Ecological Impact Assessment of proposed development at No. 4 Rockville Drive, Glenamuck, Dublin 18 D18 X6Y6

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for Dun Laoghaire Rathdown County Council

October 2022

www.openfield.ie

1. INTRODUCTION

This report has been prepared by Padraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for 25 years 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 report provides the for an ecological assessment of the proposed development and is hereafter referred to as the Ecological Impact Assessment or EcIA.

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, 2018). Terminology for the assessment of impact magnitude is taken from the National Roads Authority (2009).

A site visit was carried out on May 19th 2022. 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).

May lies within the optimal period for general habitat surveys (Smith et al., 2010) and so it was possible to classify all habitats on the site to Fossitt level 3. A survey for breeding birds was also carried out as May lies within the optimal nesting season. May is also within the optimal season for surveying amphibians and large mammals, particularly Badger and Otter.

3 THE EXISTING RECEIVING ENVIRONMENT

3.1 Zone of Influence

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 1.

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.

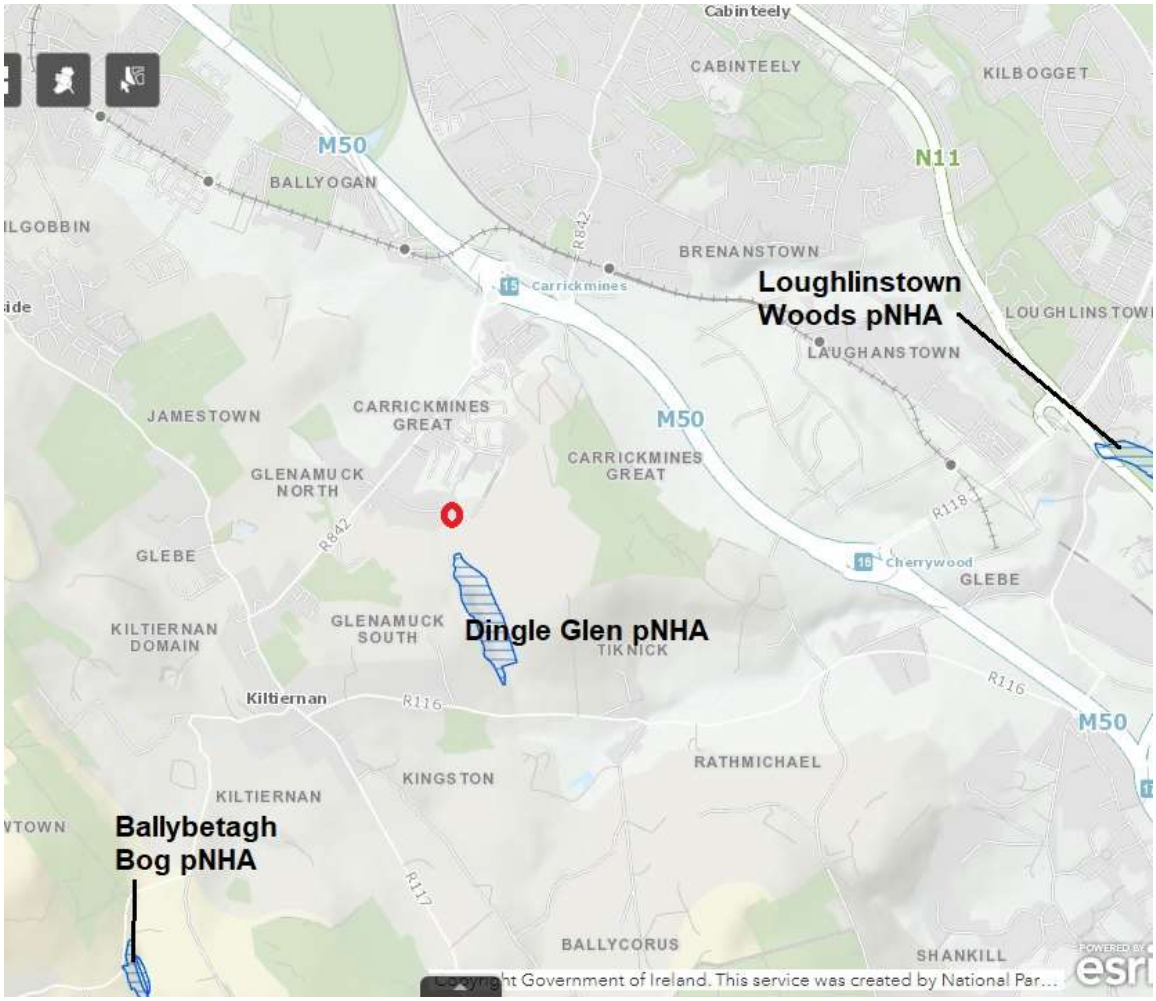

Figure 1 – Site location showing areas designated for nature conservation and local water courses (from www.epa.ie).

The following areas were found to be located within the vicinity of the application site:

Dingle Glen pNHA (site code: 1207): This is a small area of regenerating native woodland that is of value for its relatively undisturbed character. A short site synopsis is available from the NPWS and it is reproduced here in its entirety.
"Dingle Glen is situated approximately 5 km west of Killiney. It is a dry valley formed as a glacial lake overflow channel.

Formerly cleared of vegetation, a woodland cover is now regenerating, with pioneer species of Holly (Ilex aquilifolium), Blackthorn (Prunus spinosa), and Willows (Salix spp.). Individual trees of Ash (Fraxinus excelsior), Hazel (Corylus avellana), Oak (Quercus petraea) and Spindle (Euonymus europaeus) occur. The woodland ground flora is represented by Foxglove (Digitalis purpurea), Wood Aven (Geum urbanum), Wood Melic (Melica uniflora) and Bugle (Ajuga reptans).

