



Killiney Hill Habitat and Species Management Plan



Prepared for

Dún Laoghaire-Rathdown County Council

by

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Cover photograph: Long-eared owl chick at Killiney (Photograph courtesy of Michael and Lucy Ryan)

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1 INTRODUCTION

1.1 Purpose

The main aim of the Killiney Hill Habitat and Species Management Plan (HSMP) is to protect biodiversity by means of the restoration and enhancement of Killiney Hill Park's constituent habitats and species.

The Plan includes commitments to explore ways to achieve a balance between the protection of natural heritage, cultural heritage, the amenity and recreational use of the park and also the impacts of climate change including fire risk.

The Plan demonstrates Dún Laoghaire-Rathdown County Council's continuing commitment to achieving its obligations to protect biodiversity for the benefit of present and future generations. This will be achieved through the actions set out in this Plan.

1.2 The Plan

The Killiney Hill Habitat and Species Management Plan has been prepared and collated for Dún Laoghaire-Rathdown County Council's Biodiversity Officer, Anne Murray, by Jenny Neff, Director and Principal Ecologist of *EACS – Ecological Advisory & Consultancy Services*. She is a Chartered Ecologist; Chartered Environmentalist with the Society for the Environment; and a Fellow of the Chartered Institute of Ecology and Environmental Management. Formerly the CIEEM Vice President for the island of Ireland from 2012 to 2018 and a member of the National Biodiversity Forum from 2018 to 2021, she is an ecologist / applied ecologist and vegetation scientist with some 50 years' professional experience of working with Irish habitats and species, and associated Irish and European legislation.

The HSMP has been informed by:

- Existing knowledge, including the results of the following specialist ecological surveys carried out in 2023:
 - Habitats and Flora, including rare plants and invasive alien plant species
 - Bats
 - Mammals (non-volant)
 - Breeding birds
 - Reptiles
 - Amphibians
 - Ongoing annual Red Squirrel monitoring programme.
- The Draft Killiney Hill Park and Vico Fields Management Plan 2013.
- Legislation, policy and strategies at local, national, European and international level.
- NPWS data for Dalkey Coastal Zone and Killiney Hill pNHA 001206
- DLR County Biodiversity Action Plan 2021-2025.
- DLR Climate Change Action Plan 2019-2024.
- DLR County Development Plan 2022-2028.
- DLR Invasive Alien Species Action Plan 2021.
- DLR Draft Wildfire Strategy Report 2023, including the Goat Grazing Case Study therein.

- Consultation with DLR Heritage and Biodiversity
- Consultation and workshops with DLR Parks Department.
- Consultation with the National Parks and Wildlife Service (NPWS).

The HSMP has also been informed by a desk study of relevant sources relating to its constituent habitats and species, including a review of the documentation listed above as well as information and data from DLR and the National Parks and Wildlife Service. Literature and other sources of information in respect of the history and geology of Killiney Hill Park and Dalkey Quarry were also consulted.

Sources are cited in the text and listed at Section 6 References.

2 SITE DESCRIPTION

2.1 Killiney Hill

Killiney Hill is a coastal promontory overlooking Killiney Bay located within the townlands of Scalpwilliam or Mount Mapas, Killiney and Dalkey Commons. It is bounded by urban development to the north, south and west.

Killiney Hill has been a public park since 1887, when first acquired (Pearson, 1955). It was subsequently enlarged in the 1930s following the purchase of lands at Dalkey Hill and Burma Road by (the then) Dún Laoghaire Corporation. This expansion included the large area of Dalkey Quarry that had been taken into public ownership in 1914, bringing the total area of the Park to eighty hectares. Dalkey Quarry was operational from the early 1800s until 1917.

All land within the site is now owned by Dún Laoghaire-Rathdown County Council and is managed as parkland, biodiversity area and public open space. See also Section 4 below.

Killiney Hill also forms part of the Dalkey Coastal Zone and Killiney Hill pNHA 001206 which is detailed below.

2.2 Site status

The area covered by the Killiney Hill HSMP is nationally important, comprising terrestrial and coastal sections of the Dalkey Coastal Zone and Killiney Hill proposed Natural Heritage Area (pNHA site code 001206) - a national designation under the Wildlife Acts 1976 to 2023, as amended. The site synopsis for the pNHA is provided in Appendix 1 of this Plan. It summarises the site's attributes as follows: *“This site represents a fine example of a coastal system with habitats ranging from the sub-littoral to coastal heath. The flora is well developed and includes some scarce species..... The site also has geological importance”*.

Killiney Hill HSMP area (Figure 1) is strategically located within the Dún Laoghaire-Rathdown ecological network (Figure 2) and biodiversity corridors. This network includes a number of pNHAs including the Dalkey Coastal Zone and Killiney Hill pNHA which extends along most of the coastal strip between Dún Laoghaire in the west to Loughlinstown in the south. Killiney Hill also provides an important stepping stone between internationally designated sites of the Natura 2000 network, both onshore and offshore, of Special Areas of Conservation (SACs) and Special Protection Areas for birds (SPAs) and the much - anticipated Marine Protection Area (MPA).

Killiney Hill also comprises part of the Dublin Bay Biosphere Reserve, a UNESCO designation that covers the entire area of Dublin Bay and associated lands. The principal objective of Biosphere reserves is the promotion of sustainable development through a partnership approach. The Dublin Bay Biosphere Reserve is managed by a group comprising the Dublin Port Authority, Failte Ireland, National Parks and Wildlife Service, and the Dublin City Councils, Dún Laoghaire-Rathdown County Council and Fingal County Council.

Killiney Hill's status within the county is underpinned by Dún-Laoghaire- Rathdown County Council's commitments to biodiversity enshrined in the policies and objectives of the County Development Plan (2022-2028) and the County Biodiversity Action Plan (2021-2025). The key policies and objectives in these Plans which underpin the HSMP are summarised in Table 1.

