Biodiversity Management Plan

Profile Park Data Centre

20/08/2021

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EXECUTIVE SUMMARY

1.1. Objectives have been established to enhance and maintain the biodiversity of the land at the proposed data centre lands within Profile Park, Clondalkin, Dublin.

1.2. These include the sensitive realignment of the Baldonnel stream, which would include a riparian strip, the planting of species-rich hedgerows to provide a plentiful source of food and shelter for a range of fauna species. Other enhancement measures include development of a wetland wildflower mix, wildflower meadow mix, berms and woodland on site. This would be in addition to, creating a herptile hibernaculum and adding bird and bat boxes to the site.

1.3. A Fossitt habitat survey of the site was conducted in June 2021 to assess the current baseline of the Application Site. An Ecological Impact Assessment (EcIA)[1] was then conducted to assess the local area and its ability to support a range of wildlife, as part of the full planning application.

1.4. The enhancements and management measures set out in this document have been developed in accordance with the findings of the above habitat survey. This will enable the Proposed Development to deliver biodiversity gain.

[1] A Blom, D Dunlop (2021) Profile Park Data Center. Ecological Impact Assessment. Neo Environmental.

INTRODUCTION

Background

1.6. Neo Environmental Ltd has been appointed by Ramboll on behalf of Vantage Data Centers Dub 11 Limited (the "Applicant") to undertake a Biodiversity Management to inform a planning application for a proposed data centre (the "Proposed Development") located on lands within Profile Park, Clondalkin, Dublin (the "Application Site").

Development Description

1.7. The development will consist of the demolition of the abandoned single storey dwelling and associated outbuilding (206sqm); and the construction of 2 no. two storey data centers with plant at roof level of each facility and associated ancillary development that will have a gross floor area of 40,589sqm that will consist of the following:

- 1 no. two storey data center (Building 11) that will be located to the south of the site and will have a gross floor area of 24,667sqm. It will include 22 no. emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height;
- 1 no. two storey data center (Building 12) that will be located to the north of the site, and to the immediate north of Building 11 and will have a gross floor area of 12,915sqm. It will include 11 no. emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height;
- Each of the two data centers will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators;
- The overall height of each data center apart from the flues and plant at roof level is c. 14.23m above the finished floor level;
- Construction of internal road network and circulation areas, with main entrance off Falcon Avenue to the south, as well as a secondary vehicular access off Legacy Drive to

the south-west, both from within Profile Park; footpaths, provision of 144 no. car parking spaces, and 66 no. cycle parking spaces;

- single storey step-up substation (38sqm) as well as 2 no. single storey switch substations (121sqm);
- AGI Gas Regulator compound that include 3 no. single storey buildings (134sqm);
- construction of a gas powered generation plant in the form of a 13m high single storey building with a gross floor area of 2,714sqm that will contain 10 gas generators with associated flues that will be 25m in height, and grouped in pairs and threes. The Gas Plant will be located to the west of Building 11;
- Ancillary site development works, that will include reorientation of the Baldonnel Stream, biodiversity management initiatives, attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gates, sprinkler tanks and pump room; and
- A temporary gas powered generation plant within a fenced yard containing 22 no. generator units in containers, each with associated flues (each 25m high), 12 transformers and 10 containers of controls to be located to the west of, and associated with the first phase of Building 11, and will be required for a period of up to 2 years if connection to the national grid is delayed. This temporary plant will not be built if the connection to the national grid is in place prior to the operation of Building 11.

Site Description

1.8. The proposed site consists of agricultural land with mature treelines, hedgerow, building and a stream. These habitats have potential to support breeding birds, bats badgers and other protected species.

OBJECTIVE OF THE BIODIVERSITY MANAGEMENT PLAN

1.9. The objective of this BMP is to minimise any potential negative impacts, arising from the Proposed Development, while increasing the habitat diversity. The enhancement of the land within the Application Site boundary will increase the sites capability of supporting wildlife.

1.10. This will be achieved by

- Realignment of the Baldonnel Stream, providing microhabitats to support benthic species;
- Creating and maintaining a wetland specific species-rich diverse grassland with a varied sward structure;
- Creating and maintaining a wildflower meadow;
- Creating and maintaining species-rich hedgerows;
- Creating and maintaining wildlife shelters for priority and locally important species;
- Ensure no net loss of biodiversity within the Application Site as a result of the habitat creation scheme; and
- Maximise the floral and faunal biodiversity of the created and retained habitats.

CURRENT CONSERVATION & BIODIVERSITY

National Conservation

Ireland's National Biodiversity Action Plan 2017 - 2021[2]

1.11. The National Biodiversity Action Plan[3] sets out a vision and seven strategic objectives to halt the decline of biodiversity across Ireland.

"Objective 1 - Mainstream biodiversity into decision-making across all sectors.

Objective 2 - Strengthen the knowledge base for conservation, management, and sustainable use of biodiversity.

[2] Department of Culture, Heritage, and the Gaeltach (2017) National Biodiversity Action Plan 2017-2021

[3] Department of Arts, Heritage and the Gaeltacht (2011) Actions for Biodiversity 2011 – 2016 Ireland's National Biodiversity Action Plan. Available at: http://www.npws.ie/sites/default/files/general/national-biodiversity-plan-english.pdf

Objective 3 - Increase awareness and appreciation of biodiversity and ecosystem services.