Trees and shrubs are mostly restricted to the valley bottom. On the slopes above a heathy vegetation is dominated by Gorse (Ulex europaeus) and Bracken (Pteridium aquilinum). Other species include Wood Sage (Teucrium scorodonia), Bell Heather (Erica cinerea), Navelwort (Umbillicus rupestris), English Stonecrop (Sedum anglicum), Heath Bedstraw (Galium saxatile), Heath-grass (Danthonia decumbens), Wood-rush (Luzula sylvatica) and the Climbing Corydalis (Corydalis claviculata).

The importance in this site lies in the variety of habitats within a relatively small area. The site is secluded and not subject to much disturbance." (NPWS, 1999)

Ballybetagh Bog pNHA (site code: 1202). This area is composed of three separate marsh areas 5km north-west of Enniskerry. It is an important wetland site and is well known for the quantity of archaeological remnants, especially relicts of Giant Irish Elk.

Loughlinstown Wood pNHA (site code: 1211). This is a woodland site which straddles the Loughlinstown Stream and, while it is of planted origin, it has developed semi-natural characteristics.

The NPWS web site (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 Glenamuck Road site is located within the square O22 and seven species of protected mammal, and flowering plant are highlighted. These species are detailed in Table 1. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other important and protected species.

In summary it can be seen that none of the previous records of protected plants is extant within this square. The mammals however are known to be present and may be of relevance to this study.

Additional records of protected species are available from the database of the National Biodiversity Data Centre. Table 2 lists mammal species that are protected under the Wildlife Act 1976 and highlights those for which there are current records in this 10km square. As can be seen there are a number of species of bat as well as larger mammal species for which there are current records in this area.

Table 1 – Known records for protected species within the O22 10km square

Species	Habitat[1] [2]	Current status
Clinopodium acinos Basil thyme	Field margins and sandy or gravelly places	Record pre-1970[3]
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	
Misopates orontium Lesser snapdragon	Arable fields	
Puccinellia fasciculata Borrer's salt-marsh grass	Muddy inlets on the coast	
Cervus nippon Sika deer	Coniferous woodland and adjacent heaths	Current[4]
Lutra lutra Otter	Rivers and wetlands	Not recorded
Sciurus vulgaris Red squirrel	Woodlands	Present[5]

[1] Parnell et al., 2012
[2] Hayden & Harrington, 2001
[3] Preston et al., 2002
[4] Harris & Yalden, 2008
[5] Carey et al., 2007

Table 2 – Protected mammals in Ireland and their known status within the zone of influence (Harris & Yalden, 2008)[6] Those cells that are greyed out indicate no records for this species in the O22 square.