Figure 1: Map showing the extent of the Killiney Hill HSMP study area

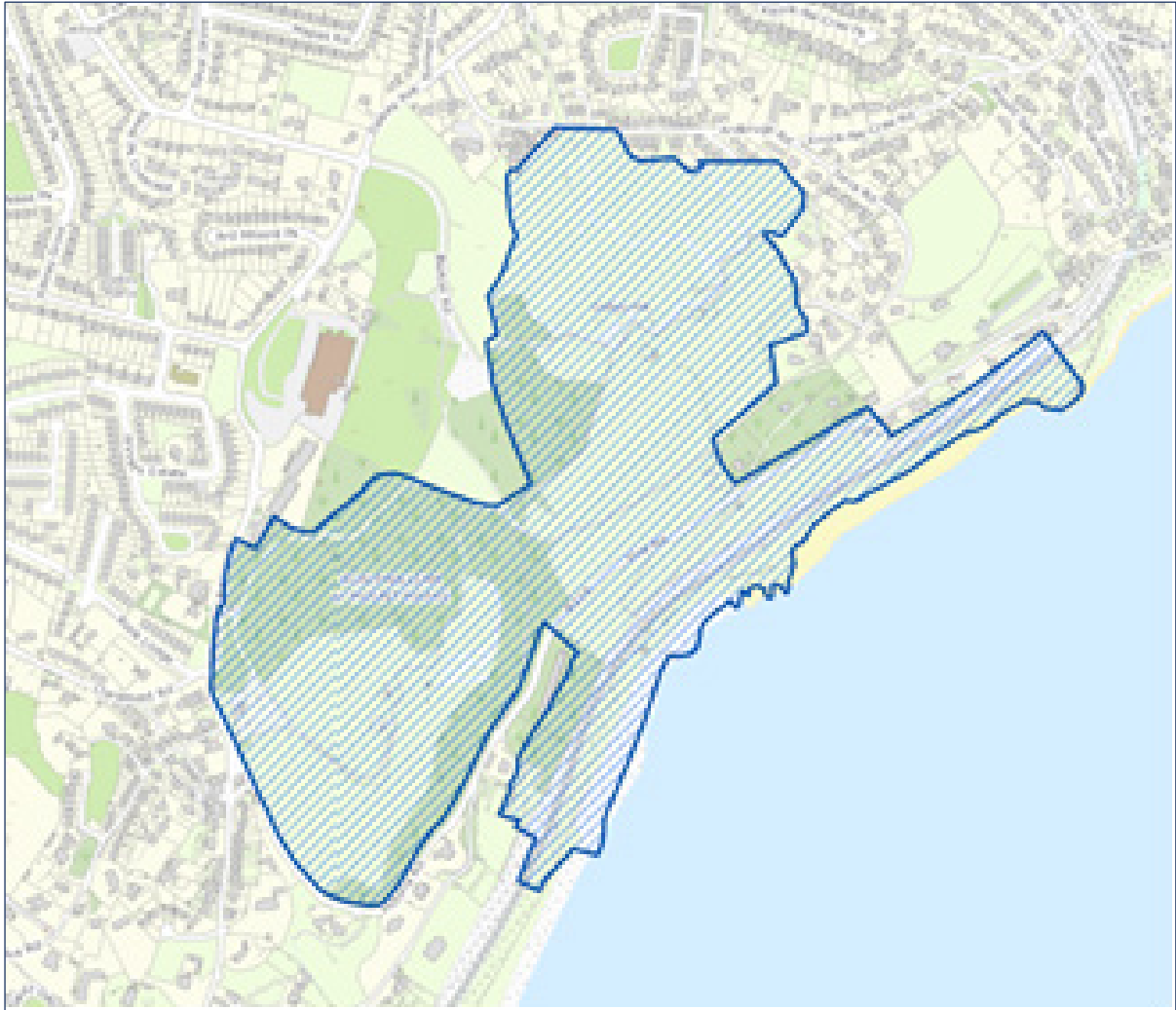


Figure 2: Map to show Killiney Hill forming part of the DLR ecological network

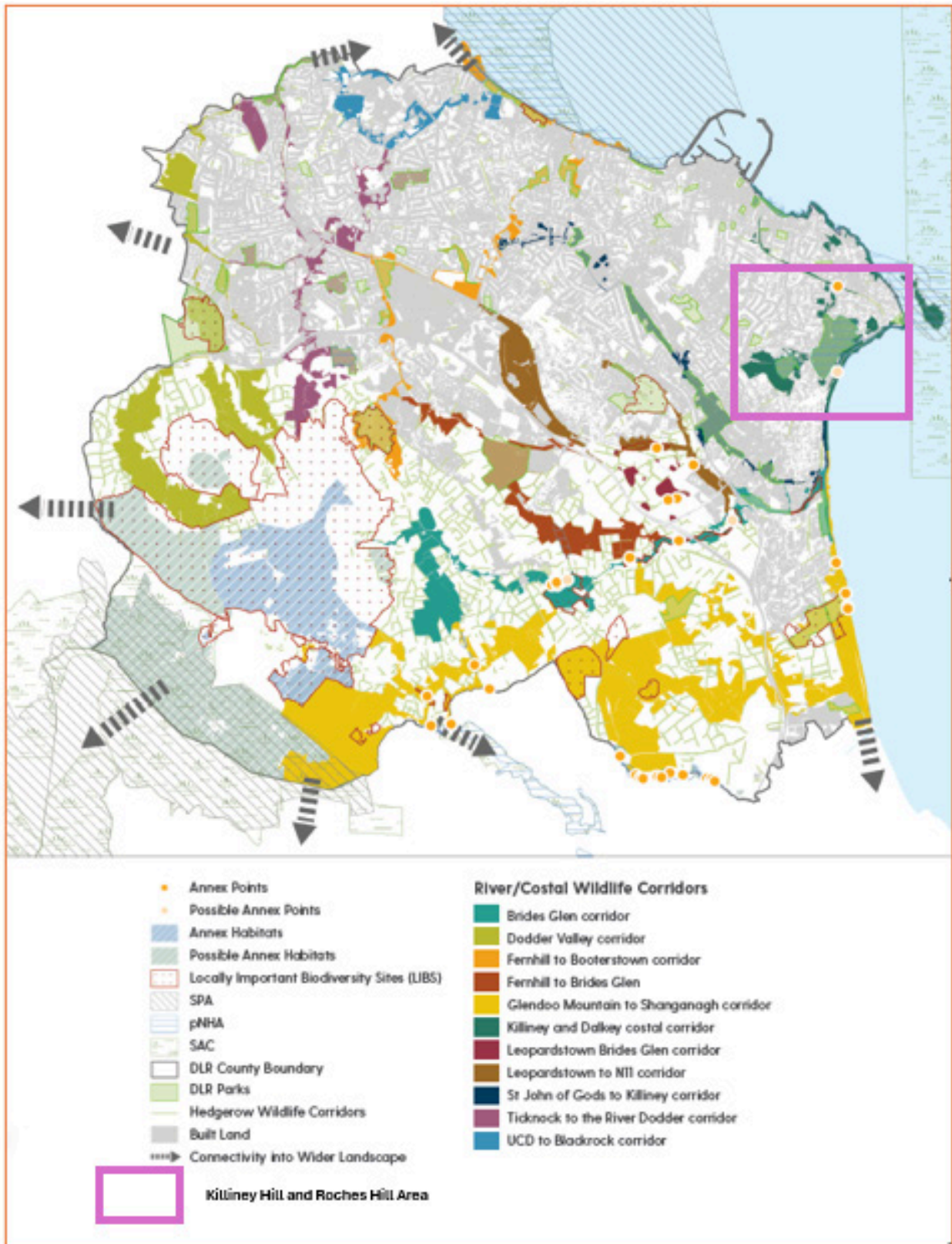


Table 1: Summary of key biodiversity policies and objectives in relation to the Killiney Hill HSMP

