

APPENDIX 6.3 - BIODIVERSITY MANAGEMENT PLAN

1 INTRODUCTION

1.1 BACKGROUND

JBA Consulting Engineers and Scientists Ltd (hereafter JBA) were appointed by South Dublin County Council to prepare a Biodiversity Management Plan (BMP) in relation to the biodiversity management and enhancement of the Kishoge development sites, hereafter referred to as the proposed project.

The BMP will be updated by South Dublin County Council (SDCC - the Employer for the construction works) prior to the commencement of the operational stage, so as to ensure that any additional measures required pursuant to conditions attached to any decision to grant approval are included in the plan.

The BMP comprises of the operational enhancements measures, which are set out in the Biodiversity Chapter (6) and will be updated to include any additional measures required pursuant to conditions attached to An Bord Pleanála's decisions.

All of the measures set out in this BMP will be implemented in full by the appointed contractor(s) and its finalisation will not affect the robustness and adequacy of the information presented and relied upon in the Biodiversity Chapter.

1.2 LEGISLATIVE CONTEXT

'Biodiversity: The National Biodiversity Action Plan 2023-2030 (DHLGH, 2024) sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland's 'Vision for Biodiversity' and has been developed in response to The Earth Summit, held in Rio de Janeiro in 1992 (UN Convention on Biological Diversity) and subsequent EU and International Biodiversity strategies and policies.

As part of the Action Plan process Local Authorities (LA) must produce Biodiversity Action Plans (BAP). BAPs highlight local biodiversity issues and set out a series of objectives and action plans for the conservation of priority species and habitats where they occur in each district or county.

2 METHODOLOGY

The ecological evaluation of the three development sites has been undertaken in line with current best practice guidance. The assessment comprises four main steps:

- A desk-based assessment was used to identify any records of protected and/or notable habitats and species, and designated nature conservation sites in the vicinity of the sites. This desk-based study combined data from various sources to help inform the baseline data for the biodiversity evaluation of the sites and their surrounds. It helped to determine the scope and detail of the sites' required surveys. It collated and presented the data to allow an overall picture of the sites with the most relevant information on the sites.
- General ecological walkover survey was conducted in tandem with a Fossitt habitat survey (Level 3) and an assessment of the possible presence of protected or priority species, and (where relevant) an assessment of the likely importance of habitat features present for such species.
- Dedicated flora and fauna specific surveys – Rare and Protected Flora; Mammal; Preliminary Bat Roost Potential and Activity; Breeding Bird; Wintering Bird; Amphibian; Terrestrial Invertebrate; and Aquatic Invertebrate surveys were conducted between August 2022 and February 2025. Invasive non-native species were also surveyed for during this time period.
- Recommendations for habitats and species of value and suggested management approaches, where deemed relevant.

2.1 RELEVANT BEST PRACTICE & GUIDANCE

This evaluation of the significance of habitats and species was conducted in using guidance from the following guidance documents:

- Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, (CIEEM 2024);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009); and
- Best Practice Guidance for habitat Survey and Mapping. The Heritage Council. (Smith et al. 2011).

2.2 BASELINE ASSESSMENT

A desk-based assessment was conducted to collate all the required information to inform for the biodiversity action plan.

A data search for protected and notable species was conducted using the National Biodiversity Data Centre (NBDC) Mapping System (NBDC, 2025) and the Botanical Society of Britain and Ireland (BSBI) Distribution Database (BSBI, 2025). A study area encompassing a 2km radius from the three sites was used, including species of conservation concern. This provides information on species that may visit the three development sites occasionally, and that may not have been observed during the sites' surveys.

Designated sites within 1km. Information for statutory designated sites including Special Areas of Conservation (SACs) Special Protection Areas (SPAs), Proposed and fully designated Natural Heritage Areas (pNHAs / NHAs) was collected from the online resources provided by the National Parks and Wildlife Service (NPWS). This includes site synopsis and conservation objectives of the relevant sites and Natura 2000 forms.

Other information on the local area was obtained, including:

- Environmental Protection Agency online databases on water quality (Available online at <https://gis.epa.ie/EPAMaps/>); and
- Water Framework Directive water maps (available online at <http://www.wfdireland.ie/maps.html> and <https://www.catchments.ie/>).

Surveying, interpretation and evaluation of species habitats and species as guided by:

- Fossitt Habitat Classification System (Level 3) (Fossitt, 2000).
- Best practice guidance for habitat survey and mapping (Smith et al., 2011)
- The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland (NPWS, 2019a).
- The Status of EU Protected Habitats and Species in Ireland. Habitats Assessment Volume 2. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland (NPWS, 2019b).
- The Status of EU Protected Habitats and Species in Ireland. Species Assessment Volume 3. Habitats Assessment Volume 2. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland (NPWS, 2019c).
- The Interpretation Manual of European Union Habitats (European Commission, 2013).

All Ireland Red Data lists for vascular flora, mammals, butterflies, non-marine molluscs, dragonflies & damselflies, amphibians and fish, including but not limited to:

- Wyse Jackson, M., FitzPatrick, Ú., Cole, E.Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland (Wyse Jackson et al., 2016);
- Regional Red List of Irish Bees (Fitzpatrick et al., 2006);
- All-Ireland Pollinator Plan 2021-2025 (All Ireland Pollinator Plan (2021); and
- International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species (available online at <http://www.iucnredlist.org>).

The following organisations, amongst others as necessary, with relevance to biodiversity have had their respective data:

- National Parks and Wildlife Service;
- Inland Fisheries Ireland;
- Bat Conservation Ireland;
- BirdWatch Ireland (BWI);
- Botanical Society of Britain & Ireland; and
- Environmental Impact Statements for any developments located in the locality.

Surveying methods utilised during surveys include techniques such as those described in:

- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009); and
- Bat Surveys for Professional Ecologists: Good Practise Guidelines (3rd edition) Bat Conservation Trust (Collins, 2024).

2.3 APPROACH TO SURVEYING AND REPORTING

The approach to survey and reporting is in 3 stages.

Stage 1: Desktop Study - Outlined in Section 3. The following steps were identified as the key parameters and were achieved before progressing to field study:

- Undertook research into the online resources as outlined in Section 2.3

Stage 2: Field Survey - Outlined in Section 4. The following steps were identified as the key objectives and were completed to generate the content of the Final Report:

- The habitats, flora and fauna occurring within the study area were surveyed.

