -

- 1,034no. residential units;
- 1no. community facility;
- 1no.retail unit;
- 2no. creche facilities;
- New vehicular access from Outer Ring Road (R136) to the west and 2no. new vehicular access points onto New Nangor Road (R134) to the north and associated re-alignment of existing roadways;
- New street network, including spine road (c.6 m in width) extending from Outer Ring Road (R136) to the west onto New Nangor Road (R134) to the north;
- New pedestrian and cycle path network;
- Public amenity open space (c.4.6 ha);
- Surface water attenuation measures (SuDs);
- Wastewater pumping station including 18hr storage tank and associated infrastructure;
- 1,510no. surface car parking spaces;
- 1,105no. covered bicycle parking spaces; and,
- Bin storage for all terraced houses, duplex / apartment and apartment blocks.

Foul waters generated by the proposed development will discharge to the existing public sewer in Corkagh Park which will be treated in Ringsend Waste Water Treatment Plant (WWTP) prior to discharge into Dublin Bay. A pumping station will serve the northern portion part of the site, due to the flat topography and will accommodate 18 hours of emergency storage. Foul waters in the southern section of the site will discharge via the gravity network.

Surface waters generated by the proposal will be treated on site prior to discharge to the existing local drainage network. Surface waters from the northern section of the site will be directed to the existing drainage network at the Old Nangor Road, while the remainder of the site will be drain to holding ponds in Corkagh Park. Ultimately, both outfalls will discharge to the Camac River which converges with the River Liffey at Heuston Station *c.* 10km northeast of the proposed site. As part of the Greater Dublin Strategic Drainage Study Regional Drainage Policies (GDSDS) the proposed development will incorporate surface water control measures and Sustainable Drainage Systems (SuDS). SuDS incorporated into the proposal include: -

- For housing and apartment blocks: rainfall gathered for irrigation of local roof planting and cleaning (apartment blocks only); soakage pits in rear gardens (Individual housing units); biofilter boundary planting (housing unit boundaries and landscaped areas in apartment blocks); and, low maintenance below ground attenuation tanks, with and without direct soakage;
- For road network and parking areas: tree pits for drainage of footpath areas and road network; biophilic streets; and, swales (infiltration ditch) alongside open green space; and,
- Site Wide: bioretention areas; flow controls at exit from site; light liquid interceptors; and, publicly managed low maintenance below ground attenuation tanks together with above ground detention areas for site wide management of surface water run-off. These systems will be designed to promote natural soakage to the underlying geology.

6.5 Potential Impact of the Proposed Development

6.5.1 Proposed Development

Based on the baseline ecological environment and the extent and characteristics of the proposed development the following potential impacts have been identified during the construction stage: -

- Habitat loss;
- Habitat fragmentation;
- Disturbance and displacement associated with construction works;
- Accidental mortality;
- Accidental pollution event during construction affecting surface water quality in receiving environment; and,
- Spread of non-native invasive species.

Based on the baseline ecological environment and the extent and characteristics of the proposed development the following potential impacts have been identified during the operational stage:

- Disturbance arising from operational artificial lighting; and,
- Operational run-off affecting surface water quality in receiving environment.

6.5.1.1 Construction Stage

Habitats – Hedgerow & Treelines

A number of hedgerows and treelines within the proposed site represent historical linear features, which are shown on OSI 6-inch mapping dating between 1837 and 1842[7], and townland boundaries between Kilcarbery, Nangor, Deansrath, Corkagh Demesne and Priest Town.[8] Numerous objectives within South Dublin County Council Development Plan 2016 – 2022 protect green infrastructure, ecological links, hedgerows and treelines.

The proposed development, including service links and access roads, was designed to retain the maximum length of hedgerows and treelines within the site and minimise fragmentation of these linear habitat features. Approximately 58% of hedgerows and treelines recorded within the surveyed lands will be retained as part of the proposal, and include a combination of historical and townland boundary hedgerows and treelines.

Considering the proposed development and location of retained hedgerows, it is possible that degradation of retained hedgerows and treelines may occur through damage to their root systems during construction works. Japanese Knotweed was recorded *c.* 50m outside the application boundary. Japanese knotweed can spread by the re-growth of cut plant fragments or root material. If a plant is broken up or disturbed during site clearance or other earthworks, it can readily re-grow in new areas where material is transported to. Although works are not proposed outside the redline boundary, if works occur within 7m[9] of the Japanese knotweed stand it may result in the spread of this non-native invasive species and could cause degradation of retained hedgerow and treelines within the site.