Document	Policy/Objective	
County Development Plan	GIB12: Access to Natural Heritage	It is a Policy Objective to promote, protect and enhance sustainable and appropriate access to the natural heritage of the County, where practicable, in a balanced way while protecting the natural heritage of the County.
	GIB18: Protection of Natural Heritage and the Environment	It is a Policy Objective to protect and conserve the environment including, in particular, the natural heritage of the County and to conserve and manage Nationally and Internationally important and EU designated sites - such as Special Protection Areas (SPAs), Special Areas of Conservation (SACs), proposed Natural Heritage Areas (pNHAs) and Ramsar sites (wetlands) - as well as non-designated areas of high nature conservation value known as locally important areas which also serve as 'Stepping Stones' for the purposes of Article 10 of the Habitats Directive.
	GIB20: Biodiversity Plan	It is a Policy Objective to support the provisions of the forthcoming DLR County Biodiversity Action Plan, 2021-2025.
	GIB21: Designated Sites	It is a Policy Objective to protect and preserve areas designated as proposed Natural Heritage Areas, Special Areas of Conservation, and Special Protection Areas. It is Council policy to promote the maintenance and as appropriate, delivery of 'favourable' conservation status of habitats and species within these areas.
	GIB22: Non- Designated Areas of Biodiversity Importance	It is a Policy Objective to protect and promote the conservation of biodiversity in areas of natural heritage importance outside Designated Areas and to ensure that notable sites, habitats and features of biodiversity importance - including species protected under the Wildlife Acts 1976 and 2000, the Birds Directive 1979, the Habitats Directive 1992, Birds and Habitats Regulations 2011, Flora (Protection) Order, 2015, Annex I habitats, local important areas, wildlife corridors and rare species - are adequately protected. Ecological assessments will be carried out for all developments in areas that support, or have potential to support, features of biodiversity importance or rare and protected species and appropriate mitigation/ avoidance measures will be implemented. In implementing this policy, regard shall be had to the Ecological Network, including the forthcoming DLR Wildlife Corridor Plan, and the recommendations and objectives of the Green City Guidelines (2008) and 'Ecological Guidance Notes for Local Authorities and Developers' (Dún Laoghaire-Rathdown Version 2014).
	GIB23: County- Wide Ecological Network	It is a Policy Objective to protect the Ecological Network which will be integrated into the updated Green Infrastructure Strategy and will align with the DLR County Biodiversity Action Plan. Creating this network throughout the County will also improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive. The network will also include non designated sites.
	GIB26: Geological Sites	It is a Policy Objective to protect, promote and preserve sites of Geological and Geomorphological importance, in particular the proposed Natural Heritage Areas (NHAs), and any County Geological Sites (CGS), that become designated during the lifetime of the Plan.
	GIB28: Invasive Species	It is a Policy Objective to prepare an 'Invasive Alien Species Action Plan' for the County which will include actions in relation to Invasive Alien Species (IAS) surveys, management and treatment and to also ensure that proposals for development do not lead to the spread or introduction of invasive species. If developments are proposed on sites where invasive species are or were previously present, the applicants will be required to submit a control and management program for the particular invasive species as part of the planning process and to comply with the provisions of the European Communities Birds and Habitats Regulations 2011 (S.I. 477/2011).
	GIB30: Promoting Biodiversity by avoiding Widespread Use Of Herbicides and Pesticides	It is a Policy Objective to promote biodiversity by avoiding the widespread use of chemical weedkillers, herbicides and pesticides such as glyphosate for routine road and park maintenance.
Biodiversity Action Plan 2022-2025		

Document	Policy/Objective	
Objectives	Objective 1: Strengthen the knowledge base for conservation, management, and sustainable use of biodiversity.	Theme 1 includes actions that aim to collect data about our county's biodiversity. This includes habitat and species surveys, identifying important biodiversity areas, and also identifying those areas most vulnerable to climate change.
	Objective 2: Mainstream biodiversity into decision-making and improve the management of this valuable resource.	Theme 2 includes actions that involve placing biodiversity into our decision-making and management processes. Actions include developing guidance and tools for our staff and decision-makers, along with inputting to other plans such as the County Development Plan, Climate Change Action Plan and others.
	Objective 3: Conserve and restore biodiversity and ecosystems and support ecosystem services in DLR, including coastal and marine.	Theme 3 includes actions to strengthen our understanding of natural capital and ecosystem services, to work with communities to identify opportunities where ecosystems can be restored and enhanced including terrestrial, river, coastal and marine ecosystems, to develop and implement appropriate rewilding projects in DLR and extend our local biodiversity areas within DLR and to protect, restore and expand our County Ecological Network and DLR'S Green Infrastructure.
	Objective 5: Strengthen the effectiveness of collaboration between all stakeholders for the conservation of biodiversity, including with Local Authority Biodiversity Officers, Local Authority Waters Programme (LAWPRO), the National Biodiversity Data Centre, BirdWatch Ireland, NPWS and other State Bodies.	Theme 5 includes actions to engage with local communities and business communities to develop local biodiversity projects, to work with our Biosphere partners, universities, government departments, other local authorities and organisations on biodiversity projects and to share our resources.
Specific Action in respect of Killiney Hill	Action 3.11: Continue the Red Squirrel Project and extend project to Fernhill (2021-2025)	This includes the Killiney Hill Red Squirrel Project.

3 SITE EVALUATION

3.1 Physical/ geological features

The character of this area is influenced by its coastal location and varied topography. It is one of the few areas where coastal cliffs of significance occur in Dublin. It reaches its highest point at the obelisk on the summit of Killiney Hill, 170m above sea level. Dalkey and Killiney Hills, being at the edge of the Wicklow intrusion, comprise granite and mica schist. On the eastern side of the summit, Leinster granite outcroppings have aplite and pegmatite veins (Kennan, P.) and some have been shaped by glaciations into “roches moutonnées”. A small scarp exposure of spodumene is also found in this area of the summit.

The lower seaward-facing slopes include some older, Ordovician rocks and have a thick covering of glacial drift boulder clay, laid down by the ice of the Irish Sea Glacier during the last ice age. The name of White Rock at Killiney beach is derived from the white granite which, when seen against the darker metamorphosed schists, was very visible to sailors (Gallagher et al, 2014). The rock here comprises a finer grain rock than the surrounding granite (Wyse Jackson *et al.* 1993) with mineralisation (including biotite, andalusite and garnet, with aplite and pegmatite veins).

The western-facing slopes are gentler than the steep seaward-facing slopes, except in the vicinity of Dalkey Quarry where quarrying activities have created vertical cliffs some thirty to forty metres in height.

The geology of the site is of national conservation importance, with the Dún Laoghaire - Rathdown County Geological Site Report for Killiney as set out in Gallagher et al. (2014) stating: “....*This is one of the best examples of a composite roche moutonnées in the country. The occurrence of killinite, named after Killiney, adds interest to the site.....This is an excellent site in terms of macro-scale Quaternary subglacial geomorphology.*”

3.2 Ecological features (Habitats and Species)

3.2.1 Ecological Surveys 2023

This section is informed by the findings of specialist ecological surveys carried out in 2023 in respect of: Flora and habitats (FitzGerald, 2023); Bats (Aughney, 2023); Non-volant mammals (mammals other than bats) (Fennessy & Kearns, 2023); Birds (Keogh & Delaney, 2023); and Reptiles and amphibians (Gandola, 2023) and follows these reports. Where relevant, text from the various reports has been included/adapted. The annual Red Squirrel monitoring programme is ongoing and the most recent monitoring data is detailed in Section 3.2.2.