- A baseline GIS information on the presence, distribution and conservation status of ecological habitats and recorded species within the study area was produced.
- A digital habitat map for the study area to Fossitt Level 3 as per Smith et al (2011) was designed and delivered.
- Elements or particular areas with specific potential for biodiversity or conservation interest i.e., value at regional, national or international scales were highlighted.
- The potential presence and effectiveness of ecological corridors have been identified, and links between the study area to adjoining areas of potential biodiversity interest have been discussed.
- Ground truthing of the existing desktop data as well as the following:
 - Species lists per habitat type;
 - Detailed recordings of protected and/or flora and faunal species of conservation concern; and
 - Invasive non-native species (presence and distribution where relevant).

Stage 3: Generation of Final Report and Recommendations. The culmination of Stage 1 and 2, this is the final version of ground-truthing habitat maps and has provided recommendations on management of habitat preservation and management, which are presented in Section 5 of this report.

Site-specific recommendations were generated for the study area.

2.4 SITE SURVEYS

An initial ecological site walkover, including habitat mapping and species-specific surveys, was conducted on the 26/08/2022 by JBA Consulting Ecologists to inform the ecological baseline of the site. Additional habitat surveys were conducted JBA Ecologists on the 07/07/2023 and 23/05/2024 when floral growth (including invasive species) was well established within the site, given the occurrence of minor scrub fires in the summer of 2022.

Aerial photographs and site maps assisted the habitat survey. Habitats have been named and described following A Guide to Habitats in Ireland by Fossitt (2000). Identification for higher plants principally follows that given in Webb's An Irish Flora (Parnell and Curtis, 2012); while contemporary nomenclature is in line with The New Flora of the British Isles 4th Edition (Stace, 2019).

Additional species-specific surveys were also conducted on-site on the following dates as outlined in Table 2-1 below.

Table 2-1: Ecological surveys and survey dates

Ecological Survey	Survey Date(s)
Habitats (Fossitt)	26/08/2022; 07/07/2023; and 23/05/2024
Non-volant Mammals	27/01/2023; and 08/02/2023
Protected Flora Survey	23/05/2024; and 18/07/2024
Amphibian Surveys	22/02/2023; and 22/03/2023
Freshwater Invertebrate Kick-sampling Survey	22/05/2023
Preliminary Bat Roost Assessment	26/08/2022 and 22/02/2023
Bat Transect Activity Surveys	10/05/2023; 22/06/2023; and 16/08/2023
Wintering Bird Surveys	27/01/2023; 09/02/2023; 22/02/2023; 10/12/2024; 06/02/2025; and 25/02/2025
Breeding Bird Surveys	25/04/2023; 16/05/2023; and 22/06/2023
Terrestrial Invertebrate Survey	26/08/2022; and 18/07/2024

These site surveys, their detailed methodology, and the resulting ecological data are expanded upon in Section 6.3 and 6.5 of the main body of the EIAR.

3 RECOMMENDATIONS

From the sub-section 6.5 (which provides the full ecological baseline), it has been outlined that the area around Kishoge supports a variety of habitats and species, with potential for these to be enhanced. This appendix focuses on the listed biodiversity management measures that can be implemented throughout all three sites:

- Remedial Planting (New and Retained Habitats);
- Tree Management (Ivy and Deadwood);
- Lighting Design and Specifications (Nocturnal Fauna); and
- Ecologically Sensitive Vegetation Management.

As well as further site-specific biodiversity management enhancements within the three residential developments at Kishoge for biodiversity:

- Habitat Connectivity (Safeguarding and Management of Ecological Corridors)
- Installation of Remedial Features for Fauna;
 - Non-volant Mammals;
 - Bats;
 - Breeding Birds;
 - Wintering Birds;
 - Amphibians;
 - Terrestrial Invertebrates;
- “Noxious Weeds” and Nettle;
- Rodent Management;
- Public Engagement; and
- Future Monitoring.

3.1 ALL SITES – GENERAL BIODIVERSITY MANAGEMENT MEASURES

3.1.1 Remedial Planting (New and Retained Habitats)

Listed below are the remedial actions to be carried out for selected habitats, as part of the landscape design for the three proposed development sites.

3.1.1.1 Meadows

Amenity Grassland

Areas within the landscape plan are set aside to be flowering lawns, this is referred to as ‘Meadow Grass’ within the planting schedule. Species in this area include grasses for a lawn and Meadow Buttercup *Ranunculus acris*, White Clover *Trifolium repens*, and Red Clover *Trifolium pratense*. This will be maintained in a short flowering meadow methodology to keep the area visually like a lawn but will have some flowering aspect to provide pollen for invertebrates. Short flowering meadows are formed when the mowing of the grassland is limited to every 4-6 weeks. After the mowing of the grass the cuttings are to be lifted away from the site to reduce the nutrients available in the soil which promotes more wildflower species than grass species.

This management will be staggered throughout the site to ensure that some areas of meadow are always in flower throughout the summer. This will provide a constant source of pollen for terrestrial invertebrates during the summer when they will be most actively foraging. Furthermore, this will specifically benefit the local red-listed Gypsy Cuckoo-bee *Bombus bohemicus*, as well as its local host species, White-tailed Bumblebee *Bombus lucorum*. Additionally, this management practice will increase the abundance of invertebrate species which will also provide more foraging potential for local bat and bird populations.

Dry meadows and grassy verges (Grassy Habitat)

Areas of grassland verges that are incorporated into the landscape plans, referred to as 'Grass Habitat' in the landscape plan, have the potential to support a variety of floral species which are beneficial to local invertebrate species. This will create foraging potential for local bird populations, as well as refuge habitat along with material for nest building.

The species to be planted within the landscape plan include Cow Parsley *Anthriscus sylvestris*, Crocus *Crocus sativus* and Grape Hyacinth *Muscari armeniacum*. The project ecology team recommends the sowing of False Oat-grass *Arrhenatherum elatius*; Meadow Foxtail *Alopecurus pratensis* and Smooth Meadow-grass *Poa pratensis* for the grass component. For the herbaceous aspect of the planting, the project ecology team recommends the sowing of Nettle *Urtica dioica*; Common Knapweed *Centaurea nigra*; Field Scabious *Knautia arvensis*; Bush Vetch *Vicia sepium*; Meadow Vetchling *Lathyrus pratensis*; and Yellow Rattle *Rhinanthus minor*. The Yellow Rattle will play a salient role in maintaining the balance between herbaceous wildflowers and the meadow grasses, as this species will parasitise the grass species present; and prevent the wildflowers from being overgrown by the grasses within areas not under regular maintenance, i.e. areas under a yearly mowing regime.

Ideally maintenance of this habitat will be carried out twice a year, mowing this grassland area in the autumn (September) and end of winter (February), lifting the cuttings from the area to reduce the nutrients that are in the soil over a prolonged time and promote a greater wildflower composition within the grassland.