Objective 4 - conserve and restore biodiversity and ecosystem services in the wider countryside.

Objective 5 - conserve and restore biodiversity and ecosystem services in the marine environment.

Objective 6 - Expand and improve management of protected areas and species.

Objective 7 - Strengthen international governance for biodiversity and ecosystem services."

1.12. This document outlines that special protection to sites of highest nature value and species most at risk, including designated sites should be afforded. However, effective conservation and sustainable use of biodiversity should also occur within the wider countryside, as this is where much of the biodiversity lies.

1.13. The primary threat to biodiversity both within and outside protected areas is from habitat degradation, fragmentation and loss due to changes in agricultural practices (such as intensification), commercial forestry, fisheries over exploitation, peat extraction, air and water pollution, invasive alien species, land clearance and development, tourism and recreational activities and climate change.

All Ireland Pollinator Plan 2021-2025[4]

1.14. On the 17th of September 2015, Ireland joined a small number of countries in Europe who have developed a strategy to address pollinator decline and protect pollination services. In March 2021, a new Plan was released.

1.15. This new Plan has six objectives and has identified 186 actions in order to achieve its objectives. The six objectives are as follows:

- **Making farmland pollinator friendly**. Working together with the farming community, increase awareness of pollinators and the resources they need in order to survive on farmland.
- **Making public land pollinator friendly**. Working with Councils, Transport Authorities, Local Communities and others, to strengthen links between this plan and other initiatives and to increase shelter and food resources for pollinators.

[4] National Biodiversity Data Centre (2015) All Ireland Pollinator Plan 2021-2025. Available at: https://pollinators.ie/wp-content/uploads/2021/03/All-Ireland-Pollinator-Plan-2021-2025-WEB.pdf

- **Making private plan pollinator friendly**. Work together with the public and community groups to create networks of biodiversity-friendly habitat across the landscape.
- **All-Ireland honeybee strategy**. Working with beekeepers, achieve healthy, sustainable populations, and for honeybees to be part of a cohesive pollinator message that balances managed and wild pollinator populations.
- **Conserving rare pollinators**. Improving our knowledge on rare pollinators, and raising awareness through dedicated initiatives, achieve a Plan that protects as much wild pollinator diversity as possible.
- **Strategic coordination of the Plan**. Continually raising awareness; addressing gaps in knowledge through research, tracking where pollinators occur and how populations are changing, work from an evidence base that enables us to coordinate a dynamic plan that is targeted and effective.

1.16. The enhancements set out within this BMP will create areas of flower-rich habitat that will support Ireland's pollinator species, including bees and flies.

South Dublin Development Plan 2016–2022[5]

1.17. The Plan sets out an overall strategy for the proper planning and sustainable development of the County and consists of a written statement and accompanying plans and maps

1.18. Chapter 9 of the Plan refers to the county's natural heritage and contains a number of key policies (outlined below), which aim to protect and enhance biodiversity and designated sites within the county:

HCL1: Objective 1: To protect, conserve and enhance natural, built and cultural heritage features and restrict development that would have a significant negative impact on these assets.

HCL1 Objective 2: To support the objectives and actions of the County Heritage Plan, including the preparation of a County Biodiversity Plan.

HCL12 Objective 1: To prevent development that would adversely affect the integrity of any Natura 2000 site located within and immediately adjacent to the County and promote favourable conservation status of habitats and protected species including those listed under the Birds Directive, the Wildlife Acts and the Habitats Directive.

HCL12 Objective 2 To ensure that projects that give rise to significant direct, indirect or secondary impacts on Natura 2000 sites, either individually or in combination with other plans or projects, will not be permitted unless the following is robustly demonstrated in accordance with Article 6(4) of the

[5] Available from : https://sdcc.ie/en/services/planning/development-plan/plan-2016-2022/plan-2016-2022.html

Habitats Directive and S.177AA of the Planning and Development Act (2000 – 2010) or any superseding legislation:

1. There are no less damaging alternative solutions available; and

2. There are imperative reasons of overriding public interest (as defined in the Habitats Directive) requiring the project to proceed; and

3. Adequate compensatory measures have been identified that can be put in place.

HCL13 Objective 1 To ensure that any proposal for development within or adjacent to a proposed Natural Heritage Area (pNHA) is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the pNHA particularly plant and animal species listed under the Wildlife Acts and the Habitats and Birds Directive including their habitats.

HCL13 Objective 2 To restrict development within a proposed Natural Heritage Area to development that is directly related to the area's amenity potential subject to the protection and enhancement of natural heritage and visual amenities including biodiversity and landscapes.

HCL15 Objective 1 To ensure that development does not have a significant adverse impact on rare and threatened species, including those protected under the Wildlife Acts 1976 and 2000, the Birds Directive 1979 and the Habitats Directive 1992.

HCL15 Objective 2 To ensure that, where evidence of species that are protected under the Wildlife Acts 1976 and 2000, the Birds Directive 1979 and the Habitats Directive 1992 exists, appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment

HCL15 Objective 3 To protect existing trees, hedgerows, and woodlands which are of amenity or biodiversity value and/ or contribute to landscape character and ensure that proper provision is made for their protection and management in accordance with Living with Trees: South Dublin County Council's Tree Management Policy 2015-2020.