3.2.1.1 Habitats

Some twenty habitat types (and/or mosaics) were recorded by Alexis FitzGerald B.A. M.Sc. within the Killiney Hill and Dalkey Quarry study area during the field surveys in 2023, with reference to Smith et al. (2011). These are listed in Table 2, showing their classification (Fossitt, 2000), their alignment with EU Habitats Directive Annex I habitats where applicable (EU, 2013), with any abbreviated names for the habitats following NPWS (2019), and their ecological evaluation. They are mapped in Figure 3. A summary of recorded impact on habitats is presented in Table 7, in Section 3.2.3. Vascular plant taxonomy and nomenclature follows Stace (2019) with bryophyte taxonomy and nomenclature after Atherton *et al.* (2010). Common nomenclature follows Scannell & Synnott (1987) and Stace (2019) for vascular plants and Atherton et al. (2010) for bryophytes.

Table 2: Habitats recorded within the HSMP area

Habitat Type (Fossitt, 2000)	EU Habitats Directive Annex I Code (if applicable)	Ecological Valuation
Amenity grassland (improved) (GA2)		Local importance (lower value)
Dry calcareous and neutral grassland (GS1)		County importance
Dry meadows and grassy verges (GS2)		Local importance (higher value)
Dry-humid acid grassland (GS3)		Local importance (higher value)
Wet grassland (GS4)		Local importance (higher value)
Dry siliceous heath (HH1)	[4030] European dry heaths	County importance
Dense bracken (HD1)		Local importance (lower value)
Oak-ash-hazel woodland (WN2)		County importance
(Mixed) broadleaved woodland (WD1)		Local importance (higher value)
Mixed broadleaved/conifer woodland (WD2)		Local importance (higher value)
(Mixed) conifer woodland (WD3)		Local importance (higher value)
Scrub (WS1)		Local importance (higher value)
Exposed siliceous rock (ER1)		County importance
Ponds (F8)		Local importance (higher value)
Recolonising bare ground (ED3)		Local importance (lower value)
Buildings and artificial surfaces (BL3)		Local importance (lower value)
Rocky sea cliffs (CS1)	[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts	National importance
Shingle and gravel banks (CB1)		Local importance (higher value)
Embryonic dunes (CD1)	[2110] Embryonic shifting dunes	County importance
Sand shores (LS2)	[1210] Annual vegetation of drift lines	County importance

Figure 3: Habitat map (FitzGerald, 2023)



Habitat Descriptions

Amenity grassland (improved) (GA2)

There are small areas of this habitat type throughout the site, alongside paths and by Vico Road. These areas are managed by frequent cutting or mowing and have poor species diversity. Perennial rye-grass (*Lolium perenne*) and Rough meadow-grass (*Poa trivialis*) are the predominant grass species. Curled dock (*Rumex crispus*), Meadow foxtail (*Alopecurus pratensis*) and Daisy (*Bellis perennis*) are also common components of the vegetation.

This habitat is assessed as being of **Local importance (lower value)**, given its poor species diversity and limited habitat potential.

No notable impacts on this habitat were recorded during the 2023 field surveys.

Dry calcareous and neutral grassland (GS1)

Often found in a mosaic with scrub (WS1), dry calcareous and neutral grassland (GS1) is scattered throughout the site. These patches of grassland have developed on shallower, neutral-calcareous soils with greater levels of disturbance/exposure where taller, tussocky grasses such as Cock's-foot (*Dactylis glomerata*) and False oat-grass (*Arrhenatherum elatius*) fail to thrive. Species richness is high, including characteristic species such as: Ox-eye daisy (*Leucanthemum vulgare*), Cowslip (*Primula veris*), Yellow-rattle (*Rhinanthus minor*), Marjoram (*Origanum vulgare*), Bulbous buttercup (*Ranunculus bulbosus*), Lesser hawkbit (*Leontodon saxatilis*), Kidney vetch (*Anthyllis vulneraria*), Wild carrot (*Daucus carota*) and Bloody crane's-bill (*Geranium sanguineum*). Two rare clover species, Knotted clover (*Trifolium striatum*) and Bird's-foot clover (*Trifolium ornithopodioides*), occur in this habitat, near the Obelisk.

While this habitat type sometimes corresponds with the EU Habitats Directive Annex I habitat [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea), insufficient positive indicator species were found in these areas to assign their classification to this Annex I habitat. It is nonetheless considered to be of **County importance** owing to the presence of two rare *Trifolium* species within the vegetation, as well as the generally high diversity of these grassland types on site.

Trampling from excessive visitor and dog access was the primary impact on this habitat recorded during the 2023 field surveys.

Dry meadows and grassy verges (GS2)

Dry meadows and grassy verges (GS2) habitat is present in the northern part of the site at Dalkey Quarry and at the Dalkey Quarry viewpoint by the old signalling station tower. It is also found on site in mosaics with Oak-ash-hazel woodland (WN2), scrub (WS1) and dense bracken (HD1). This habitat is characterised by being rarely mown or grazed, which results in the grassland becoming rank over time, often dominated by perennial tussocky grass species such as False oat-grass (*Arrhenatherum elatius*) and Cock's-foot (*Dactylis glomerata*), along with significant quantities of Cleavers (*Galium aparine*), Creeping thistle (*Cirsium arvense*), Common nettle (*Urtica dioica*) and more occasional-rare Alexanders (*Smyrnium olusatrum*).

This habitat is considered to be of **Local importance (higher value)**, owing to its broad habitat potential, and its presence within a nationally designated site.

No notable impacts on this habitat were recorded during the 2023 field surveys.

Dry-humid acid grassland (GS3)

Dry-humid acid grassland (GS3) habitat occurs in small scattered patches within the site, always in mosaics with larger areas of scrub (WS1) and/or exposed siliceous rock (ER1). This habitat is relatively species-rich and includes some of the species which occur in the exposed siliceous rock (ER1) habitat, along with more typical grassland species. Grass species occurring in GS3 habitat on site include Common bent (*Agrostis capillaris*), Sweet vernal-grass (*Anthoxanthum odoratum*), Yorkshire-fog (*Holcus*

lanatus) and Red fescue (*Festuca rubra* agg.), whilst herbaceous species like Cat's-ear (*Hypochaeris radicata*), White clover (*Trifolium repens*) and Ribwort plantain (*Plantago lanceolata*) were also recorded widely.

The grassland on site does not correspond with the priority Annex I habitat type [*6230] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe). This is because it lacks sufficient positive indicator species within the site for it to be considered equivalent to the Annex habitat (including Mat-grass, *Nardus stricta*). Nonetheless, GS3 habitat on site is considered to be of **Local importance (higher value)**, given its relatively high species diversity and the relative scarcity of this habitat within Co. Dublin, being present within a nationally designated site.