Species	Level of Protection	Habitat	Red List Status[7]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands	Near Threatened
Lesser horseshoe bat *Rhinolophus hipposideros*		Disused, undisturbed old buildings, caves and mines	Least Concern
Grey seal *Halichoerus grypus*	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	Coastal habitats	-
Common seal *Phocaena phocaena*			-
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats	Least Concern
Natterer's bat *Myotis nattereri*		Woodland	Least Concern
Brown long-eared bat *Plecotus auritus*		Woodland	Near Threatened
Leisler's bat *Nyctalus leisleri*		Woodlands and buildings	Least Concern
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas	Least Concern
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland	Least Concern
Daubenton's bat *Myotis daubentonii*		Woodlands and bridges associated with open water	Least Concern
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats	Least Concern
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats	Least Concern
Pine Marten *Martes martes*		Broad-leaved and coniferous forest	Least Concern
Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows	Least Concern
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands	Least Concern

[6] Excludes marine mammals
[7] Marnell et al., 2009

Red squirrel *Sciurus vulgaris*		Woodlands	Near Threatened
Irish stoat *Mustela erminea hibernica*		Wide range of habitats	Least Concern
Badger *Meles meles*		Farmland, woodland and urban areas	Least Concern
Red deer *Cervus elaphus*		Woodland and open moorland	Least Concern
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat	Least Concern
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths	-

Water quality in rivers 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 = pristine quality and Q5 = grossly polluted (Toner et al., 2005). EPA mapping shows the lands to be in the catchment of the Golf Stream, a tributary of the Glenamuck stream which is itself a tributary of the Carrickmines Stream. There are no water quality monitoring points upstream of the development site and the nearest downstream station is on the Carrickmines Stream where it crosses the M50 motorway. At this point the river was most recently (2003) assessed as Q3 indicating moderately polluted status. More recent (2020) sampling point showed Q4 (unpolluted) status at a monitoring point under the N11 road. The river as a whole (water body code: IE_EA_10C040350) is assessed as 'moderate' under the Water Framework Directive monitoring period for 2013-2018.

3.2 Site Survey

The development site occupies vacant land within the Rockville Drive residential housing estate. Mapping from the EPA shows no water courses or areas protected for nature conservation in the immediate vicinity.

3.2.1 Flora

The development site is located within an existing housing estate, on vacant land between No.4 and No. 5 Rockville Drive. Vegetation is **recolonising bare ground – ED3** including Sow Thistle *Sonchus arvensis,* Nettle *Urtica dioica,* Black Mustard Brassica nigra, Cuckoo Flower *Cardamine pratensis* and Creeping Bent *Agrostis stolonifera.*

The rear (eastern) boundary is characterised by a **hedgerow – WL1**. This is of mixed composition with native species, Holly *Ilex aquifolium,* Ivy *Hedera helix,* and Scots Pine *Pinus sylvestris* but also non-native, horticultural species such as Palm *Palmae*, and New Zealand Broadleaf *Grisilinea littorina.*

These habitats provide some refuge for common species which are habituated to human disturbance, however they are not associated with any which are listed as of high conservation value (i.e. Annex I Habitats Directive).

Three-cornered Leek *Allium triquetrum* is growing on the site and this is an alien invasive species as listed on SI No. 477 of 2011.

There are no water courses on the development site, no open water bodies or habitats which can be described as wetlands.

3.2.2 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 2 details those mammals that are protected under national or international legislation in Ireland.

There is no suitable habitat for Otter or Irish Hare. There was no evidence of Badger activity although there are numerous records of Badger from this area from the National Biodiversity Data Centre, most recently from 2017. Badgers are highly likely to be active in the open grassland and hedges to the south, and the area around the Dingle Glen pNHA. Nevertheless, the development site has few resources for Badger and there are no setts in this stretch of hedgerow.

Features within the site boundary are of very low bat roost potential, with no older trees with holes, cracks and cavities. There are no buildings on the site and no obvious cavities on adjacent buildings. The hedgerow, which is part of a wider area of scrub to the east provides foraging opportunities. Bat species which are active in this area will be tolerant of existing levels of human disturbance, particularly lighting which is associated with the housing estate.