3.1.1.2 Hedgerows and Treelines

The planting of new linear (screening) native hedging and trees within the three sites, along with soils from the cleared hedgerow areas (to preserve existing seedbank / local flora genetics), will help remedy the loss experience by the hedgerow and treeline habitat during the construction stage. When these new hedges and tress have matured, they will mirror the ecological diversity and ecosystem services (e.g. refuge; nesting opportunities for birds; and wildlife commuting corridors) of the existing hedgerow and treeline sections to be removed.

3.1.1.3 Scrub

The proposed landscape plans for the three development sites include the creation of new shrub areas (of varying height) scattered throughout the sites, which will in part include maintenance-suitable scrub species. The landscaping will also prioritise the planting of shrub species that will provide multiple ecosystem services (e.g. refuge; nesting opportunities for birds; and wildlife commuting corridors) and be pollinator-friendly.

3.1.2 Tree Management (Ivy and Deadwood)

3.1.2.1 Ivy

Ivy serves an important ecosystem function in that it provides a rich and important food source for mammal and bird species during the later winter months, as berries ripen in late winter when other berries are not readily available. Additionally, the Ivy vines provide potential roosting features for local bat species. Ivy is also important for invertebrates including butterfly species (e.g. Holly Blue *Celastrina argiolus*), as a caterpillar foodplant. Furthermore, a number of breeding bird species (e.g., Goldcrest - Breeding: Amber list) will construct their nests amongst its vines and year-round green leaves. Moreover, as Ivy flowers late in the season, it is also an important nectar source for overwintering colonies, e.g. Honeybee *Apis mellifera*, and Bumblebee queens.

There is a common misconception that Ivy damages trees. Ivy has green leaves and creates its own food sources and has its own root system in the ground. Ivy is an opportunistic species, not a parasite. It is a climber that utilises trees and other structures to reach above the canopy to compete for sunlight. It's increased volume on unhealthy trees is likely more a function of the light and space afforded to it on an unhealthy tree, as opposed to being damaging or parasitic. Therefore, it is recommended that Ivy should be left on trees as it reduces management costs of the site during operation and provides foraging and nesting potential for birds as well as foraging for terrestrial invertebrates.

3.1.2.2 Deadwood Piling

The logs / large branches that were used to provide Otter *Lutra lutra* with a sheltered commuting corridor along the Kilmahuddrick Stream will be re-used for habitat enhancement (see Site 4 specific Protected Fauna Mitigations sub-section 6.8.6 with the EIA Biodiversity Chapter), as well as other native tree and shrub species felled during the construction stage. The logs and branches will be cut into shorter, more manageable

segments. These shorter deadwood segments are to be incorporated into the new and existing woodland areas as discrete deadwood piles. The placement of these deadwood piles will be overseen by the appointed ECoW. The addition of the deadwood piles will be beneficial for local amphibians, which may utilise them as a hibernation location; as well as for terrestrial invertebrates, such as detritivore species and wood-burrowing solitary bee species.

3.1.3 Lighting Design and Specifications (Nocturnal Fauna)

The below incorporated specifications within the lighting design described herein will ensure that operational lighting levels will not significantly affect the activities of nocturnal species, primarily the local bat species, though these design elements will also ensure no disruption to Otter, Badger *Meles meles*, Pine Marten *Martes martes*, Hedgehog *Erinaceus europaeus*, Common Frog *Rana temporaria* and Smooth Newt *Lissotriton vulgaris* activities; in the event they increase their frequency within the site or expand their respective ranges into the three proposed development sites.

3.1.3.1 Light Levels and type

Operational site lighting that meets the lowest light levels permitted under health and safety is preferable for bats in the vicinity. The specification and colour of light treatments, such as single bandwidth lights and no UV light are essential. LED luminaires are ideal and will be used where possible due to their sharp cut-off, lower intensity, and dimming capability. A warm white spectrum (2700-3000K) will be used in the lighting located along the adjacent to dark corridors within the proposed development sites, to reduce the blue light component.

3.1.3.2 Column Heights of Lamp Posts

In order to reduce the amount of light spillage where it is not needed, the height of lamp columns located adjacent to dark corridors will be restricted to a height of 6m to avert negative light spillage impacts from three proposed development sites.

3.1.3.3 Dark Corridor Connectivity

Placement of lamp posts was considered in cases where road infrastructure bisected dark corridors within and adjacent to the three proposed development sites. The ecological review of lamp post placements allowed for relocations, where necessary, in order to help minimising any bottlenecks of the future dark corridors. As this was of particular concern for local bat species, where notable bottlenecks did occur as result of road and pedestrian health and safety requirements, it was ensured that a dark "V" or elevated section was still present for local bats to commute through the dark corridor bottleneck.

3.1.4 Checks for Vulnerable Fauna Prior to Maintenance Works

Within the maintained green areas, checks for Hedgehogs prior to any maintenance grass or scrub trimming on-site during the Hedgehog hibernation period from November-February and their breeding period from June-September, when the young hoglets will be particularly vulnerable within their nests and not yet ready to venture into exposed areas with potential predator species.

3.2 SPECIFIC SITE 3 BIODIVERSITY MANAGEMENT

3.2.1 Habitat Connectivity (Safeguarding and Management of Ecological Corridors)

The eastern ecological corridor (mixed broadleaved / conifer woodland and dry meadow verge) will be fenced off from the public, both north and south of the access road, with a 1.5m height wooden fence, with chicken-wire mesh that will have occasional gaps in the mesh to allow passage for local fauna in and out of the eastern wildlife corridor.

The exclusion of public footfall will allow the woodland habitat to develop a more typical woodland ground flora composition unhindered; as well as minimising littering of this important wildlife corridor and disturbance to fauna, which find refuge within.

Following the removal of invasive flora, planting of new shrub / tree vegetation and erection of fencing, the eastern ecological corridor is to be unmaintained, bar overhanging vegetation, broken limbs and fallen trees along the western boundary of the wildlife corridor. This will further aid in the establishment of optimal woodland wildlife corridor, with a complex internal structure that provides ample refuge for local fauna.

3.2.2 Installation of Remedial Features for Fauna

3.2.2.1 Non-volant Mammals

Installation of passage holes /gaps at the base of the walls / solid fences / and mesh-based fencing to provide access for Hedgehog and Pygmy Shrew across Site 3, ensuring landscape connectivity for these smaller non-volant mammal species.

3.2.2.2 Non-volant Mammals - Hedgehog

Large-scale habitat loss and/or alteration of scrub and woodland habitat will reduce the availability of potential nesting and hibernation sites for the local Hedgehog population. Providing small log and leaf piles to increase nesting options for local Hedgehogs during the spring, summer and early autumn. These will be installed within the eastern corridor woodland (north and south sections) and the north-western woodland patch, which will not be open to the public, towards the site of Site 3. This will also create refugia for terrestrial invertebrates, which in turn will boost prey species abundance for local Hedgehogs. In addition to these measures, to mitigate the loss of hedgehog hibernation habitat, artificial / built Hedgehog hibernacula will be installed in the same locations listed above. These can be created from wooden planters or storage boxes. While the hibernacula will be primarily utilised by Hedgehog, they may potentially also be utilised by Pygmy Shrew.