No notable impacts on this habitat were recorded during the 2023 field surveys.

Wet grassland (GS4)

Two small areas of wet grassland (GS4) were detected on site. One area is located at the south-east corner of the site adjacent to the railway line and the other being found in the northern part of the site in Dalkey Quarry. Here the vascular plant species Creeping bent (*Agrostis stolonifera*) and Hemp agrimony (*Eupatorium cannabinum*) predominate. In the northern area of wet grassland vegetation, Hard rush (*Juncus inflexus*), Soft rush (*Juncus effusus*) and the bryophyte Pointed Spear-moss (*Calliergonella cuspidate*) are the most frequent species. Oval sedge (*Carex leporina* – syn. *C. ovalis*), Jointed rush (*Juncus articulatus*) and Creeping cinquefoil (*Potentilla reptans*) also occur occasionally to frequently.

The Third Schedule-listed invasive species New Zealand pygmyweed (*Crassula helmsii*) also occurs here and is considered to be of High Impact.

This site is assessed as of **Local importance (higher value)** as a result of the apparent scarcity of this habitat type locally, as well as the diversity of wetland species noted.

Invasive species spread and scrub encroachment were the primary impacts on this habitat recorded during the 2023 field surveys.

Dry siliceous heath (HH1)

This habitat occurs in two very small isolated patches in the south and north of the site and grades into exposed siliceous rock (ER1) and scrub (WS1) habitat. This heath habitat is in its nascent stages and has formed as result of the concentration of Bell heather (*Erica cinerea*) within these isolated areas, along with the grass species Red fescue (*Festuca rubra* agg.), Common bent (*Agrostis capillaris*) and the bryophyte Cypress-leaved Plait-moss (*Hypnum cupressiforme*). Gorse (*Ulex europaeus*) is gradually invading this small area of heathland.

Both of the areas of dry heath within the site were classified as the EU Habitats Directive Annex I habitat [4030] European dry heaths. This habitat is therefore considered to be of **County importance**, given its Annex I status and the scarcity of the habitat county-wide. However, owing to its very small area and nascent status, it is currently not considered to be of national importance.

Scrub encroachment was the primary impact on this habitat recorded during the 2023 field surveys.

Dense bracken (HD1)

Dense bracken (HD1) habitat is scattered across the north of the study area and is mostly located in areas of deeper soils between the higher areas of exposed siliceous rock (ER1) where the characteristic fern Bracken (*Pteridium aquilinum*) can establish its extensive rooting systems. Whilst this habitat is characterised by the dominance of Bracken, a few shrub species compete with this dominant species, including Bramble (*Rubus fruticosus* agg.). Beneath the cover of Bracken and Bramble, a few other species occur, including Common sorrel (*Rumex acetosa*), False oat-grass (*Arrhenatherum elatius*), Ivy (*Hedera helix*) and Cleavers (*Galium aparine*).

This habitat is considered to be of **Local importance (lower value)**, because of its relatively species-poor status within the site.

No notable impacts on this habitat were recorded during the 2023 field surveys.

Oak-ash-hazel woodland (WN2)

Oak-ash-hazel woodland (WN2) occurs along the path below the higher cliffs at the old signalling station tower above Dalkey Quarry and also occurring with scrub (WS1) and dry meadows and grassy verges (GS2) further to the west at the base of the quarry. This dry semi-natural woodland habitat is dominated by the tall canopy species Ash (*Fraxinus excelsior*) with some Sycamore (*Acer pseudoplatanus*) also evident.

The understorey and ground flora of the woodland comprises frequent Bramble (*Rubus fruticosus* agg.), False brome (*Brachypodium sylvaticum*) and Ivy (*Hedera helix*) with lesser quantities of Hogweed (*Heracleum sphondylium*), Hedge bindweed (*Calystegia sepium*), Herb-Robert (*Geranium robertianum*), Wood avens (*Geum urbanum*), Common nettle (*Urtica dioica*), Soft shield-fern (*Polystichum setiferum*), Greater stitchwort (*Stellaria holostea*) and the liverwort Forked Veilwort (*Metzgeria furcata*).

Surveys have shown that Three-cornered leek (*Allium triquetrum*), a Third Schedule invasive species, occurs less than ten metres from an area of WN2, with the potential to negatively affect this habitat if it were to spread into the woodland. Other non-native species recorded include Cotoneaster (*Cotoneaster* sp.), Montbretia (*Crocsmia x crocosmiiflora*) and Flowering currant (*Ribes sanguineum*).

Some areas of WN2 habitat correspond with the EU Habitats Directive Annex I habitat [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. However, the area of WN2 habitat within the site is not considered to align with the annex habitat owing to the lack of sufficient key indicator species for the habitat type, including *Quercus* species. Nonetheless, this habitat is considered to be of **County importance**, as a result of its relatively well-developed woodland vegetation, which is locally scarce and is within a nationally designated site.

No notable impacts on this habitat were recorded during the 2023 field surveys.

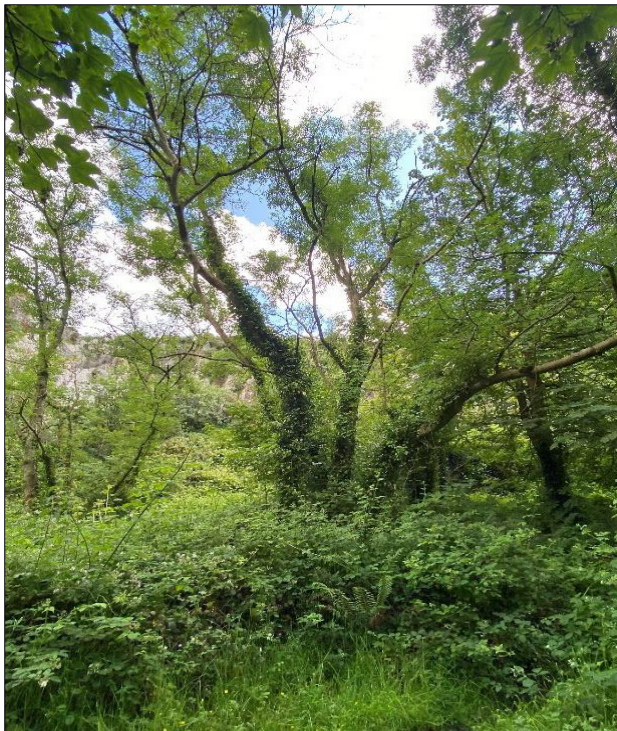


Plate 1: Oak-ash-hazel woodland (WN2) (FitzGerald, 2023)

(Mixed) broadleaved woodland (WD1)

This habitat is woodland which is highly modified as evidenced by a large proportion of non-native species, active removal of trees or timber and/or a poorly developed understorey. The former criterion applies at Killiney Hill where non-native species Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*) are the main canopy-forming species. Native tree species, Pedunculate oak (*Quercus robur*) and Ash (*Fraxinus excelsior*), are present in smaller quantities. Although the dominant canopy species are non-native, the relatively well-developed understorey vegetation indicates the considerable age of some of these patches of woodland, with the areas on the old Dalkey Quarry floor levels having presumably developed after the cessation of quarrying works here. The understorey contains ferns such as Hart's-tongue (*Asplenium scolopendrium*), Broad buckler-fern (*Dryopteris dilatata*) and Soft shield-fern (*Polystichum setiferum*). The woody species bramble (*Rubus fruticosus* agg.) and Ivy (*Hedera helix*) are abundant. The bryophyte component of the vegetation includes Common Feather-moss (*Kindbergia praelonga*), Swan's-neck Thyme-moss (*Mnium hornum*) and Dotted Thyme-moss (*Rhizomnium punctatum*). The locally rare native Yew (*Taxus baccata*) occurs in this habitat (although it is unclear whether it has escaped from cultivation or had been planted). The Third Schedule invasive species Three-cornered leek (*Allium triquetrum*) is present also.