Sika deer *Cervus nippon* are known from the area and are likely to be active in open ground and woodlands along with Rabbits *Oryctolagus cuniculus.*

While limited data are available on the distribution of Hedgehog, Pygmy Shrew and Irish Stoat, they are considered widespread in the Irish countryside and suitable habitat is available for them in the hedgerow and scrub beyond (Hayden & Harrington, 2001). There is no suitable woodland habitat for Red Squirrel or Pine Marten. Non-protected species such as Red Fox *Vulpes vulpes,* House Mouse *Mus domesticus,* Wood Mouse *Apodemus sylvaticus* and Brown Rat *Rattus norvegicus* may also be found in this area.

No birds were nesting in the hedgerow during the survey although suitable habitat is available for common garden and countryside species. Of those species listed as being of high conservation importance in Ireland, Meadow Pipit *Anthus pratensis* and Grey Wagtail *Motacilla cinerea* are recorded from this part of Dublin (Gilbert et al., 2021; Balmer et al., 2013). Neither of these birds were noted during the survey.

Common Frog *Rana temporaria,* Smooth Newts *Lissotriton vulgaris* and Common Lizard *Lacerta vivipara* are protected under the Wildlife Act 1976 however there is no suitable spawning habitat for amphibians. Common Lizard is considered widespread however no records of this species are with the National Biodiversity Data Centre from this area.

There are no habitats on the site suitable for fish. The Glenamuck/Golf Stream can be considered to be of salmonid potential, although significant culverting downstream (e.g. at the M50) is likely to limit the movement of migratory fish such as Trout *Salmon trutta,* European Eel *Anguilla anguilla* or Lamprey

Lampetra sp. However, there are no surface, hydrological pathways from the development site to the Carrickmines river system.

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

In summary it has been seen that the application site is not within, or adjacent to, 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. Three-cornered Leek is an alien invasive species growing on the site. While there is some suitable nesting habitat for birds there are no suitable roost locations for bats.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in table 3. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in table 4.