The following guidance sets out a few ways to build a Hedgehog a place to sleep or hibernate:

<https://www.nhm.ac.uk/discover/how-to-make-a-hedgehog-house.html>

3.2.2.3 Bats

To offset some of the loss of commuting and foraging habitat that the proposed development will incur for local bat populations, it is recommended that a minimum of eight bat boxes are to be installed on the trees within eastern ecological corridor. The lighting of Site 3 along with the existing urban spaces make it difficult to incorporate bat features within the site, utilising the existing woodland which creates a natural darker corridor.

Within the Irish context, the Vincent's Wildlife Trust's reporting on Irish Bat Box schemes highlighted that 1FF Schwegler boxes are recommended for use by Pipistrelle spp., whereas Leisler's Bat displayed no preference for bat box type (McAney and Hanniffy, 2015), therefore the 1FF Schwegler boxes will be suitable to house all bat species which frequent Site 3.

Guidance on installing bat boxes can be found here: <https://www.bats.org.uk/our-work/buildingsplanning-and-development/bat-boxes/putting-up-your-box>.

Other simple bat boxes suitable for Pipistrelle's bats can be constructed by local community groups e.g., Men's Sheds. Note that some bat box designs (that are enclosed at the base) require annual cleaning out, which must be carried out by a Bat Specialist or NPWS Ranger.

Guidance on installing bat boxes is detailed in the following resource document: http://www.batcon.org/images/InstallingYourBatHouse_Building.pdf.

A summary on installing bat boxes can be summarised as:

- Suggested locations include areas with mature trees within the woodlands strips.
- All bat boxes should be mounted at least 3-4 metres above the ground.
- Mount on the south facing side of the tree where the box is exposed to the sun for part of the day.
- Do not install bat boxes on a tree that is near any lighting column, such as near the car park or the buildings on site.
- The placement must be free from ivy with no branches within a 1m radius around the location of the box.

These suggestions are generalised for the improvement of a site to become more bat friendly. As such, it is recommended that if there are intended to be bat enhancements on site, that a bat specialist provides more definitive advice on how and where to appropriately install and maintain bat boxes.

3.2.2.4 Breeding Birds

Site 3 supports nine species of breeding bird of conservation concern, two of which can be accommodated for through artificial means.

While the proposed trees to be planted as part of the landscape plan will provide some nesting potential for local bird populations; it is recommended that additional bird boxes are placed within the site to allow for additional nesting opportunities during the ecological lag period (while the newly planted trees mature).

Bird boxes will be hung with the face of the box orientated between north and south-east, and at a height of at least 2-3m from ground level to avoid potential predation. Based on the breeding bird species of conservation concern (which utilise artificial nests) recorded within Site 3, the bird box types (five each) to be installed within Site 3 are:

- For House Sparrow: a 32mm diameter oval opening for entry. Bird boxes can be hung from trees or nailed to the trunk at a height of 2-4 metres, and it is preferred that the bird boxes are faced in a way to avoid the brunt of prevailing direct wind or rain. House Sparrows will also utilise terraced nest boxes, facilitating two or three nest boxes in one installation; and
- For Starling: a 45mm entrance hole, with height 51cm, width 16cm and depth 18cm (may also be used by local Great Spotted Woodpecker).

3.2.2.5 Amphibians

Installation of passage holes /gaps at the base of the walls / solid fences / and mesh-based fencing to provide access for Common Frog across Site 3, ensuring continued landscape connectivity.

Wetland and drainage ditch / swale habitats are not to undergo maintenance (clearance of vegetation or dredging) during sensitive amphibian life stages for both Common Frog.; therefore, such maintenance will only be conducted between June and late September.

3.2.2.6 Terrestrial Invertebrates

The Site 3 development will lead to the direct loss of nesting habitat for local terrestrial invertebrate species, potentially displacing species from the locality. To help remedy this loss, insect refugia will be installed in shrub, hedgerow and woodland habitats within Site 3. These can include log and leaf piles, as well as stone piles and old bricks with holes in them.

3.2.3 “Noxious Weeds” and Nettle

Noxious Weeds” are species of plants that have been designated by a statutory body as damaging to agriculture, horticulture, habitats/ecosystems, humans or livestock. ‘Noxious weeds’ control in Ireland come under the Noxious Weeds Act, 1936; Number 38 of 1936, and various orders thereafter. Due to the large benefits afforded by the retention of these species, it is recommended that a low cover of these species are retained within the meadow areas. These species will then continue to provide valuable resources to faunal species, while also being easily monitored and removed if dominating the areas of meadows and dry grassy verges, or in encroaching into the areas of play. If they become overbearing and area most dominant, they can be reduced.

With the retention of unmown areas and the establishment of grassy areas with less management, this increases the opportunities for plants that are noted as "noxious weeds" such as thistles, docks, and ragwort, which provide important sources of food for local fauna. Native species such as these may not pose a threat when grown in a natural environment but only becomes a problem with changing landscape, e.g. clearance to cultivation. These species have an intrinsic biodiversity value that can become lost in overzealous management practices.

Thistles are important plants and are consistently well visited by pollinators. They are also the foodplant for the migratory Painted Lady butterfly *Vanessa cardui*, and nectar for Meadow Brown *Maniola jurtina* and Common Blue *Polyommatus icarus* butterflies as well as a larval foodplant for a range of moth species. Dock species are wind pollinated plants, and as such do not provide nectar to pollinators, however, they are an important source of seeds for seed-eating birds and mammals through the winter including Bullfinch *Pyrrhula pyrrhula*, Goldfinch *Carduelis carduelis*, and Hedgehog. Nettle also provides an important habitat, particularly for butterfly species. Nettles are used by the caterpillars of Red Admiral Butterfly *Vanessa atalanta*; Small Tortoiseshell *Aglais urticae*; Peacock *Aglais io*; and Comma *Polyommatus c-album* caterpillars.

3.2.4 Rodent Management

It was noticed during the site visits that Rat traps were present within the site. It is advised that Rat traps that make use of poisons are avoided within the site. A poison that is ingested by a Rat can then be passed through the food chain if that Rat is then predated by protected species, such as the local Stoat population.

It is then recommended that any poisonous rat traps are replaced with mechanical rat traps which are regularly checked and reset, that function either through the use of a piston or a spring. This would both continue the efforts to remove rats, while also not impacting the local food chain. The presence of the raptor platform as listed above may incentivise raptors to visit the site more frequently, their presence may reduce the presence of Rats in the site.