In the absence of mitigation, considering habitat loss and potential degradation of retained hedgerows and treelines, it is likely that the proposed development will result in significant adverse impacts to hedgerows and treelines at a local scale.

[7] Available online at http://map.geohive.ie/mapviewer.html Accessed 9th January 2019
[8] Available online at https://www.townlands.ie/dublin/newcastle/kilbride/clondalkin-village/kilcarbery/ Accessed 9th January 2019
[9] The rhizomes of Japanese knotweed are known to extend up to 7m from visible growth above ground (Environment Agency, 2013)

Bats

Four trees of the 17 identified as containing suitable PRFs for bats (see Table 2), have been recommended for removal by the arborist and will be removed as a result of the proposed development. For most trees being retained, removing the ivy and unstable/dead growth has been removed. In several cases this management will result in the PRF being removed from the tree (see Table 2). In the absence of mitigation, the removal of trees, ivy and unstable/dead growth identified as PRFs could result in the potential loss of a bat roost, if present, and as such, there would be a significant impact on bats at a local scale. Of the PRFs identified, none were considered suitable to accommodate large numbers of roosting bats and have more potential to house single or small numbers of bats and most likely being used as transient night roosts.

The removal of *c.* 42% of hedgerows and treelines recorded within the subject lands will have an adverse impact on foraging and commuting bats. The removal of these linear features will fragment ecological connectivity within the site and across to the surrounding suitable habitat e.g. Grange Castle Golf Club and Corkagh Park. Retained hedgerows and treelines and proposed periphery planting, once established, will maintain some connectivity between the site and surrounding area. However, proposed supplementary landscape planting is not expected to replace existing linear habitats in the short term and long-term displacement of bats from the proposed development site may occur.

The subject lands are currently largely unlit, therefore it is likely that temporary lighting required during the construction stage of the proposed development will illuminate previously unlit feeding and/or commuting areas making them less suitable for bats.

In the absence of mitigation, overall impacts on the local bat population during the construction stage are expected to result in significant adverse impacts, however as low levels of bat activity were recorded using the site in 2017 (Doherty Environmental, 2017) these impacts are expected to occur at a local scale.

Breeding Birds

All birds are protected under the Wildlife Acts 1976-2012 and it is an offence to disturb birds while on their nests, or to wilfully take, remove, destroy, injure or mutilate their eggs or nests. In the absence of adoption of protocols for the protection of birds and their nests, there is potential for direct impacts on nesting birds and/or mortality of birds arising from the clearance of vegetation within the proposed site if occurring during the bird breeding season (1st March to 31st August).

Vegetation removal required to facilitate the construction of the proposed development consists of the dry meadows and grassy verges, hedgerows and treelines which provide a both feeding and nesting habitat for birds. If this vegetation removal was to be undertaken during the breeding bird season, it could result in the destruction of nests and accidental mortality of unfledged chicks, considered to be a significant impact at a local scale.

It is likely that birds currently utilising the site and its environs will be temporarily disturbed as a consequence of site clearance and increased noise and human activity levels in the construction zone of the proposed development. This disturbance is likely to result in the temporary displacement of birds from the proposed site during the construction phase and as a result, a potential reduction in the breeding success of such birds. Suitable alternative breeding and feeding habitat for temporarily displaced birds is available in the surrounding area to the south, Corkagh Park, and west, Grange Castle Golf Course, of the proposed site. These green spaces with hedgerows and treelines will provide refuge for displaced birds recorded using the site during the construction of the development. Long-term displacement resulting from the proposed development is discussed in the operational impacts section below.

In the absence of mitigation, overall impacts on the local bird population during the construction stage are expected to result in temporary significant adverse impacts, at a local scale.

Camac River

During the construction stage of the proposed development, there is potential for surface water run-off contaminated with silt, sediments, hydrocarbons or chemicals to reach the downstream hydrological environment. All surface waters arising from the proposed site ultimately discharge to the Camac River located *c.* 100m south of the proposed development. The Camac River supports populations of Brown Trout, Three-spined Stickleback, European Eel, Minnow and White-clawed Crayfish. In the absence of mitigation, construction-related surface water run-off could result in adverse significant impacts at significant at a local to County scale.

6.5.1.2 Operational Stage

Habitats – Hedgerows & Treelines

There is a risk that the condition of retained hedgerows and treelines within the proposed development may become degraded as a result of management practices or as a result of adjacent land use change, which may ultimately lead to the loss of retained hedgerows and treelines. The proposed landscaping plan has adequately buffered these features to minimise impact on the roost system, however an appropriate management plan which aims to enhance of maintain the condition of the existing hedgerows and treelines will need to be implemented to achieve this.