1.19. The South Dublin County Council Development Plan for the period 2022 – 2028 is still under review.

South Dublin County Council Draft Biodiversity Action Plan 2015-2020[6]

1.20. The preparation of this Biodiversity Action Plan is an objective of the South Dublin County Heritage Plan and the South Dublin County Council Development Plan 2016-2022 The South Dublin County Biodiversity Plan was prepared in the context of a range of national and international plans for biodiversity protection and enhancement

1.21. The National Biodiversity Plan lists a range of actions for biodiversity that aim to achieve this vision, arranged under a series of 7 Strategic Objectives. These objectives are:

[6]https://www.meath.ie/system/files/media/file-uploads/2019-06/County%20Meath%20Biodiversity%20Plan%202015-2020.pdf

- the mainstreaming of biodiversity issues across the decision-making in all sectors;
- the strengthening of the knowledge base for conservation, management and sustainable use of biodiversity;
- increasing public awareness and appreciation of biodiversity and ecosystem services;
- the conservation and restoration of biodiversity and ecosystem services in the wider countryside;
- the conservation and restoration of biodiversity and ecosystem services in the marine environment;
- the expansion and improved management of protected areas and species; and
- the strengthening of international governance for biodiversity and ecosystem services.

Local Conservation

1.22. The Proposed Development does not lie within or directly adjacent to any statutory or non-statutory designated environmental sites. Within 15km of the Application Site boundary there are seven Natura 2000 designated sites, four Special Areas of Conservation (SACs) and three Special Protection Areas (SPA)

1.23. Please refer to the supporting Appropriate Assessment (AA) Screening report (**Appendix 11.2**) for details of all Natura 2000 sites within 15km of the Application Boundary.

1.24. From the findings of the EcIA and AA it is considered that with the implementation of design, best practice and mitigation measures the Proposed Development will not significantly impact upon any of the designated and non-designated sites located within 15km of the Proposed Development.

HABITATS & SPECIES PRESENT

1.25. An extended habitat survey of the Proposed Development was undertaken on the 17th June 2021. The following habitat types were identified:

- Improved agricultural grassland (GA1)
- Amenity grassland (improved) (GA2)
- Dry meadows and grassy verges (GS2)
- Hedgerows (WL1)
- Treelines (WL2)
- Depositing/lowland rivers (FW2)
- Recolonising bare ground (ED3)
- Buildings and artificial surfaces (BL3)

(Note: Fossitt classification within brackets).

Fauna

1.26. The potential presence of protected species within the study area was assessed though a data search conducted through the NBDC. This identified records of invasive, rare, scarce and protected species within 2km of the Proposed Development location.

1.27. The Application Site is located within the 1km grid squares O03F and O03K. A database search was also carried out for adjacent grid squares to ensure a full assessment of the 2km radius.

1.28. Additional information on the suitability of habitat in the surrounding area for bats was also obtained from the NBDC in the form of a habitat suitability map. The map provided enhanced information on the recorded distribution of bats and broad-scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat species.

1.29. In addition, the extended habitat survey included a species scoping survey in order to assess the potential of the site to support protected species.

1.30. The Application Site and adjacent areas offer suitable habitat for badger, bat, bird and herptile species which are known to be present in the local area.

POTENTIAL IMPACTS

1.31. Potential impacts which could arise from a Development include:

- Potential habitat loss and fragmentation;
- Disturbance during construction and decommissioning; and
- Potential contamination of surface waters.

1.32. Each of these potential impacts have been considered below in relation to the Proposed Development.

Potential Habitat Loss and Fragmentation

1.33. The overall ground-level Proposed Development footprint take up 40,455m^2.

1.34. Currently the habitat present under the Proposed Development footprint is primarily improved agricultural grassland, considered to be of low ecological value. As the surrounding landscape is of a similar nature, the loss of these small areas will not be significant and the alteration of this habitat will not result in fragmentation.

1.35. Post-construction, with the implementation of this BMP, existing habitats are to be enhanced, with new habitats created. This document sets out how the habitats including hedgerows, trees and grasslands within the Application Site will be sensitively managed to ensure the maximum potential of these habitats are maintained throughout the lifetime of the development.

1.36. It is therefore demonstrated that the Proposed Development will have a positive significant impact on local habitats and will indeed deliver biodiversity enhancements to the benefit of the site and wider area.

Disturbance During Construction and Operation

1.37. The construction and decommissioning phases of the Proposed Development have the greatest potential to impact upon local wildlife.

1.38. Measures will be implemented prior to construction and decommission work taking place to minimise any potential disturbance to wildlife. Mitigation measures recommended within the Ecological Impact Assessment (**Appendix 11.1**) include:

- Pre-construction bird surveys, if works commence between March and August inclusive;
- Pre-construction badger survey;
- Pre-construction otter survey;

- Securely covering all excavations at the end of each working day to prevent accidental trapping of badger, otter or other small mammals.

1.39. With the creation of the wildflower meadow, along with the introduction of hibernacula, bat and bird boxes and the enhancement of existing hedgerows and sensitive management, the sites potential for supporting local wildlife could be greatly increased post-construction.

Potential Disturbance and Contamination of Surface Waters

1.40. The proposed development includes reorientation of the Baldonnel Stream which is considered to be of low ecological value. The diversion will be carried out in line with the Irish Fisheries Guidelines[7], with appropriate protection measures to the existing and diverted channel during construction works.