3.2.5 Public Engagement

There are some misconceptions in ecology that may be misinterpreted by members of the public. This includes:

- The retention of Ivy which is often thought of as damaging to trees;
- It may not be realised that Rabbits are an invasive species and measures that pose a risk to their presence within a site can be incorrectly interpreted as harmful to local ecology, rather than beneficial; and
- Retention of “unsightly” ecological features (deadwood, low mowing regimes, weedy species) can be seen as neglectful rather than a form of management for nature.

It would be beneficial to erect a noticeboard to highlight the biodiversity efforts taking place within the grounds of the housing development.

3.2.6 Future Monitoring

The above biodiversity recommendations will be monitored on an on-going basis, in order to understand which of them have been successful, if any additional efforts are required, and if these efforts could be spread further throughout the site, as well as to monitor and limit the spread of invasive non-native species.

3.2.6.1 Post-construction Monitoring of Flora and Fauna

Rare and Protected Flora

A qualified ecologist will conduct post-construction floral surveys over 24-month period, one year apart during the optimal growth period, for the Lesser Centaury and Pyramidal Orchids, and any other rare or protected flora, which may have established between the time of writing of this chapter and the post-construction period of the proposed development. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Non-volant Mammals

A suitably qualified ecologist will conduct four mammal surveys (one summer and one winter) over a 24-month period in order to monitor mammal activity and potential new rest sites, as well as the potential use of provided artificial refuges (Hedgehog hibernacula). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

A suitably qualified environmental scientist or ecologist will regularly (every three months for the first 24 months of operations) monitor the level of lighting disturbance within the dark corridors of Site 4. The periodic monitoring will allow for the variation of vegetation and canopy cover during the different seasons and how they affect the levels of light spillage into the dark corridors. This monitoring can identify potential gaps in the cover and then provide recommendations on how to resolve this unintended light spillage (e.g. additional landscaping or cowlings of specific lamp posts). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Bats

A 36-month post-construction monitoring period will be conducted by a suitably qualified bat ecology team on the local bat populations. The bat activity data collected during this monitoring period will be compared with that of the existing baseline, and the pre-construction surveys, in order to establish whether the general activity levels, flight patterns and specific habitat utilisation has been altered during these time periods. The ecology

team will also check the use of the installed artificial bat boxes by the local bats. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

A suitably qualified environmental scientist or ecologist will regularly (every three months for the first 24 months of operations) monitor the level of lighting disturbance within the dark corridors of Site 4. The periodic monitoring will allow for the variation of vegetation and canopy cover during the different seasons and how they affect the levels of light spillage into the dark corridors. This monitoring can identify potential gaps in the cover and then provide recommendations on how to resolve this unintended light spillage (e.g. additional landscaping or cowl of specific lamp posts). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Breeding Birds

A 24-month post-construction monitoring period will be conducted by a suitably qualified ecology team on the local breeding bird species. The breeding bird data collected during this monitoring period will be compared with that of the existing baseline, the pre-construction surveys, in order to establish whether there has been changes to frequency of occurrence and numbers within Site 4. The ecology team will also monitor the use of the artificial bird nesting boxes during this 24-month period. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Invasive Non-native Species

A qualified invasive species specialist shall be engaged to verify if the invasive species recorded in this report are still present following construction works. This will be carried out for five years post-construction and a copy of any records of the invasive flora shall be lodged with the NBDC, NPWS and SDCC. If invasive floral species are recorded, they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines.

3.3 SPECIFIC SITE 4 BIODIVERSITY MANAGEMENT

3.3.1 Habitat Connectivity (Safeguarding and Management of Ecological Corridors)

The northern ecological corridor (Kilmahuddrick Stream riparian zone) will be fenced off from the public with a 1.5m height wooden fence, with chicken-wire mesh that will have occasional gaps in the mesh to allow passage for local fauna in and out of the northern wildlife corridor. The fencing will run from the north-western corner along the southern riparian zone boundary across to the north-eastern in road culvert section. A gate will be incorporated into the fence to allow for maintenance of the road culvert. This gate will be able to accommodate the passage of small machinery.

The exclusion of the public from this wildlife corridor will help ensure that the relocated Lesser Centaury will persist within this location. The exclusion of public footfall will also allow the marsh habitat to expand into the new flood overflow section unhindered; as well as minimising littering of the stream and disturbance to fauna which find refuge within this wildlife corridor.

Following the relocations, removal of invasive flora, planting of new shrub / tree vegetation and erection of fencing, the northern ecological corridor is to be unmaintained, bar removal of stream blockages and overhanging vegetation along the southern boundary of the wildlife corridor. This will protect the relocated Lesser Centaury and ensure the fauna within the corridor remain undisturbed year-round.

Following the relocations, removal of invasive flora, planting of new shrub / tree vegetation and erection of fencing, the secure woodland and pond area to the south of Site 4 is to be minimally maintained, bar removal of ditch blockages and the vegetation extending outward into the surrounding public access and private areas. This will ensure minimal disturbance to the fauna that will reside / take refuge within this small woodland area.

3.3.2 Installation of Remedial Features for Fauna

3.3.2.1 Non-volant Mammals

Installation of passage holes /gaps at the base of the walls / solid fences / and mesh-based fencing to provide access for Hedgehog and Pygmy Shrew across Site 4, ensuring landscape connectivity for these smaller non-volant mammal species.

3.3.2.2 Non-volant Mammals – Hedgehog

Large-scale habitat loss and/or alteration of scrub and woodland habitat will reduce the availability of potential nesting and hibernation sites for the local Hedgehog population. Providing small log and leaf piles to increase nesting options for local Hedgehogs during the spring, summer and early autumn. These will be installed within the woodland and pond area, which will not be open to the public, towards the site of Site 4, as well as the upper banks of the riparian zone along the Kilmahuddrick Stream. This will also create refugia for terrestrial invertebrates, which in turn will boost prey species for local Hedgehogs.

In addition to these measures, to mitigate the loss of hedgehog hibernation habitat, artificial / built Hedgehog hibernacula will be installed in Site 4, within the secure woodland and pond area and the north-eastern and north-western corners of Site 4, north of the Kilmahuddrick Stream. These can be created from wooden planters or storage boxes. While the hibernacula will be primarily utilised by Hedgehog, they may potentially also be utilised by Pygmy Shrew.

The following guidance sets out a few ways to build a Hedgehog a place to sleep or hibernate:

<https://www.nhm.ac.uk/discover/how-to-make-a-hedgehog-house.html>

3.3.2.3 Bats

To offset some of the loss of commuting and foraging habitat that the proposed development will incur for local bat populations, it is recommended that a minimum of eight bat boxes are to be installed on the trees within eastern ecological corridor. The lighting of Site 4 along with the existing urban spaces make it difficult to incorporate bat features within the site, utilising the existing woodland which creates a natural darker corridor.