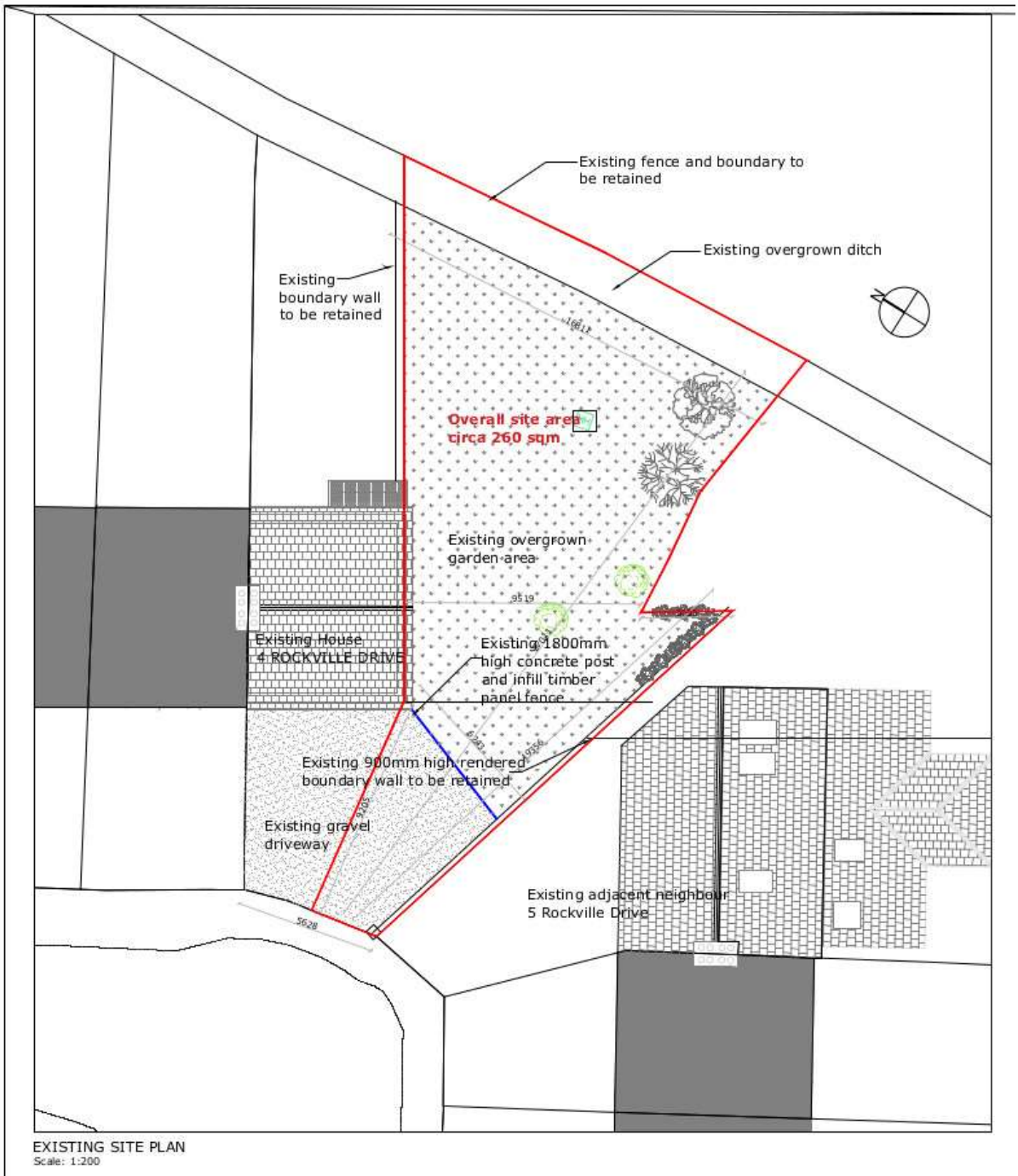

Figure 2 – Existing features of the Glenamuck Road site

Table 3 Site evaluation scheme taken from NRA guidance 2009

Site Rating	***Qualifying criteria***
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 4 Evaluation of the importance of habitats and species on the development site

Hedgerow – WL1	E – Local Importance (lower value)
Recolonising bare ground – ED3	Negligible biodiversity value

4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

It is proposed to construct a 2-storey 3-bedroom detached house in the side garden of 4 Rockville Drive. The proposal includes the removal of some hedgerow vegetation to the rear of the site to install a boundary fence.