1.41. The construction phase of a development has the potential for contamination of surface waters, if appropriate measures are not implemented.

1.42. An Outline Construction and Environmental Management Plan has been produced by Pinnacle Consulting Engineers for the diversion of the existing Baldonnel Stream. During the work stream protection and measured outlined will be adhered to.

1.43. Species diversity within the stream has been characterised using kick sampling and has been identified to be low and dominated by freshwater shrimp and stone clingers (see **Appendix B** of **Appendix 11.1:** Ecological Impact Assessment). Given the low species diversity of invertebrates within the stream, and its small size, the stream would be classified as being of local importance higher value (as this is not a common habitat within the local area).

1.44. It is proposed that selected areas of stream realignment would have shallower banks to provide additional surface roughness, pools, and riffles to provide enhanced microhabitats.

1.45. It is therefore demonstrated that the Proposed Development will have a positive significant impact on local habitats and will indeed deliver biodiversity enhancements to the benefit of the site and wider area.

[7] https://www.fisheriesireland.ie/joomlatools-files/docman-images/constrctionguidelines.jpg

MANAGEMENT & RECOMMENDATIONS

1.46. The following management recommendations have been made:

- to maintain and improve the biodiversity of species within the site;
- to enhance the quality of habitats present;
- increase the sites potential for supporting wildlife; and
- to avoid any potential negative impacts arising from the Proposed Development of the site.

1.47. It is proposed that the implementation of biodiversity and landscaping enhancements, including the reorientation of the Baldonnel Stream, will be undertaken early within the construction programme. This will enable habitats to establish before the operational phase of the development.

Recommended Management

1.48. Currently the agricultural land of which the majority of the Application Site comprises offer limited benefit to wildlife. The potential of the site to support wildlife will be significantly increased by the habitat creation measures set out below.

Stream Realignment

1.49. The stream realignment will provide microhabitats and providing more habitats for a wider range of species. The general flow, and stream profile proposed in general will be similar to the current habitat, but will benefit from the flood basin, and microhabitats within the stream and selected areas would have shallower banks to provide additional surface roughness, pools, and riffles to provide enhanced microhabitats. The habitats created will not only benefit the aquatic species, through the creation of microhabitats, but the additional planting will create species rich foraging grounds for a variety of species.

1.50. The incorporation of wetland specific planting would be designed to attract a wider range of species and create a diverse habitat which benefits invertebrates, bats, amphibians, and birds. This will also contribute towards the All-Ireland Pollinator Plan, by creating habitats that will support important pollinator species such as bees and flies.

Habitat Enhancement

1.51. Various options exist to enhance the biodiversity value of a site, including the creation of different habitats, such as: hedgerows, woodland and wildflower meadows.

1.52. Habitats that will be created at the development site will include:

- Pools and riffles within the Baldonnel Stream;
- Wetland wildflower meadow;
- Standard wildflower meadow;
- Hibernaculum;
- Bird and bat boxes;
- Bee and beetle banks.

1.53. These habitats individually offer shelter and a food source for supporting a variety of wildlife. The mosaic of these new habitats combined with the existing hedgerows, will support the existing wildlife within the site. They also have excellent potential to allow the biodiversity of the site to increase, by offering a wider range of habitats that benefit local wildlife.

General Considerations

Obligations

1.54. During each of the Proposed Development phases there are a number of legal obligations that should be considered by all those involved in site work:

- Ensure obligations of the European Communities (Birds and Natural Habitats) Regulations 2011 are met by all involved with the site.
- Ensure obligations of the Wildlife Act 1976 and Wildlife (Amendment) Act 2000 are met by all involved with the site.
- Ensure all relevant Health & Safety at Work Act obligations.

Good Ecological Practice

1.55. Whilst management practices should only be altered if there is a good ecological reason for doing so, they should not be rigidly adhered to if they are obviously detrimental.

Invasive Non-Native Species

1.56. During the extended habitat survey no field signs or evidence of invasive non-native species were observed.

MANAGEMENT OBJECTIVES AND ACTION PLAN

Table 1-1: Recommended Management

Objective	Action Plan Task	Timescale	Notes
Realignment of the Baldonnel Stream	All works will be confined to within the protection barriers situated 5m from the northern bank of the existing stream. Once the new channel, earthworks and landscaping has been undertaken the stream will be carefully diverted into the realigned stream at either of the new stream channel. Selected areas of the stream will have shallower banks to provide additional surface roughness, pools, and riffles to provide enhanced microhabitats. A mix of riparian species will be planted along the banks of the new stream, containing: Fool's watercress (*Apium nodiflorum*), Marsh-marigold (*Caltha paulaustris*), Yellow iris (*Iris pseudacorus*), Myosotis scorioides Water forget-me-not (*Myosotis scorioides*), Watermilfoil *(Myriophyllum spicatum*), Sparganium spp. Bur-reed (*Sparganium spp.*), Snow rush (*Luzula nivea*) Soft shield fern (*Polystichum setiferum*), Common fern (*Dryopteris filix-mas*).	Year 1 (early within the construction phase)	Riparian vegetation will provide food and shelter for aquatic species. Water features provide a diverse range of habitats, favoured by wading birds, amphibians and dragonflies, and provide an important source of food for bats and reptiles. The ecological value of the stream will increase.
Creating a diversity of	Wetland wildflower mix to contain:	Year 1 (early within the	Wildflower mix will also provide habitat for small mammals and larvae of