Within the Irish context, the Vincent's Wildlife Trust's reporting on Irish Bat Box schemes highlighted that 1FF Schwegler boxes are recommended for use by *Pipistrelle* spp., whereas *Leisler's* Bat displayed no preference for bat box type (McAney and Hanniffy, 2015), therefore the 1FF Schwegler boxes will be suitable to house all bat species which frequent Site 4.

Guidance on installing bat boxes can be found here: <https://www.bats.org.uk/our-work/buildingsplanning-and-development/bat-boxes/putting-up-your-box>.

Other simple bat boxes suitable for *Pipistrelle's* bats can be constructed by local community groups e.g., Men's Sheds. Note that some bat box designs (that are enclosed at the base) require annual cleaning out, which must be carried out by a Bat Specialist or NPWS Ranger.

Guidance on installing bat boxes is detailed in the following resource document: http://www.batcon.org/images/InstallingYourBatHouse_Building.pdf.

A summary on installing bat boxes can be summarised as:

- Suggested locations include areas with mature trees within the woodlands strips.
- All bat boxes should be mounted at least 3-4 metres above the ground.
- Mount on the south facing side of the tree where the box is exposed to the sun for part of the day.
- Do not install bat boxes on a tree that is near any lighting column, such as near the car park or the buildings on site.
- The placement must be free from ivy with no branches within a 1m radius around the location of the box.

These suggestions are generalised for the improvement of a site to become more bat friendly. As such, it is recommended that if there are intended to be bat enhancements on site, that a bat specialist provides more definitive advice on how and where to appropriately install and maintain bat boxes.

3.3.2.4 Breeding Birds

The notable loss of mature and semi-mature trees within Site 4 will reduce the nesting habitat on site for local breeding bird species. To mitigate the loss of nesting habitat, bird boxes will be installed on the retained mature and semi-mature trees present within Site 4. Bird boxes will be hung with the face of the box orientated between north and south-east, and at a height of at least 2-3m from ground level to avoid potential predation.

Based on the breeding bird species of conservation concern (which utilise artificial nests) recorded within Site 4, the bird box types (five each) to be installed within Site 4 are:

- For Starling: 45mm entrance hole, with height 51cm, width 16cm and depth 18cm (may also be used by local Great Spotted Woodpecker); and
- For Spotted Flycatcher: semi-open nest box style (will also be used by local Blackbird, Robin and Wren).
- For Goldcrest: a brushwood style nest, 28mm diameter oval opening with dimensions 290 x 145 x 110 mm for the nest (may also be used by Wren and Treecreeper)

3.3.2.5 Amphibians

Installation of passage holes /gaps at the base of the walls / solid fences / and mesh-based fencing to provide access for Common Frog and Smooth Newt across Site 4, ensuring continued landscape connectivity.

Wetland, drainage ditch and pond habitats are not to undergo maintenance (clearance of vegetation or dredging) during sensitive amphibian life stages for both Common Frog and Smooth Newt.; therefore, such maintenance will only be conducted between July and late September.

Terrestrial Invertebrates

The development of Site 4 will lead to the direct loss of nesting habitat for local terrestrial invertebrate species, potentially displacing species from the locality. To help remedy this loss, insect refugia will be installed in shrub, hedgerow and woodland habitats within Site 4. These can include log and leaf piles, as well as stone piles and old bricks with holes in them.

3.3.3 “Noxious Weeds” and Nettle

It is proposed to retain noxious weeds for Biodiversity purposes. There is a responsibility on OPW to control noxious weeds under “S.I. No. 103/1937 - Noxious Weeds (Thistle, Ragwort, and Dock) Order, 1937. However, many plants that are noted as weeds such as thistles, docks, and ragwort, provide important sources of food for local fauna. Thistles are important and are consistently well visited by pollinators - some sources suggest bees and bumblebees prefer blue/purple flowers, given the UV range of their eyesight. They are also the foodplant for the migratory Painted Lady butterfly, basking and nectar providers for Meadow Brown and Common Blue butterflies as well as foodplant for larvae of a variety of moths.

Docks are wind pollinated plants so do not provide nectar to pollinators, however they are important resources of seeds for seed-eating birds and mammals through the winter including Bullfinches, Goldfinches etc.

Nettle also provides an important habitat, particularly for butterflies. Nettles are used by the caterpillars of Red Admiral butterfly, Small Tortoiseshell, Peacock and Comma caterpillars and thus should only be removed if in the paths where people are walking. Any further management of patches that might need to be taken on could be done on a cyclical basis to allow the majority of patches to remain each year.

3.3.4 Rodent Management

It was noticed during the site visits that Rat traps were present within the site. It is advised that Rat traps that make use of poisons are avoided within the site. A poison that is ingested by a Rat can then be passed through the food chain if that Rat is then predated by protected species, such as the local Stoat population.

It is then recommended that any poisonous rat traps are replaced with mechanical rat traps which are regularly checked and reset, that function either through the use of a piston or a spring. This would both continue the efforts to remove rats, while also not impacting the local food chain. The presence of the raptor platform as listed above may incentivise raptors to visit the site more frequently, their presence may reduce the presence of Rats in the site.

3.3.5 Public Engagement

There are some misconceptions in ecology that may be misinterpreted by members of the public. This includes:

- The retention of Ivy which is often thought of as damaging to trees;
- It may not be realised that Rabbits are an invasive species and measures that pose a risk to their presence within a site can be incorrectly interpreted as harmful to local ecology, rather than beneficial; and

- Retention of “unsightly” ecological features (deadwood, low mowing regimes, weedy species) can be seen as neglectful rather than a form of management for nature.

It would be beneficial to erect a noticeboard to highlight the biodiversity efforts taking place within the grounds of the housing development.

3.3.6 Future Monitoring

The above biodiversity recommendations will be monitored on an on-going basis, in order to understand which of them have been successful, if any additional efforts are required, and if these efforts could be spread further throughout the site, as well as to monitor and limit the spread of invasive non-native species.