This habitat is considered to be of **Local importance (higher value)** owing to its relatively well-developed woodland vegetation, which is within a nationally designated site.

Invasive species spread and vegetation trampling/fertilisation from excessive visitor access and domestic dog faecal and urine pollution were the primary impacts on this habitat recorded during the 2023 field surveys.



Plate 2: (Mixed) broadleaved woodland (WD1) – showing an area of little-disturbed woodland ground flora in the south of the site which is in high quality condition, including abundant Bluebell (*Hyacinthoides non-scripta*) (FitzGerald, 2023)

Mixed broadleaved/conifer woodland (WD2)

Mixed broadleaved/conifer woodland (WD2) is found throughout and is the most common habitat type in the south of the site. This dry woodland has a mix of conifer and broadleaved canopy species such as Sycamore (*Acer pseudoplatanus*), Scots pine (*Pinus sylvestris*), Beech (*Fagus sylvatica*), Larch species (*Larix* sp.), Pedunculate oak (*Quercus robur*) and Sessile oak (*Quercus petraea*). The ground flora contains herbs such as Greater Stitchwort (*Stellaria holostea*), Ground-ivy (*Glechoma hederacea*), Soft Shield-fern (*Polystichum setiferum*) and Broad Buckler-fern (*Dryopteris dilatata*). The woody species *Rubus fruticosus* agg. and *Hedera helix* are quite frequent. Typical woodland bryophytes are present including Common Feather-moss (*Kindbergia praelonga*), Swan's-neck Thyme-moss (*Mnium hornum*) and Rough-stalked Feather-moss (*Brachythecium rutabulum*). Cabbage palm (*Cordyline australis*) and Winter heliotrope (*Petasites pyrenaicus* (syn. *Petasites fragrans*)), both non-native taxa, have been recorded in this habitat.

High levels of trampling from human visitors to the park are negatively impacting the ground vegetation in some areas and it is considered likely that the high numbers of domestic dogs accessing these areas is causing an increase in nutrients locally in the soil through their faeces/urine deposition, and this is in line with recent research on the subject (De Frenne *et al.*, 2022). These areas should be the focus of woodland restoration measures in the future.

This habitat is considered to be of **Local importance (higher value)** owing to its relatively well-developed woodland vegetation, which is within a nationally designated site.

Invasive species spread and vegetation trampling/fertilisation from excessive visitor and dog access were the primary impacts on this habitat recorded during the 2023 field surveys.

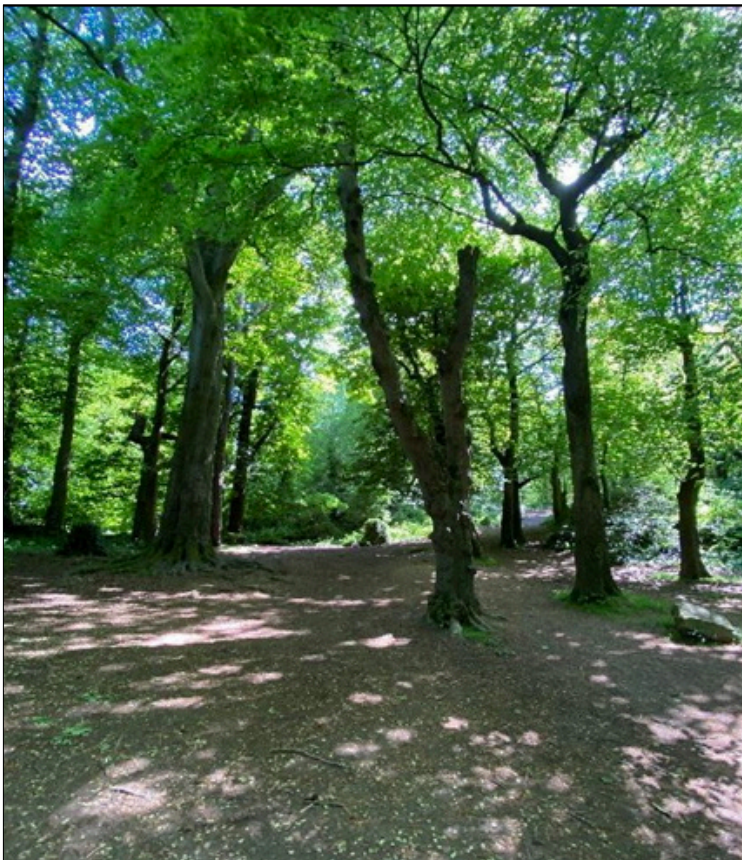


Plate 3: An area of Mixed broadleaved/conifer woodland (WD2) in the centre of the site where trampling, has resulted in a significant decline in ground flora cover (FitzGerald, 2023)

(Mixed) conifer woodland (WD3)

One area of (mixed) conifer woodland (WD3) occurs in the centre of the study area. Old stands of presumably planted (and naturalised) conifer species dominate the canopy here, with a predominance of Scots pine (*Pinus sylvestris*). The ground vegetation here is rocky and very sparse, with few plant species growing. Ivy (*Hedera helix*) is a shade-tolerant species which occurs scattered.

This habitat is assessed as being of **Local importance (higher value)** owing to its relatively well-developed coniferous canopy cover with the once-native and long-naturalised *Pinus sylvestris*, which is within a nationally designated site.

Vegetation trampling/fertilisation from excessive visitor and dog access was the primary impact on this habitat recorded during the 2023 field surveys.



Plate 4: Mixed conifer woodland (WD3). A stand of mature pines. (McDermott, 2024)

Scrub (WS1)

In terms of area, Scrub (WS1) is the most dominant habitat, frequently colonising exposed siliceous rock (ER1) giving rise to a common mosaic of these two habitats. The scrub habitat on site is characterised by the dominance of such shrub species as Bramble (*Rubus fruticosus* agg.), Gorse (*Ulex europaeus*), Elder (*Sambucus nigra*), Rusty willow (*Salix cinerea* subsp. *Oleifolia*), as well as Bracken (*Pteridium aquilinum*). Non-native shrub species also occur scattered within the vegetation, including Butterfly-bush (*Buddleia davidii*) and Himalayan honeysuckle (*Leycesteria formosa*).