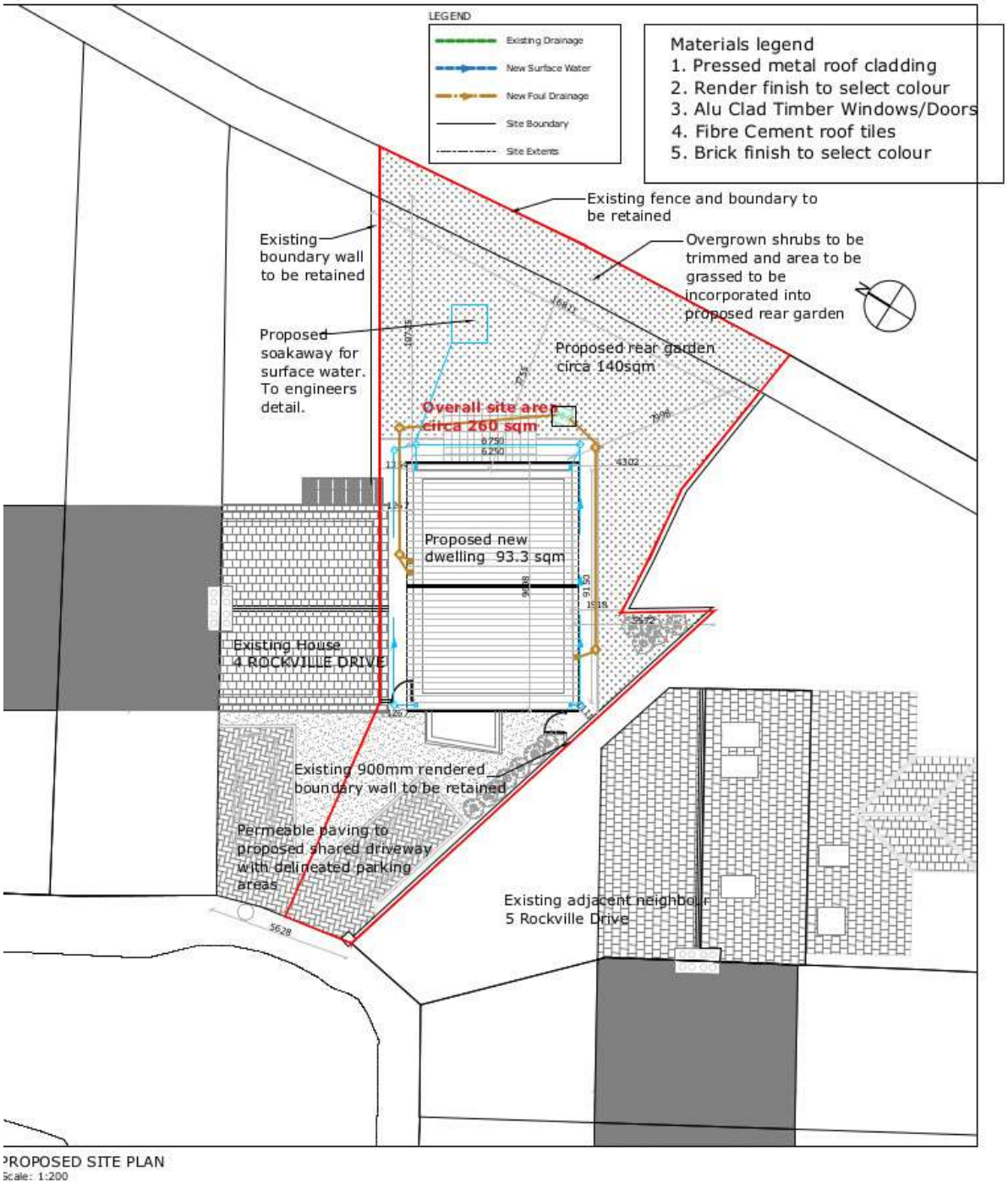

Figure 3 – Development overview

5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT IN THE ABSENCE OF MITIGATION

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 NRA.

5.1 Construction Phase

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

1. A strip of hedgerow vegetation approximately 16m long and 2m deep is to be removed. The removal of hedgerow habitats will reduce the area and resources available for species which are common and widespread. The existing vegetation is shown in figure 4 and this shows that plants on the margin of the hedge (i.e. those to be removed) are largely non-native New Zealand Broadleaf and Palm. However some native vegetation, including the Scots Pine tree on the right of this image, is to be removed. Overall the impact on biodiversity from this loss of habitat is minor negative.

Figure 4 – View towards the hedgerow at the rear of the site

2. The direct mortality of species during land clearance.

Hedgerow vegetation provides habitat for nesting birds and other fauna. There are no features which are suitable for bat roosting which could be affected. All birds' nests and eggs are protected under the Wildlife Act while it is prohibited to remove vegetation between the months of March and August. Without mitigation this impact is moderate negative.

3. Disturbance to Three-cornered Leek

Without mitigation, site clearance works could result in the spread of this invasive species and this would result in a moderate negative impact to biodiversity.

4. Pollution of water courses through the ingress of silt, oils and other toxic substances.

The potential for pollution to arise during construction is very low as the site is already cleared and there are no water courses in this vicinity. Public surface sewers could provide a pathway to the Golf Stream however, even with no mitigation the impact to water quality would be minor negative. Nevertheless, best practice site management should be employed to prevent pollution during this phase.

Operation Phase

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

5. Impacts to species through the disruption of ecological corridors:

The hedgerow to the rear of the site is connected to a wider area of scrub stretching to the east, as well as other linear habitats which connect to the Dingle Glen pNHA, a nationally important biodiversity site. However, no disruption to these corridors will arise from this project. The removal of some hedgerow vegetation (which is in any case largely non-native) will not affect movement of species in this area. No effects to biodiversity will arise from this source.