3.3.6.1 Post-construction Monitoring of Flora and Fauna

Rare and Protected Flora

A qualified ecologist will conduct post-construction floral surveys over 24-month period, one year apart during the optimal growth period, for the Lesser Centaury, Bee Orchids and Pyramidal Orchids, and any other rare or protected flora, which may have established between the time of writing of this chapter and the post-construction period of the proposed development. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Non-volant Mammals

A suitably qualified ecologist will conduct four mammal surveys (one summer and one winter) over a 24-month period in order to monitor mammal activity and potential new rest sites, as well as the potential use of provided artificial refuges (Hedgehog hibernacula). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

A suitably qualified environmental scientist or ecologist will regularly (every three months for the first 24 months of operations) monitor the level of lighting disturbance within the dark corridors of Site 4. The periodic monitoring will allow for the variation of vegetation and canopy cover during the different seasons and how they affect the levels of light spillage into the dark corridors. This monitoring can identify potential gaps in the cover and then provide recommendations on how to resolve this unintended light spillage (e.g. additional landscaping or cowl of specific lamp posts). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Bats

A 36-month post-construction monitoring period will be conducted by a suitably qualified bat ecology team on the local bat populations. The bat activity data collected during this monitoring period will be compared with that of the existing baseline, and the pre-construction surveys, in order to establish whether the general activity levels, flight patterns and specific habitat utilisation has been altered during these time periods. The ecology team will also check the use of the installed artificial bat boxes by the local bats. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

A suitably qualified environmental scientist or ecologist will regularly (every three months for the first 24 months of operations) monitor the level of lighting disturbance within the dark corridors of Site 4. The periodic monitoring will allow for the variation of vegetation and canopy cover during the different seasons and how they affect the levels of light spillage into the dark corridors. This monitoring can identify potential gaps in the cover and then provide recommendations on how to resolve this unintended light spillage (e.g. additional landscaping or cowl of specific lamp posts). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Breeding Birds

A 24-month post-construction monitoring period will be conducted by a suitably qualified ecology team on the local breeding bird species. The breeding bird data collected during this monitoring period will be compared with that of the existing baseline, the pre-construction surveys, in order to establish whether there has been changes to frequency of occurrence and numbers within Site 4. The ecology team will also monitor the use of the artificial bird nesting boxes during this 24-month period. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Invasive Non-native Species

A qualified invasive species specialist shall be engaged to verify if the invasive species recorded in this report are still present following construction works. This will be carried out for five years post-construction and a copy of any records of the invasive flora shall be lodged with the NBDC, NPWS and SDCC. If invasive floral species are recorded, they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines.

4 SPECIFIC SITE 5 BIODIVERSITY MANAGEMENT

4.1.1 Habitat Connectivity

The north-eastern park section of Site 5 will contain areas of shrub, grassy meadows, treelines, and hedgerows which will provide commuting, foraging and nesting/hibernation sites for local non-volant mammals, bats and birds, in particular those linear and connected features that provide the means of commuting through and between the site and its surrounding environs.

4.1.2 Installation of Remedial Features for Fauna

4.1.2.1 Non-volant Mammals

Installation of passage holes /gaps at the base of the walls / solid fences / and mesh-based fencing to provide access for Hedgehog and Pygmy Shrew across Site 5, ensuring landscape connectivity for these smaller non-volant mammal populations.

4.1.2.2 Non-volant Mammals – Hedgehog

Large-scale habitat loss and/or alteration of scrub and woodland habitat will reduce the availability of potential nesting and hibernation sites for the local Hedgehog population. Providing small log and leaf piles to increase nesting options for local Hedgehogs during the spring, summer and early autumn. These will be installed within the wooded parkland section, adjacent to the wetland planting in the north-east section of Site 5. This will also create refugia for terrestrial invertebrates, which in turn will boost prey species abundance for local Hedgehogs. In addition to these measures, to mitigate the loss of hedgehog hibernation habitat, artificial / built Hedgehog hibernacula will be installed in the same location. This can be created from wooden planters or storage boxes. While the hibernacula will be primarily utilised by Hedgehog, they may potentially also be utilised by Pygmy Shrew.

The following guidance sets out a few ways to build a Hedgehog a place to sleep or hibernate:

<https://www.nhm.ac.uk/discover/how-to-make-a-hedgehog-house.html>

4.1.2.3 Bats

To offset some of the loss of commuting and foraging habitat that the proposed development will incur for local bat populations, it is recommended that a minimum of eight bat boxes are to be installed on the trees within eastern ecological corridor. The lighting of Site 5 along with the existing urban spaces make it difficult to incorporate bat features within the site, utilising the existing woodland which creates a natural darker corridor.

Within the Irish context, the Vincent's Wildlife Trust's reporting on Irish Bat Box schemes highlighted that 1FF Schwegler boxes are recommended for use by *Pipistrelle* spp., whereas *Leisler's* Bat displayed no preference for bat box type (McAney and Hanniffy, 2015), therefore the 1FF Schwegler boxes will be suitable to house all bat species which frequent Site 5.

Guidance on installing bat boxes can be found here: <https://www.bats.org.uk/our-work/buildingsplanning-and-development/bat-boxes/putting-up-your-box>.

Other simple bat boxes suitable for *Pipistrelle's* bats can be constructed by local community groups e.g., Men's Sheds. Note that some bat box designs (that are enclosed at the base) require annual cleaning out, which must be carried out by a Bat Specialist or NPWS Ranger.

Guidance on installing bat boxes is detailed in the following resource document: http://www.batcon.org/images/InstallingYourBatHouse_Building.pdf.

A summary on installing bat boxes can be summarised as:

- Suggested locations include areas with mature trees within the woodlands strips.
- All bat boxes should be mounted at least 3-4 metres above the ground.

- Mount on the south facing side of the tree where the box is exposed to the sun for part of the day.
- Do not install bat boxes on a tree that is near any lighting column, such as near the car park or the buildings on site.
- The placement must be free from ivy with no branches within a 1m radius around the location of the box.

These suggestions are generalised for the improvement of a site to become more bat friendly. As such, it is recommended that if there are intended to be bat enhancements on site, that a bat specialist provides more definitive advice on how and where to appropriately install and maintain bat boxes.

4.1.2.4 Breeding Birds

The Site 5 area currently supports a number of breeding bird species of conservation concern, three of which can be accommodated for through artificial means.

While the proposed trees to be planted as part of the landscape plan will provide some nesting potential for local bird populations; it is recommended that additional bird boxes are placed within the site to allow for additional nesting opportunities during the ecological lag period (while the newly planted trees mature).

Bird boxes will be hung with the face of the box orientated between north and south-east, and at a height of at least 2-3m from ground level to avoid potential predation. Based on the breeding bird species of conservation concern (which utilise artificial nests) recorded within Site 3, the bird box types (five each) to be installed within Site 3 are:

- For House Sparrow: a 32mm diameter oval opening for entry. These bird boxes can be hung from trees or nailed to the trunk at a height of 2-4 metres, and it is preferred that the bird boxes are faced in a way to avoid the brunt of prevailing direct wind or rain. House Sparrows will also utilise terraced nest boxes, facilitating two or three nest boxes in one installation; and
- For Starling: a 45mm entrance hole, with height 51cm, width 16cm and depth 18cm (may also be used by local Great Spotted Woodpecker).
- For Goldcrest: a brushwood style nest, 28mm diameter oval opening with dimensions 290 x 145 x 110 mm for the nest (may also be used by Wren and Treecreeper)

4.1.2.5 Amphibians

Installation of passage holes /gaps at the base of the walls / solid fences / and mesh-based fencing to provide access for Common Frog across Site 5, ensuring continued landscape connectivity.