Japanese Knotweed was recorded outside the application boundary in a hedgerow along the Upper Nangor Road, however works in the area of the Japanese Knotweed location (see Figure 4) outside of and separate to the proposed development, could result in the spread of this non-native invasive species and degradation of retained habitats within the site.

There is a risk that the operational phase of the development may result in the degradation of retained hedgerows and treelines and could potentially lead to additional long-term loss of these linear habitats within the proposed site. In the absence of mitigation, this impact is considered to be potentially significant at a local scale.

Bats

Artificial lighting during the operational stage of the proposed development may result in a permanent significant impact on foraging and/or commuting bats in the locality. Artificial lighting on previously unlit, dark foraging and/or commuting bat corridors located within the proposed development site may cause them to become unsuitable, in turn reducing the availability of suitable foraging and/or commuting habitat for bats in the locality resulting in long-term displacement.

A review of the operational lighting plan has concluded that largely light spill at the edge of retained vegetation or new landscape planting has been maintained at 5 lux or less which is equivalent to typical side road lighting, however there are areas of retained hedgerows and treelines which will experience higher light spill, and therefore reducing the suitability of these features for use by bats.

Considering this and the low level of bat activity recorded during baseline surveys, the operational impact of the proposed development on the local bat population is assessed as a potentially long-term significant impact at a local scale.

Birds

Long-term habitat loss of dry meadows and grassy verges, hedgerows and treelines would likely result in permanent displacement of birds from the proposed site. Supplementary landscape planting will not provide an immediate resource or replacement of suitable breeding or feeding habitat for birds, however the combination of retained hedgerows and treelines with landscape planting will maintain suitable habitat within the proposed site. It is likely that suitable habitat within the site will be used by species more typical of urban environments that more readily habituate to disturbance and human presence. The existing local bird population may currently be habituated to low levels of noise and human activity, due to the suburban nature of the site and its

surroundings, however given the scale of the proposed development long-term displacement is likely for birds found in more semi-natural habitats e.g. Reed Bunting and Stonechat both recorded within the proposed site

Corkagh Park to the south and Grange Castle Golf Course to the west may provide long-term alternative habitat for displaced birds. Both amenities are protected from future development under the current South Dublin County Council Development Plan 2016-2022 under 'Objective OS – to preserve and provide for open space and recreational amenities' (SDCC, 2016).

It is likely that there will be long-term displacement of birds from the proposed development site arising from the proposed development due to long-term habitat loss and disturbance impacts such as increased noise levels and human presence. In the absence of mitigation, this impact is considered to be potentially significant at a local scale.

Camac River

There is potential for contaminated surface water arising from the operational phase of the proposed development, e.g. hydrocarbon contamination from a leaking vehicle, to reach the downstream Camac River. It is highly unlikely that a major pollution event will occur during the operational phase of the proposed development, nonetheless in the absence of mitigation it is possible that contaminated operational related surface water run-off could reach the Camac River and result in adverse significant impacts at a local to County scale.

6.5.1.3 Do-Nothing Impact

The existing unmanaged or minimal management of hedgerows, treelines and grassy meadows within the proposed site is expected to maintain existing habitat conditions close to their current state. There is evidence of scrub encroachment of hedgerow vegetation into grassy meadows, which is expected to continue and extend further into grassy meadows. Storm-damage may create new bat roost features in trees located within boundary hedgerows and treelines.

6.5.2 Cumulative – Kilcarbery

6.5.2.1 Construction Stage

According to myplan.ie, there are a number of proposed developments within the environs of the proposed site, including a proposed development for 109 residential units within the survey area (planning reference SD178/0002).[10] There is potential to produce in combination effects on downstream water quality in the Camac River if there is overlap of construction phases with the proposed development. A number of surrounding applications are located within existing built environments and therefore involve minimal vegetation clearance, which will reduce the risk of sediment and silt contaminated surface water run-off from entering the receiving hydrological environment.

In the absence of mitigation, there may be a risk that contaminated construction-related surface water run-off reaches the Camac River and results in a temporary to long-term adverse significant impact at a local to County scale.

[10] According to myplan.ie https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=9cf2a09799d74d8e9316a3d3a4d3a8de accessed 17th December 2018

6.5.2.2 Operational Stage

Considering the proposed development in-combination with other proposed plans and projects in the surrounding area and current South Dublin County Council Development Plan 2016-2022 zoning, cumulative impacts are considered highly unlikely. An objective of the Greater Dublin Strategic Drainage Study is for all development plans, including South Dublin County Council and in this case any other development within the Camac River catchment, to include Sustainable Urban Drainage Systems in new development. This objective is considered likely to reduce pressures on water quality in the receiving hydrological environment.