habitats within the site	Ragged robin (*Lychnis flos-cuculi*), cuckoo flower (*Cardamine pratensis*), meadowsweet (*Filipendula ulmaria*), selfheal (*Prunella vulgaris*), sainfoin (*Onobrychis viciifolia*), ox-eye daisy (*Leucanthemum vulgare*), black medic (*Medicago lupulina*), common vetch (*Vicia sativa*), lady's bedstraw (*Galium verum*), meadow vetchling (*Lathyrus pratensis*), meadow buttercup (*Ranunculus acris*), musk mallow (*Malva moschata*), yellow rattle (*Rhinanthus minor*) and yarrow (*achillea milliefolium*).	construction phase)	pollinating insects, including butterflies and moths.
To enhance the quality of habitats present	<u>Enhance existing hedgerow boundary</u> Gap existing hedgerows with blackthorn (*Prunus spinosa)*, hawthorn (*Crataegus monogyna)*, ash (*Fraxinus excelsior)*, alder (*Alnus glutinosa)*, hazel (*Corylus avellana)* and holly (*Ilex aquifolium)*. These corridors will allow the movement of small mammals and herptile species. To ensure a diverse hedgerow with a good structure it is important to plant and maintain ground flora along the hedgerow.	Year 1 (early within the construction phase)	A hedgerow provides shelter and a source of food for a variety of species including birds, small mammals, amphibians, reptiles and butterflies. If the correct species are planted and maintained correctly, a hedgerow's potential can be maximised, providing food and shelter throughout the year.
Ensure fencing does not inhibit the movement of wildlife	To allow movement of badgers, small mammals and herptiles across the Proposed Development area the fence will be above ground level, with at	Year 1 (during construction phase)	Although badgers will not pass through a 10cm gap, they will dig a depression into the ground at the required areas.

	least a 10cm gap at the base, allowing access for these species where required.		
Creating a diversity of habitats within the site	Creation of hibernaculum, stone piles and log piles	Year 1	See appendix A The hibernaculum comprise log, rock and stone piles, which are aimed at providing shelter for herptile species to hibernate. However, the hibernaculum and log pile may also be used by a variety of insects and small mammals.
Creating a diversity of habitats within the site	Creation of bat roosting habitat Bat boxes will be placed on a few of the mature trees within the site.	Year 1	The creation of roosting habitat, along with the creation of species-rich habitat that will encourage an abundance of invertebrate life (a potential food source) will be beneficial to local bats.
Creating a diversity of habitats within the site	Creation of bird nesting habitat Bird boxes will be placed on a few of the mature trees within the site.	Year 1	The creation of nesting habitat, along with the creation of species rich habitat that will encourage an abundance of invertebrate life (a potential food source) and the wild bird seed mix areas will be beneficial to local birds. Boxes installed should include a mixture of single hole, and open fronted bird boxes.
Creating a diversity of habitats within the site	Creation of invertebrate banks and insect hotels	Year 1	See Appendix B Some banks should be left bare, and south facing for insects such as solitary

	Several earth banks shall be created across the site to support invertebrates.		bees, while others should be sown with grass for beetles etc.
Maintaining the hedgerows	Section of hedgerow to be cut	Each year between January and February	Cutting on a rotational basis, following standard advice[8], to ensure the optimal availability of berry and blossom for wildlife throughout the year, as a potential food source. Management will also ensure a good base is maintained within the hedgerow, to provide suitable habitat for a range of wildlife.

STREAM REALIGNMENT

1.57. The stream realignment will provide microhabitats and providing more habitats for a wider range of species. The general flow, and stream profile proposed in general will be similar to the current habitat, but will benefit from the flood basin, and microhabitats within the stream and selected areas would have shallower banks to provide additional surface roughness, pools, and riffles to provide enhanced microhabitats.

1.58. Riffles form where shallow water with high velocity flows over gravel or cobble material, creating a broken water surface. Riffles are home to clinging aquatic insects such as caddisflies, and are favoured by fish as a feeding area, for shelter from predators because of the broken water surface.

1.59. Pools are areas of much deeper water and lower current velocities. They provide species with protection and food, owing to the organic matter that accumulates on the river bed.

1.60. The habitats created will not only benefit the aquatic species, through the creation of microhabitats, but the additional planting will create species rich foraging grounds for a variety of species, such as otter, bats and birds.

[8] Hedgelink UK, The Complete Hedge Good Management Guide, Available at www.hedgelink.org.uk

1.61. Following the diversion works it is anticipated that the ecological value of the stream will increase following development.

1.62. An assessment of benthic macroinvertebrates was completed on the stream within the site, the results of which are detailed in **Appendix B** of **Appendix 11.1: Ecological Impact Assessment**. No notable species were identified during this stream assessment, the dominate species were Freshwater shrimp (*Gammerus sp.*) and Stone clingers (*Baetidae sp.*), biodiversity was considered to be **low.**

1.63. Currently the stream is considered to be of **low ecological value.** It is considered that the stream realignment works will provide enhanced habitats for benthic macroinvertebrates, and the value of the stream will increase to at least **moderate ecological value**.