Wetland and drainage ditch / swale habitats are not to undergo maintenance (clearance of vegetation or dredging) during sensitive amphibian life stages for both Common Frog.; therefore, such maintenance will only be conducted between June and late September.

4.1.2.6 Terrestrial Invertebrates

The construction of Site 5 will lead to the direct loss of nesting / hive-building habitat for local terrestrial invertebrate species, potentially displacing species from the locality. To help remedy this loss, insect refugia will be installed in shrub, hedgerow and woodland habitats within Site 5. These can include log and leaf piles, as well as stone piles and old bricks with holes in them.

4.1.3 "Noxious Weeds" and Nettle

Noxious Weeds" are species of plants that have been designated by a statutory body as damaging to agriculture, horticulture, habitats/ecosystems, humans or livestock. 'Noxious weeds' control in Ireland come under the Noxious Weeds Act, 1936; Number 38 of 1936, and various orders thereafter. Due to the large benefits afforded by the retention of these species, it is recommended that a low cover of these species are retained within the meadow areas. These species will then continue to provide valuable resources to faunal species, while also being easily monitored and removed if dominating the areas of meadows and dry grassy verges, or in encroaching into the areas of play. If they become overbearing and most dominant, they can be reduced.

With the retention of unmown areas and the establishment of grassy areas with less management, this increases the opportunities for plants that are noted as "noxious weeds" such as thistles, docks, and ragwort, provide important sources of food for local fauna. Native species such as these may not pose a threat when grown in a

natural environment but only becomes a problem with changing landscape, e.g. clearance to cultivation. These species have an intrinsic biodiversity value that can become lost in overzealous management practices.

Thistles are important and are consistently well visited by pollinators. They are also the foodplant for the migratory Painted Lady butterflies, and nectar for Meadow Brown and Common butterflies as well as a larval foodplant for a range of moth species. Dock species are wind pollinated plants, and as such do not provide nectar to pollinators, however, they are an important source of seeds for seed-eating birds and mammals through the winter including Bullfinch, Goldfinch, and Hedgehog. Nettle also provides an important habitat, particularly for butterfly species. Nettles are used by the caterpillars of Red Admiral Butterfly; Small Tortoiseshell; Peacock; and Comma caterpillars.

4.1.4 “Public Engagement

There are some misconceptions in ecology that may be misinterpreted by members of the public. This includes:

- The retention of Ivy which is often thought of as damaging to trees
- Retention of “unsightly” ecological features (deadwood, low mowing regimes, weedy species) can be seen as neglectful rather than a form of management for nature

It would be beneficial to erect a noticeboard to highlight the biodiversity efforts taking place within the grounds of the housing development.

4.1.5 Future Monitoring

The above biodiversity recommendations should be monitored in the future, in order to understand which of them have been successful, and any additional efforts required, if these efforts could be spread further throughout the site, and to monitor and limit the spread of invasive species, where possible.

4.1.5.1 Specific Monitoring of Rare and Protected Flora and Fauna

Non-volant Mammals

A suitably qualified ecologist will conduct four mammal surveys (one summer and one winter) over a 24-month period in order to monitor mammal activity and potential new rest sites, as well as the potential use of provided artificial refuges (Hedgehog hibernacula). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

A suitably qualified environmental scientist or ecologist will regularly (every three months for the first 24 months of operations) monitor the level of lighting disturbance within the dark corridors of Site 4. The periodic monitoring will allow for the variation of vegetation and canopy cover during the different seasons and how they affect the levels of light spillage into the dark corridors. This monitoring can identify potential gaps in the cover and then provide recommendations on how to resolve this unintended light spillage (e.g. additional landscaping or cowlings of specific lamp posts). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Bats

A 36-month post-construction monitoring period will be conducted by a suitably qualified bat ecology team on the local bat populations. The bat activity data collected during this monitoring period will be compared with that of the existing baseline, and the pre-construction surveys, in order to establish whether the general activity levels, flight patterns and specific habitat utilisation has been altered during these time periods. The ecology team will also check the use of the installed artificial bat boxes by the local bats. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

A suitably qualified environmental scientist or ecologist will regularly (every three months for the first 24 months of operations) monitor the level of lighting disturbance within the dark corridors of Site 4. The periodic monitoring will allow for the variation of vegetation and canopy cover during the different seasons and how they affect the levels of light spillage into the dark corridors. This monitoring can identify potential gaps in the cover and then provide recommendations on how to resolve this unintended light spillage (e.g. additional landscaping or cowlings of specific lamp posts). The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

Breeding Birds

A 24-month post-construction monitoring period will be conducted by a suitably qualified ecology team on the local breeding bird species. The breeding bird data collected during this monitoring period will be compared with that of the existing baseline, the pre-construction surveys, in order to establish whether there has been changes to frequency of occurrence and numbers within Site 4. The ecology team will also monitor the use of the artificial bird nesting boxes during this 24-month period. The subsequent survey report will be disseminated to relevant bodies, i.e. NPWS and SDCC.

4.1.5.2 Invasive Non-native Species Monitoring

A qualified invasive species specialist shall be engaged to verify if the invasive species recorded in this report are still present following construction works. This will be carried out for five years post-construction and a copy of any records of the invasive flora shall be lodged with the NBDC, NPWS and SDCC. If invasive floral species are recorded, they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines.

5 LONG-TERM HABITAT REINSTATEMENT (ALL SITES)

In order to guarantee that the operational landscaping, including the newly landscaped or reinstated areas, within the three sites, matures in manner that ensures the long-term ecological functionality of these new habitats, a suitably qualified ecologist (or ecologists) will be appointed to liaise with the post-construction landscape team. As dictated within the Biodiversity Chapter of the EIAR, yearly spring and summer visits will be conducted by the ecologist over a 60-month period so that they may identify potential functional ecological failings within the site's (sites') operational landscape(s). The ecologist will write up yearly summary reports detailing the natural maturation of habitats within the site's (sites') landscape(s); and provided recommendations to resolve any identified issues, which may impede the long-term maturation of habitats at the targeted quality set out within the landscape designs for the site(s). The ecologist will then work with the post-construction landscape team to implement the ecological solutions provided within the summary report. The subsequent summary report(s) will be disseminated to relevant bodies, i.e. NPWS and SDCC.

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