6. Pollution of water from foul wastewater arising from the development.

Foul effluent from the proposed development will be sent to the wastewater treatment plant at Shanganagh in Dublin. This plant is operated by Irish Water and discharges treated effluent to the Irish Sea under licence from the EPA (licence no.: D0038-01). It has a treatment capacity of 186,000 population equivalent (P.E.). According to the most recent Annual Environmental Report (AER) for 2021 emissions from the plant were not fully in compliance with the Urban Wastewater Treatment Directive during that year. There were 10 exceedences of dissolved inorganic nitrogen (N) during that year. The cause is given as "WWTP not designed for N removal". Nevertheless, according to the AER "the discharge from the wastewater treatment plant does not have an observable impact on the water quality. [or…] the Water Framework Directive status." The report states that there is remaining organic capacity of 56,992 P.E. and that the treatment capacity is not likely to be exceeded in the next three years.

Therefore, there is ample capacity at the plant to treat the additional wastewater from this development and no impacts to biodiversity are likely to arise.

7. 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. The current design includes Sustainable Urban Drainage System (SUDS) and will be separate from the foul network. No effects to the quality or quantity of surface run-off are expected.

8. Disturbance to species from increased human activity (lighting, etc.).

The species/habitats present on this site are not likely to be sensitive to disturbance from noise or general human activity due to the existing background levels of disturbance, including lighting. Bats which may be using the vegetation to the east of the site for foraging are habituated to existing light levels which will not noticeably change due to this development. No impacts to bats or other species will arise due to lighting or other forms of disturbance during the operation phase.

9. Impacts to protected areas.

The nearest area designated for nature conservation is the Dingle Glen pNHA, which can be found c.170m to the south. This is too far for any disturbance effects to arise. There is no pathway between the site and this conservation area (which is of value for its woodland habitat). Negative effects to the pNHA cannot occur.

The Ballybetagh Bog pNHA is composed of three separate areas, this nearest of which can be found approximately 2.6km to the south-east at its closest point. The NPWS information for this pNHA shows that each sub-area is a marsh within a small valley. This stream running through the valley is a tributary of the Glencullen River which flows through the Knocksink Wood near Enniskerry. As such the pNHA is hydrologically separated from the development lands. Due to these reasons no impact can arise to the pNHA from this project.

The Loughlinstown Wood pNHA is found east of the N11 primary road and c. 3.1km from the development site. There is no pathway for any effects to arise to this pNHA.

A separate Screening Report for Appropriate Assessment has been presented and this concludes that negative effects to Natura 2000 sites are not likely to arise. No impacts to areas designated for nature conservation are likely to arise from this project.

Table 5: Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Habitat loss of features of low local value (c.16m x 2m of vegetation)	Minor negative
2	Mortality to animals during construction	Moderate negative
3	Disturbance to Three-cornered Leek	Moderate negative
4	Pollution of water during construction phase	Minor negative
5	Impacts to ecological corridors	Neutral
6	Wastewater pollution	Neutral

7	Surface water pollution	Neutral
8	Disturbance to species from human disturbance (lighting)	Neutral
9	Protected areas	Neutral

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

4.5.2 Cumulative impacts

A number of the identified impacts can act cumulatively with other impacts from this and similar developments in the Kilternan/Glenamuck area. These primarily arise through the urbanisation of the city's hinterland as provided for by land use zoning and include: loss of habitats, particularly hedgerows and treelines; spread of alien invasive species, pollution from surface water run-off and pollution from wastewater generation. It can also occur through the indirect effects arising from light pollution. Each of these impacts are assessed individually in this report.

The project can be seen as part of wider urbanisation of the Glenamuck/Kilternan area as provided under the 2013 Local Area Plan (LAP). This includes additional residential development as well as a new link road through the area. This will result in the loss of field boundaries as well as river crossings which will affect wildlife populations. The LAP was subject to Strategic Environmental Assessment (SEA) which has analysed the environmental impacts arising therefore, and which suggested amendments to the plan to mitigation those effects.

Effects such as the spread of alien invasive species can act cumulatively with other development and for this reason it has been assessed as 'moderate negative' in this assessment.

4.6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This report has identified two impacts that were assessed as 'moderate negative' and therefore mitigation is needed to reduce the severity of this potential effect.