Under South Dublin County Council Development Plan 2016-2022, Corkagh Park to the south and Grange Castle Golf Course to the west are protected under 'Objective OS – to preserve and provide for open space and recreational amenities' (SDCC, 2016). These green spaces may provide long-term alternative habitat for displaced birds, and other fauna, and will not be subject to future development under current zoning.

For reasons outlined above, no cumulative adverse significant impacts are predicted from the proposed development in combination with other plans or projects.

6.5.2.3 Do-Nothing Impact

Assuming, proposed plans and projects in the area have proposed and implement appropriate mitigation to minimise impacts arising from them, in a do-nothing scenario no potential adverse cumulative impacts are predicted.

6.6 Ameliorative, Remedial or Reductive Measures

6.6.1 Proposed Development

A number of measures to minimise adverse impacts on Key Ecological Receptors have been incorporated into the design of the development and are considered in the operational stage section below, while others will be implemented for particular phases of the development works and are largely discussed in the construction stage section.

6.6.1.1 Construction Stage

Habitats – Hedgerow & Treelines

- Implement and demarcate a 3m root protection zone from the edge of each hedgerow prior to the commencement of construction works;
- Implement and demarcate a Root Protection Area around retained trees and treelines prior to the commencement of construction works. The Root Protection Area will be calculated following Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of National Road Schemes (NRA, undated); and,
- Implementation of an Invasive Species Management Plan prior to the commencement of construction to eradicate and prevent any spread of Japanese Knotweed. This plan will include: -
    a) A buffer of at least *c.* 10m[11] will be applied to the stand of Japanese knotweed. This area will be clearly demarcated by fencing, prior to and during construction, to avoid any disturbance and to exclude access by plant and machinery. Signs will be erected on fencing to inform contractors of any risks posed;

[11] The rhizomes of Japanese knotweed are known to extend up to 7m from visible growth above ground (Environment Agency, 2013), an addition of 3m has been added to the buffer as a precaution.

b) Prior to any works taking place, a toolbox talk will be given to all relevant site personnel to ensure they are aware of the location of the stand of Japanese knotweed, the impacts of this species and associated risks;
c) Posters outlining the key features of this plant will be displayed in communal areas on-site to ensure all site personnel are aware of this species and the associated risks;
d) Prior to construction works commencing, the adjacent landowner(s) will be liaised with regarding the treatment of Japanese knotweed that may extend outside of the ownership of the applicant;
e) Designated haul routes located on lands within the ownership of the applicant will be clearly marked up to ensure no contamination occurs. In the case, that infested soils are excavated, infested soils will be transported along these designated routes; and,
f) If any materials are to be imported into the site, it is recommended that the contractor obtains documentation from suppliers that the material is free from Knotweed and other invasive species. No new materials will be stored adjacent to the stand of Japanese knotweed.

Bats

- A number of trees located within the proposed development site contained suitable features for roosting bats. As a precautionary measure, it is recommended that the potential bat roost trees are inspected by an experienced ecologist for the presence of bats prior to felling and are section-felled using controlled rigging under the supervision of an experienced ecologist. If bats are present, the relevant works will have to cease and NPWS will have to be contacted in order to obtain a derogation licence;
- Construction phase lighting will follow advice provided in Bats and lighting – *Guidance for Planners, Engineers, Architects and Developers* (Bat Conservation Ireland 2010), *Guidance Notes for the Reduction of Obtrusive Light GN01* (Institute of Lighting Professionals, 2011), and *Guidance Note 08/18: bats and artificial lighting in the UK; Bats and the Built Environment* (Bat Conservation Trust & institute of Lighting Professionals, 2018). Construction stage lighting details shall be reviewed by a qualified bat ecologist. If necessary the bat ecologist shall recommend adjustments to directional lighting (*e.g.* through cowls, shields or louvres) to restrict light to those areas where it is needed with a light level of 3 lux or less at ground level.

Breeding Birds

- In order to avoid disturbance of breeding birds, their nests, eggs and/or their unflown young, all works involving the removal of trees or hedgerows will be undertaken outside of the nesting season (1st March to 31st August inclusive);
- Where this seasonal restriction cannot be observed, a breeding bird survey will be undertaken during the appropriate survey season (between early March and late June) by an ecologist with experience undertaking breeding bird surveys in order to confirm whether birds are nesting within suitable habitat affected by or immediately adjacent to the subject lands. Should nesting birds be encountered during surveys, the removal of trees or hedgerows may be required to be delayed until after the nesting season (1st March to 31st August inclusive);
- Installation of bird boxes to provide suitable nesting habitat for urban bird species that will continue to use the site during the operational stage.