Management

1.64. All works would be confined to within the protection barriers situated 5 m from the northern bank of the existing stream. Works would progress from east to west and excavations and earthworks for the new channel and landscaping embankment and proposals north of the existing stream would be undertaken in line with an appropriate method statement and would be carried out in line with the Irish Fisheries Guidelines[7].

1.65. Once the new channel and landscaping improvements discussed elsewhere in this BMP have been undertaken the stream would be carefully diverted into the realigned stream.

HABITAT CREATION

1.66. The existing groundcover (currently primarily improved agricultural grassland) will be replaced by a mix of wet grassland, wildflower meads and native woodland. Existing hedgerows will be enhanced, with a new hedgerow created within the Proposed Development boundary. Native coniferous trees and medium or large deciduous trees have been proposed to give visual screening.

1.67. These habitats will be in place and managed for the duration of the Proposed Development.

Riparian Planting

1.68. A riparian planting mix (**Table 1-2**) has been proposed to be planted along the banks of the stream.

1.69. They are an important source of food and shelter for aquatic species and support many terrestrial organisms, including bats and a wide range of bird species.

Table 1-2: Native Riparian Planting Mix

SCIENTIFIC NAME	ENGLISH NAME
Apium nodiflorum	Fool's watercress
Caltha paulaustris	Marsh-marigold
Iris pseudacorus	Yellow iris
Myosotis scorioides	Water forget-me-not
Myriophyllum spicatum	Watermilfoil
Sparganium spp.	Bur-reed
Luzula nivea	Snow rush
Polystichum setiferum	Soft shield fern
Dryopteris filix-mas	Common fern

Management

1.70. Within the first year the main aim is to control weeds and to reduce competition from grasses. Where appropriate, this may include hand pulling of weeds.

1.71. After the wildflower mix has established, no specific management is required for the riparian strip

Wetland Wildflower Meadow

1.72. A wetland wildflower meadow has been proposed to be planted adjacent to the Baldonnel stream. These species will attract a wider range of species and create a diverse habitat which benefits invertebrates, bats, amphibians, and birds.

1.73. The species mixture is set out in **Table 1-2** below.

Table 2-2: Wetland wildflower meadow mix

SCIENTIFIC NAME	ENGLISH NAME
Succisa pratensis	Devils Bit Scabious
Rumex acetosa	Common Sorrel
Cardamine pratensis	Cuckoo Flower
Primula veris	Cowslip
Erigeron	Fleabane*
Lotus pedunculatus	Greater Trefoil*
Eupatorium cannabinum	Hemp Agrimony

SCIENTIFIC NAME	ENGLISH NAME
Centaurea nigra	Lesser Knapweed
Comarum palustre	Marsh Cinquefoil
Caltha palustris	Marsh Marigold
Ranunculus acris	Meadow Buttercup
Filipendula ulmaria	Meadowsweet
Thalictrum	Meadow Rue
Leucanthemum vulgare	Oxeye Daisy
Lythrum salicaria	Purple Loosestrife
Lychnis flos-cuculi	Ragged Robin
Trifolium pratense	Red Clover

Wildflower Meadow

1.74. The wildflower meadow, as shown within the landscape masterplan (by KFLA Architects) accompanying the application, is a species-rich grassland comprised of 85% grass species and 15% perennial species. This will create an insect-rich habitat and support a range of birds, mammals and invertebrates.

1.75. The species mixture is set out in **Table 1-3** below.

Table 1-3: Wildflower meadow mix

SCIENTIFIC NAME	ENGLISH NAME
Agrostis capillaris	Browntop Bent
Cynosurus cristatus	Crested Dogstail
Festuca ovina	Sheeps Fescue
Festuca rubra subsp. commutata	Chewings Fescue
Festuca rubra	Slender Creeping Red Fescue
Trisetum flavescens	Yellow Oat Grass
Anthoxanthum odoratum	Sweet Vernal Grass
Lotus Corniculatus	Birdsfoot Trefoil
Hypochaeris Radicata	Common Cat's Ear
Primula Veris	Cowslip
Knautia Arvensis	Field Scabious
Galium Verum	Lady's Bedstraw
Centaurea Nigra	Lesser knapweed
Ranunculus Acris	Meadow Buttercup
Lathyrus pratensis	Meadow Vetchling
Malva Moschata	Musk Mallow
Leucanthemum Vulgare	Ox Eye Daisy
Lychnis Flos Cuculi	Ragged Robin
Silene Dioica	Red Campion

Planatago Lanceolata	Ribwort Plantain
Leontodon hispidus	Rough Hawkbit
Sanguisorba Minor	Salad Burnet
Prunella Vulgaris	Self Heal
Scabiosa columbaria	Small Scabious
Rumex Acetosa	Common Sorrel
Silene Alba	White Campion
Daucus carota	Wild Carrot
Torilis Japonica	Upright Hedge Parsley
Achillea millefolium	Yarrow
Rhinanathus Minor	Yellow Rattle
Salvia Verbenaca	Wild Clary

Management

1.76. The wildflower mix will be sown in September or March/April, after the completion of the construction phase.

1.77. Within the first year the main aim is to control weeds and to reduce competition from grasses. The sward will be kept short in the first year until the end of June to reduce competition and then allowed to grow in July and August to permit any wildflowers to seed. All cuttings should be removed from site several days after cutting to avoid smothering the sward, but allowing any seeds to disperse.