4.6.1 Mitigation Measures Proposed

The following mitigation measures are proposed for the development

Construction Phase

1. Loss of vegetation

All birds, their nests and eggs are protected under the Wildlife Act. Vegetation should not be cleared during the closed season which lasts from March 1st to August 31st. Where this is not possible, vegetation must first be inspected by a suitably qualified ecologist for nesting activity. Where a nest is found it cannot be disturbed unless under licence from the NPWS. Where no nest is found vegetation can be cleared within 48 hours.

2. Spread of Three-cornered Leek.

An Invasive Species survey and Invasive Species Management Plan will be prepared by a suitably qualified invasive species specialist and which will be submitted for agreement with DLR County Council prior to commencement of works.

3. Pollution to water courses

Although pollution during construction was assessed as a minor negative effect, best practice management should be employed to ensure that pollution does not occur. This includes storing dangerous substances such as oils and fuels in a bunded area, keeping stockpiles of sand or clay well way from surface drains while any discharge of silt-laden water should only take place via a suitably-sized silt trap.

4.7 PREDICTED 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.

Construction Phase

There will be no temporary residual impacts to biodiversity arising from this project.

- The removal of hedgerow vegetation will result in a short-term minor negative effect to biodiversity. As garden planting matures this impact will be reduced to neutral.

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APPENDIX 2 SPECIES LIST

The nomenclature for vascular plants is taken from the *New Flora of the British Isles* (Stace, 2010).

Scientific names for mosses comes from *A Checklist and Census Catalogue of British and Irish Bryophytes* (Hill et al., 2008) while common names are taken from *Mossess and Liverworts of Britain and Ireland* (Atherton et al. eds., 2010).

Species indicated with an asterisk '*' are known to have been introduced to Ireland by humans.

Treeline - WL2/Hedgerow - WL1 (higher significance)		**DAFOR**
*Acer pseudoplatanus**	Sycamore	O
Arum maculatum	Lords-and-Ladies	O
Betula sp.	Birch	O
*Cuprocyparis leylandii**	Leyland Cypress	R
Fraxinus excelsior	Ash	F
Galium aparine	Cleavers	O
Hedera helix	Common Ivy	A
Ilex aquifolium	Holly	F
*Petasites fragrans**	Winter Heliotrope	F
Polystichum setiferum	Soft Shield-fern	O
Populus tremula	Aspen	R
Rubus fruticosus agg.	Brambles	A
Salix cinerea	Grey Willow	O
*Salix fragilis**	Crack-willow	O
Sambucus nigra	Elder	O

Hedgerow - WL1 - lower significance		**DAFOR**
Prunus spinosa	Blackthorn	A
Rubus fruticosus agg.	Brambles	A

Dry meadow - GS2		**DAFOR**
Agrostis stolonifera	Creeping Bent	A
Alnus glutinosa	Alder	O
Arrhenatherum elatius	False Oat-grass	A
Carex pendula	Pendulus Sedge	O
Cirsium arvense	Creeping Thistle	F
Dactylis glomerata	Cock's-foot	A
*Petasites fragrans**	Winter Heliotrope	O
Plantago lanceolata	Ribwort Plantain	O
Potentilla reptans	Creeping Cinquefoil	O
Quercus sp.	Oak (large specimen)	R
Rhytidiadelphus squarrosus	*Springy Turf-moss*	F
Rubus fruticosus agg.	Brambles	O
Senecio jacobaea	Common Ragwort	O
Urtica dioica	Common Nettle	O

Broadleaved woodland - WD1/Glenamuck Stream - FW1		**DAFOR**
canopy		
Betula sp.	Birch	O
*Cuprocyparis leylandii**	Leyland Cypress	R
Fraxinus excelsior	Ash	F
shrub		
Corylus avellana	Hazel	F
Fagus sylvatica*	Beech	O
Ilex aquifolium	Holly	F
*Prunus laurocerasus**	Cherry Laurel	F
Rubus fruticosus agg.	Brambles	F
*Symphoricarpos albus**	Snowberry	O
ground		
Asplenium adiantum-nigrum	Black Spleenwort	O
Asplenium scolopendrium	Hart's-tongue	O
Dryopteris filix-mas	Male-fern	O
Hedera helix	Common Ivy	A
Polystichum setiferum	Soft Shield-fern	O
Primula vulgaris	Primrose	O