Camac River

- See Water EIAR Chapter (Chapter 8), Section 8.6.1.1 for mitigation measures which will be implemented to protect the receiving hydrological environment and the Camac River during the construction stage.

6.6.1.2 Operational Stage

Habitats – Hedgerow & Treelines

- Implementation of a Habitat Management Plan to maintain or enhance condition of retained hedgerows and treelines.

Camac River

As part of the proposed development design no untreated surface water run-off will be discharged from the site. The below SuDS measures incorporated into the design will protect the receiving hydrological environment: -

- For housing and apartment blocks: rainfall gathered for irrigation of local roof planting and cleaning (apartment blocks only); soakage pits in rear gardens (Individual housing units); biofilter boundary planting (housing unit boundaries and landscaped areas in apartment blocks); and, low maintenance below ground attenuation tanks, with and without direct soakage;
- For road network and parking areas: tree pits for drainage of footpath areas and road network; biophilic streets; and, swales (infiltration ditch) alongside open green space; and,
- Site Wide: bioretention areas; flow controls at exit from site; light liquid interceptors; and, publicly managed low maintenance below ground attenuation tanks together with above ground detention areas for site wide management of surface water run-off. These systems will be designed to promote natural soakage to the underlying geology.

6.7 Residual Impact of the Proposed Development

6.7.1 Proposed Development

6.7.1.1 Construction Stage

Habitats – Hedgerow & Treelines

The residual impacts on hedgerow and treelines would be permanent habitat loss, assessed as significant at a local level.

Bats

The residual impacts on the local bat population would be temporary displacement during the construction stage, which is considered to be significant at a local level.

Breeding Birds

The residual impacts on breeding birds would be temporary displacement during the construction stage, which is considered to be significant at a local level.

Camac River

Assuming full and successful implementation of mitigation measures, there will be no significant residual impacts on the Camac River during the construction stage of the proposed development.

6.7.1.2 Operational Stage

Habitats – Hedgerow & Treelines

The residual impacts on hedgerow and treelines would permanent habitat loss, assessed as significant at a local level.

Bats

The residual impacts on the local bat population would be a potentially long-term displacement during the operational stage, which is considered to be significant at a local level.

Breeding Birds

The residual impacts on the local bat population would be potentially long-term displacement during the operational stage, which is considered to be significant at a local level.

Camac River

Assuming full and successful implementation of mitigation measures, there will be no significant residual impacts on the Camac River during the construction stage of the proposed development.

6.7.1.3 Worst Case Impact

Mitigation measures outlined above have been incorporated into the design of the development and will be implemented into the construction methodology. Nonetheless, worst case scenarios during the construction and operational phases are discussed below.

At worst case, during the construction phase of the proposed development a significant pollution event (either hydrocarbon or other) could occur causing damage to the receiving water in the Camac River. The impact would be temporary but could have longer-term significant impacts on the fish and White-clawed Crayfish population within the river. In this instance, an emergency plan to respond to the spill or pollution event will be initiated and a clean-up operation to restore the condition of the receiving waters will be implemented and agreed with the relevant body prior to commencement.

At worst case, during the operational phase of the proposed development condition of retained hedgerows and treelines within and along the periphery of the site could degrade and vegetation could die, ultimately loosing these retained linear features from the area. In this case, it is expected that landscape planting would be planted to supplement or reinstate these habitats, however it could result in long-term displacement of bats and breeding birds from the proposed site, and would reduce connectivity between the site and the wider surrounding area. The complete loss of retained hedgerows and treelines from the proposed site would result in a significant impact but not at a geographical scale greater than local.

6.8 Monitoring

6.8.1 Proposed Development

6.8.1.1 Construction Stage

Ecological monitoring will be carried out during the construction stage to ensure mitigation measures, outline above, are implemented appropriately.

6.8.1.2 Operational Stage

Invasive species monitoring and habitat monitoring of retained hedgerows and treelines will be carried out up to 5 years post-construction.

6.9 Difficulties Encountered

Breeding bird and bat activity resurveys were not carried out due to the timing of surveys outside the breeding bird season (March to August inclusive) and active bat season (May to September). As comprehensive surveys of the subject lands were carried out in 2017 such limitations are not considered to effect the impact assessment, however where necessary a precautionary approach was taken to account for any deficiencies in the data.