1.78. After the wildflower mix has established, this area should only require one cutting in late summer (August – September), allowing flowering species to seed with an additional cut in October. Cuttings should be left on site for several days to disperse any seeds, then removed from site.

Hedgerow

1.79. Existing hedgerow boundaries will be enhanced in line with the arborist report.

1.80. Enhancing native hedgerows will benefit a range of local species including BAP Priority Species such as badgers, herptiles, invertebrates and birds. If the correct species are planted and maintained correctly, a hedgerow's potential can be maximised, providing food and shelter throughout the year, as well as connecting corridors.

Table 1-4: Hedgerow Species Mix

SCIENTIFIC NAME	ENGLISH NAME
Corylus avellana	Hazel
Crategus monogyna	Hawthorn
Euonymus Europaeus	Spindle
Ilex aquifolium	Holly
Lonicera periclymenum	Honeysuckle

SCIENTIFIC NAME	ENGLISH NAME
Prunus spinosa	Blackthorn
Rosa canina	Dog Rose
Viburnum opulus	Guelder Rose

1.81. It is also important to plant and maintain ground flora along the hedgerow to provide suitable commuting corridors for small mammals and herptiles.

Management

1.82. New hedgerows will be planted within the first available planting season (November – March).

1.83. Any pruning or cutting should be done outside of the breeding bird season (March to August inclusive) to minimise disturbance to nesting birds.

Tree planting

1.84. Triple staggered rows of native trees have been proposed to screen the Proposed Development from the surrounding area. A woodland planting mix (**Table 1-5**) has been proposed to enhance habitats around the perimeter and throughout the site.

1.85. Planting trees will provide potential new habitat for roosting bats and birds, providing food and shelter for other BAP Priority Species.

1.86. Native woodland planting is proposed around the perimeter and throughout the site to create a biodiverse native habitat as shown within the landscape masterplan (by KFLA Architects).

Table 1-5: Woodland planting mix

SCIENTIFIC NAME	ENGLISH NAME
Alnus glutinosa	Alder
Betula pendula	Silver birch
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Ilex aquifolium	Holly
Larix decidua	Larch
Pinus sylvestris	Scots pine
Prunus avium	Wild cherry

Wildlife Shelters

1.87. The creation of wildlife shelters strategically placed throughout the Application Site, will provide shelter to a wide range of species.

Bat boxes

1.88. Providing bat boxes will increase opportunities for roosting bats within the local area. Bat boxes should be erected in suitable locations throughout the site. It can however take bats a long time to make use of artificial roosts, therefore a number of factors must be considered when installing a new bat box.

1.89. Microclimate within a new roost is a very important factor in terms of increasing the chance of successful uptake by bats. In line with Bat Conservation Trust guidelines9 bat boxes should be draught-proof and made from a thermally stable material. They should be located where they will receive full/partial sunlight (southerly orientation). The boxes should also be positioned a minimum of 2m above the ground. Access points should also be clear of any obstructions.

1.90. To allow a choice of roosting, bat boxes should be installed in more than one aspect. Bat boxes located on a shady side will be cooler and may be suitable as a hibernation roost or used by male bats throughout the entire year.

1.91. There is a wide range of bat boxes currently available, some which are more suitable for certain species. A variety of bat boxes are recommended in **Table 1-7**. It is recommended that three of each box detailed below be installed on site.

Table 1-7: Details of Bat Boxes

BAT BOX	DETAILS	IMAGE
Schwegler 1FF[10]	Can be used as a summer roost or nursery site. Is open at the bottom and does not require cleaning.	

[9] Bat Conservation Trust – Bat Box Information Pack – Available at: http://www.bats.org.uk/data/files/publications/Bat_Box_Information_Pack_FINAL.pdf

[10] Full specification available at: http://www.nhbs.com/title/158636/1ff-schwegler-bat-box-with-built-in-wooden-rear-panel

Schwegler 2F[11]	Standard box and most popular. Simple entrance role. Used as summer roosting space.	
Schwegler 1FD[12]	Specific for smaller bats such as common pipistrelle, nathusius pipistrlle, daubenton's bat and brown long-eared.	

Bird boxes

1.92. In order to enhance the site for nesting birds, a number of bird boxes shall be placed throughout the site. Several types of nest boxes will be installed at suitable locations to favour a variety of bird species.

1.93. Open-fronted boxes will provide enhanced nesting opportunities for species such as robins, pied wagtails and spotted flycatchers. Boxes with entrance holes are suitable for tits, wren and tree sparrows.

1.94. Bird boxes should be mounted so that they face between the south-east and north to avoid direct sunlight. They should be tilted forwards so that rain is directed away from the entrance.

1.95. A variety of bird boxes are recommended in the table below.

[11] Full specification available at: http://www.nhbs.com/title/158629

[12] Full specification available at: http://www.nhbs.com/title/177076/1fd-schwegler-bat-box

Table 1-8: Details of Bird Boxes

BIRD BOX	DETAILS	IMAGE
1B Schwegler Nest Box[13]	This nest box will attract a wide range of species and is available with different entrance hole sizes to prevent birds from competing with each other for the boxes. The 32mm entrance hole will attract Great, Blue, Marsh, Coal and Crested Tit, Redstart, Nuthatch, Collared and Pied Flycatcher, Wryneck, Tree and House Sparrow and bats. The 26mm entrance hole suits Blue, Marsh, Coal and Crested Tit and possibly Wren. All other species are prevented from using the nest box due to the smaller entrance hole.	
2H Schwegler Robin Box[14]	This traditional design has proved to be highly effective in attracting robins, as well as other small species such as black redstart, spotted flycatcher and wren.	