In the ground layer of these shrubs, some tall and/or shade-tolerant, perennial grass species occur, including *Dactylis glomerata*, as well as creeping herbaceous species like Cleavers (*Galium aparine*) and Bush vetch (*Vicia sepium*). Other herbaceous species occur at the more exposed edges of the scrub vegetation, including Greater stitchwort (*Stellaria holostea*) and Alexanders (*Smyrniololus atratum*). The rare Dublin vascular plant Climbing corydalis (*Ceratocarpus claviculata*) was recorded in open patches amongst scrubland in numerous locations in the north-east and south-west of the site.

This habitat is considered to be of **Local importance (higher value)**, owing to its relatively high species diversity, broad habitat potential and its presence within a nationally designated site.

During the 2023 field surveys the primary impact noted in respect of this habitat was the spread of invasive species.



Plate 5: Gorse scrub on Killiney Hill (Keogh, 2023)

Exposed siliceous rock (ER1)

Exposed siliceous rock (ER1) habitat is concentrated on higher areas of the site and at Dalkey Quarry, on the old exposed quarry rock faces. Often occurring in a mosaic with scrub (WS1) and more rarely dry-humid acid grassland (GS3), this exposed granite bedrock produces an acidic substrate which makes it difficult for plants to establish as there is little or no soil substrate to which they can bind, resulting in generally patchy and often sparse vegetation.

It is characterised by hardy tufted grasses such as Red-fescue (*Festuca rubra* agg.) and Sheep's-fescue (*Festuca ovina* agg.) which have become established along with occasional low woody shrubs like Heather, Ling (*Calluna vulgaris*) and Bell heather (*Erica cinerea*). Herbaceous species such as Sheep's sorrel (*Rumex acetosella*), Cat's-ear (*Hypochaeris radicata*) and Foxglove (*Digitalis purpurea*) occur. Also to be found in this habitat are ferns, eg. Intermediate polypody (*Polypodium interjectum*) and bryophytes including: Dilated Scalewort (*Frullania dilatata*), Bristly/Lesser Fringe-moss (*Racomitrium heterostichum* agg.), Hooded Bristle-moss (*Orthotrichum cupulatum*) and Cypress-leaved Plait-moss (*Hypnum cupressiforme*). The rare Dublin vascular plant species Heath groundsel (*Senecio sylvaticus*) and Climbing corydalis (*Ceratocarpus claviculata*) also occur in this habitat. The locally rare, Irish endemic Whitebeam (*Sorbus Hibernica*) occurs on the sheer tops of the old quarry faces.



Plate 6: Exposed siliceous rock (ER1) Dalkey Quarry, with the climbing invasive species Maidenhair Vine on the rock face. (FitzGerald, 2023)

This habitat is considered to be of **County importance**, owing to its relative species richness, its scarcity at a county level, and its presence within a nationally designated site.

The primary impact on this habitat, noted during the 2023 field surveys, was the spread of invasive species. For example, Maidenhair vine (*Muehlenbeckia complexa*) found climbing extensively on the rock face of the quarry (Plate 6).

Ponds (FL8)

This habitat occurs as a temporary feature, occurring in close association with the wet grassland habitat at Dalkey Quarry when the quarry floor floods. Water levels are not maintained and levels drop quickly, drying out completely over a short period in dry weather.

Currently this habitat is assessed as of **Local importance (higher value)** because of its potential to support amphibians and invertebrates, such as dragonfly species that were observed during surveys in 2023; and in turn providing foraging habitat for bats.

Invasive species spread and scrub encroachment were the primary impacts on this habitat recorded during the 2023 field surveys.



Plate 7: Temporary ponding in Dalkey Quarry (Gandola, 2023)

Recolonising bare ground (ED3)

Recolonising bare ground (ED3) is located at the northern margin of the site and near the old signalling station tower where many non-native species have colonised the ground, including Himalayan honeysuckle (*Leycestria formosa*), Common wheat (*Triticum aestivum*), Mallow species (*Malva* sp.), Wilson's honeysuckle (*Lonicera nitida*) and Opium poppy (*Papaver somniferum*), Bramble (*Rubus fruticosus* agg.), Spear thistle (*Cirsium vulgare*), Prickly sow-thistle (*Sonchus asper*) and Smooth sow-thistle (*Sonchus oleraceus*) also grow here. The locally rare Heath groundsel (*Senecio sylvaticus*) occurs here, where it was found colonising the recently disturbed terrain.

This habitat is considered to be of **Local importance (lower value)** owing to the generally low species diversity, along with the abundance of non-native species.

No notable impacts on this habitat were recorded during the 2023 field surveys.

Buildings and artificial surfaces (BL3)

This habitat is scattered throughout the site in the form of pathways, roadways and built structures, including the old signalling station tower above Dalkey Quarry; and the Obelisk and Pyramid on Killiney Hill. Many non-native species have been recorded in this habitat including Toothed fireweed (*Senecio minimus*), Silver ragwort (*Jacobaea maritima*), Green alkanet (*Pentaglottis sempervirens*) and Snowberry (*Symphoricarpos albus*). Some coastal species also grow here including Rock sea-spurrey (*Spergularia rupicola*), Sea beet (*Beta vulgaris*), Sea plantain (*Plantago maritima*) and Rock Samphire (*Crithmum maritimum*). Other species colonise cracks in walls, especially ferns, such as Black spleenwort (*Asplenium adiantum-nigrum*) and Common maidenhair spleenwort (*Asplenium trichomanes subsp. Quadrialeans*).

This habitat is assessed as being of **Local importance (lower value)**, owing to the very species-poor status of the habitat and high abundance of non-native species.

No notable impacts on this habitat were recorded during the 2023 field surveys.

Rocky sea cliffs (CS1)

Rocky sea cliffs (CS1) habitat extends for over half of the length of the shore included in the pNHA study area. These areas of exposed bedrock provide little substrate for plants growth except for species such as Thrift (*Armeria maritima*) and Sea campion (*Silene uniflora*) found growing in crevices and on ledges. Sea spleenwort (*Asplenium marinum*) is also found within the sea spray zone, in crevices in the cliff edges. Other characteristic species include Rock sea-lavender (*Limonium binervosum* agg.), Portland spurge (*Euphorbia portlandica*), Common scurvygrass (*Cochlearia officinalis* agg.), Danish scurvygrass (*Cochlearia Danica*) and Buck's-horn plantain (*Plantago coronopus*). The notable species Rock samphire (*Crithmum maritimum*) occurs scattered on the cliffs here and a population of over fifty individuals of the locally rare Spring squill (*Scilla verna*) (Plate 4) was recorded on cliff-top grassland.

This habitat corresponds to the EU Habitats Directive Annex I habitat [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts and is evaluated as being of **National importance** owing to the presence of an Annex I habitat and locally rare species, within a nationally designated site.

Invasive species spread was the primary impact on this habitat recorded during the 2023 field surveys.