1.96. It is recommended that 1B Schwegler nest boxes (three 32mm and three 26mm holes) and 2H Schwegler robin boxes are installed.

Hibernacula

1.97. The hibernacula comprise of log, rock and stone piles and is aimed at providing shelter for reptile and amphibians to hibernate. It may also be used by a variety of insects and small mammals. The hibernacula will follow the instructions laid out within Appendix B below.

Management

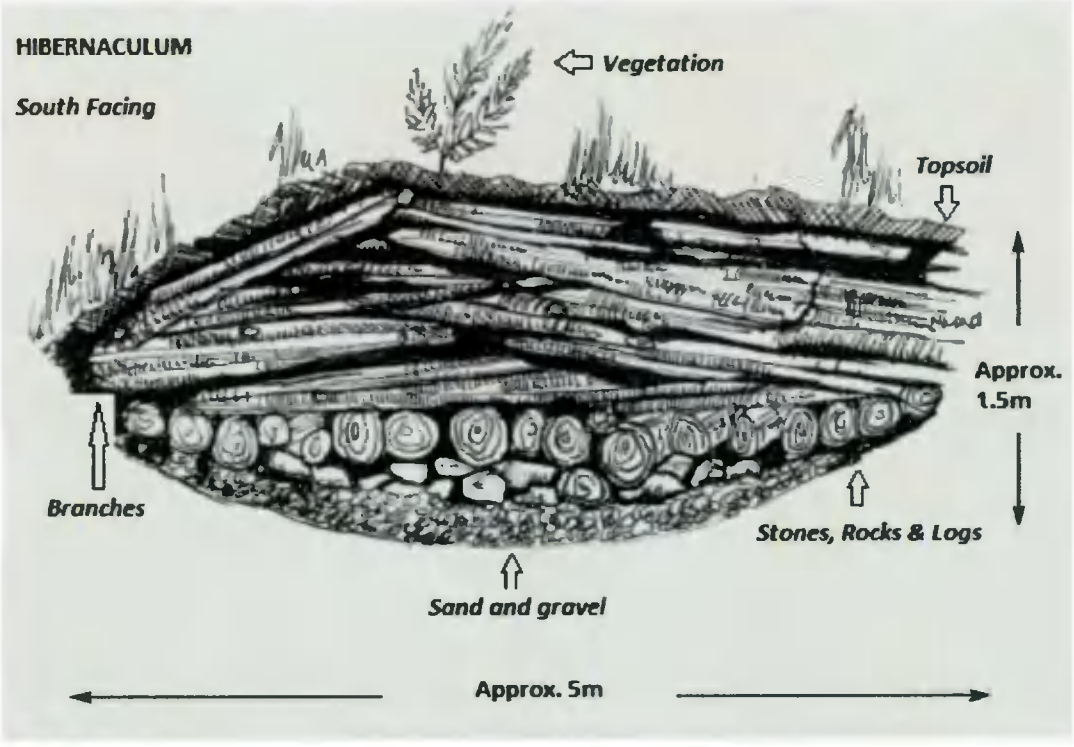
1.98. Final location and number of bird nest boxes and bat boxes to be determined on site by an ecologist.

[13] Full specification available at: http://www.nhbs.com/title/158587/1b-schwegler-nest-box
[14] Full specification available at: http://www.nhbs.com/title/161277/2h-schwegler-robin-box

APPENDICES

Appendix A - Hibernaculum Construction

1.99. The hibernaculum will follow the basic construction set out below, with the log and stone piles situated to the north of the hibernaculum.



- A 5m long east-west running ditch 1m deep and 1m wide will be dug.
- The base will be lined with sand and gravel.
- This will be followed with layers of stones, rocks and logs.
- Smaller branches will then be placed on top, and covered soil from the excavation will be placed over the pile, leaving gaps for access.
- The soil will be shaped into a mound.
- North facing side of the mound will be seeded / planted with species that will attract insects and will also provide extra shelter.
- South facing side will be maintained with a sparse vegetation cover to provide an area to bask.
- A log pile of approximately 2m by 1m will be placed to the north of the hibernaculum.

Appendix B – Invertebrate Bank Creation

Beetle Bank

- September is the best month to establish the grass sward that forms a beetle bank.
- Create a raised bank of about 0.4 metres.
- The grass mix should include up to 60% of tussock-forming species such as cocksfoot or Scots timothy grass. For the rest of the mix choose native species and include fescues.
- Up to three cuts may be needed in the first summer (when the sward reaches 10 cm in height) to encourage the grasses to tiller and to help control invasive annual weeds.
- Once established, the grass strips should be cut typically no more than once every three years.

Bee Bank

- Material (such as aggregate and sand) will be shaped into a mound with various slopes, hollows and angles that may be utilised and favoured by different species.
- Vertical banks created on bee banks take much longer to vegetate and this makes them attractive to many species. Over time a bee bank will be vegetated over through succession.
- Planting vegetation in an open structure in front of a bee bank will provide extra habitat 0for invertebrates that are attracted to the bee bank.
- These banks should be created close to flower-rich areas which will provide important foraging areas for pollinators.