Plate 8: Spring squill (*Scilla verna*) in flower on rocky sea cliffs (CS1) (FitzGerald, 2023)

Shingle and gravel banks (CB1)

A narrow strip of nascent Shingle and gravel banks (CB1) habitat has developed on the landward edge of a section of Killiney Beach in the south-east of the site, where large sediments have been deposited. These coastal areas are dynamic, being occasionally disturbed during storms and spring tides. Generally, species such as Sea mayweed (*Tripleurospermum maritimum*) and Sea sandwort (*Honckenya peploides*) would be expected on such a substrate but the shingle here is unvegetated.

Owing to the lack of vegetation, this area is not considered to be equivalent to the EU Habitats Directive Annex I habitat [1220] Perennial vegetation of stony banks and is therefore considered to be of **Local importance (higher value)** currently, owing to the lack of colonising vegetation. However, if plants were to colonise this habitat in the future, it would be a habitat of at least county importance. The lack of vegetation may be a result of the fact that the shingle is highly mobile as a result of storm action thus making it unsuitable for the development of colonising vegetation, though this is probably exacerbated by heavy pressure (trampling) from beach visitors.

Trampling of the shingle from heavy beach visitor traffic was the primary impact on this habitat recorded during the 2023 field surveys.

Embryonic dunes (CD1)

A very small area of nascent embryonic dunes (CD1) habitat occurs along a section of Killiney Beach in the south-east of the site, adjacent to a sea wall. Although smaller than the typical minimum mapping unit size for habitat mapping, the vegetation is significant nonetheless and so is worthy of description. This habitat consists of small accumulations of sand have been colonised by Lyme-grass (*Leymus arenarius*) which binds the sand substrate and can enable further sand accumulation, given the continuation of suitable conditions and processes. These are the first stages in the formation of more mature sand dune systems. This habitat occurs at the upper end of the seashore, between the high tide mark and the more established marram dunes (CD2) habitat which is typically located at slightly higher elevations (the latter habitat was not recorded on site). Given the nascent condition of this habitat, only a few other species have been recorded here. These include Red valerian (*Centranthus ruber*), Cat's-ear (*Hypochaeris radicata*), Prickly sow-thistle (*Sonchus asper*) and Danish scurvygrass (*Cochlearia Danica*), which have all colonised the stabilised sand between the tufts of Lyme-grass (*Leymus arenarius*). A few individuals of the notable Early forget-me-not (*Myosotis ramosissima*) are found here.

The nascent area of embryonic dunes habitat within the site has been classified as the EU Habitats Directive Annex I habitat [2110] Embryonic shifting dunes. This habitat is assessed as being of **County importance** because of the scarcity of this Annex I habitat at a county scale.

Trampling of the dune vegetation from heavy beach visitor traffic was the primary impact on this habitat recorded during the 2023 field surveys.

Sand shores (LS2)

This habitat occurs along a section of Killiney Beach in the south-east of the site where it is very sparsely vegetated, with slow species diversity as a result. The tide line in this habitat contains large amounts of washed up seaweed and other organic material, which enhances the nutrients within the substrate locally. A few pioneer plant species have established on the loose sand and have created some minor, localised (and often ephemeral) stability within the sand. Those that have colonised this habitat are concentrated in the upper part of the shore where sediment and decaying organic matter accumulates at the strandline (and where there is somewhat reduced footfall from beach visitors). Species include Sea radish (*Raphanus raphanistrum* subsp. *Maritimum*), Curled dock (*Rumex crispus*), Spear-leaved orache (*Atriplex prostrata*), Sea mayweed (*Tripleurospermum maritimum*) and Silver ragwort (*Jacobaea maritima*).

All of the areas of sand shores within the site have been classified as the EU Habitats Directive Annex I habitat [1210] Annual vegetation of drift lines. This habitat represents the pioneer species mentioned above which establish on the nutrient-enriched seaweed/organic debris zone, although the habitat is evidently heavily degraded by the significant visitor traffic to the beach. This habitat is assessed as being of **County importance** due to the scarcity of this Annex I habitat at a county scale.

Trampling of the colonising drift line vegetation from heavy beach visitor traffic was the primary impact on this habitat recorded during the 2023 field surveys.

3.2.1.2 Plant Species

Legally Protected and Rare Flora

No plant species listed on the *Flora (Protection) Order (FPO) 2022* were recorded during field surveys in 2023. Seventeen locally rare native species were recorded within the study area (Table 3). Whilst having a restricted distribution, many of these species are locally abundant at Killiney Hill. Over fifty plants of Spring squill (*Scilla verna*) and hundreds of Climbing Corydalis (*Ceratocapnos claviculata*) individuals were recorded in May 2023. As mentioned above, Bird's-foot clover (*Trifolium ornithopodioides*) and Knotted clover (*Trifolium striatum*) were found to be thriving at their historic site near the Killiney Obelisk, with approximately thirteen plants of the former and thirty plants of the latter species noted in May 2023.

Table 3: Locally rare native plant species recorded within the study area in 2023

Species name	Common name
<i>Ceratocapnos claviculata</i>	Climbing Corydalis
<i>Crithmum maritimum</i>	Rock Samphire
<i>Euphorbia portlandica</i>	Portland spurge
<i>Fumaria purpurea</i>	Purple ramping fumitory
<i>Geranium sanguineum</i>),	Bloody crane's-bill
<i>Myosotis ramosissima</i>	Early forget-me-not
<i>Origanum vulgare</i>	Marjoram
<i>Orobanche hederæ</i>	Ivy broomrape
<i>Primula veris</i>	Cowslip
<i>Rosa rubiginosa</i>	Sweet-briar
<i>Rosa spinosissima</i>	Burnet rose
<i>Scilla verna</i>	Spring squill
<i>Senecio sylvaticus</i>	Heath groundsel
<i>Sorbus hibernica</i>	Whitebeam
<i>Taxus baccata</i>	Yew
<i>Trifolium ornithopodioides</i>	Bird's-foot clover
<i>Trifolium striatum</i>	Knotted clover

Non-native (Invasive) Flora

Two plant species listed on the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations, 2011 to 2021* were recorded during the field surveys in 2023, namely, Three-cornered leek (*Allium triquetrum*) and New Zealand pygmyweed (*Crassula helmsii*). *Allium triquetrum*

is scattered throughout the site mostly in scrub and woodland. *Crassula helmsii* was also found in wet grassland (GS4) in the north of the site.

Many other non-native/introduced plant species were recorded across the study area during the field surveys, and although some can be of benefit to wildlife (e.g. pollinators), some of these are considered to be invasive in some habitats and contexts. These species have arrived by various means, including natural and human routes, such as garden escapes, transportation by birds, small mammals and wind, as well as via intentional dumping of garden waste and accidental transport by human visitors.

These non-native species are particularly concentrated along the margins of the study area. The majority of these species are unlikely to become invasive within the site, due in part to natural competition with native species, and many provide floral food resources for local animals, including insect pollinators.

Non-native plant species recorded on site in 2023 are listed below in Table 4 and shown in Figure 4.

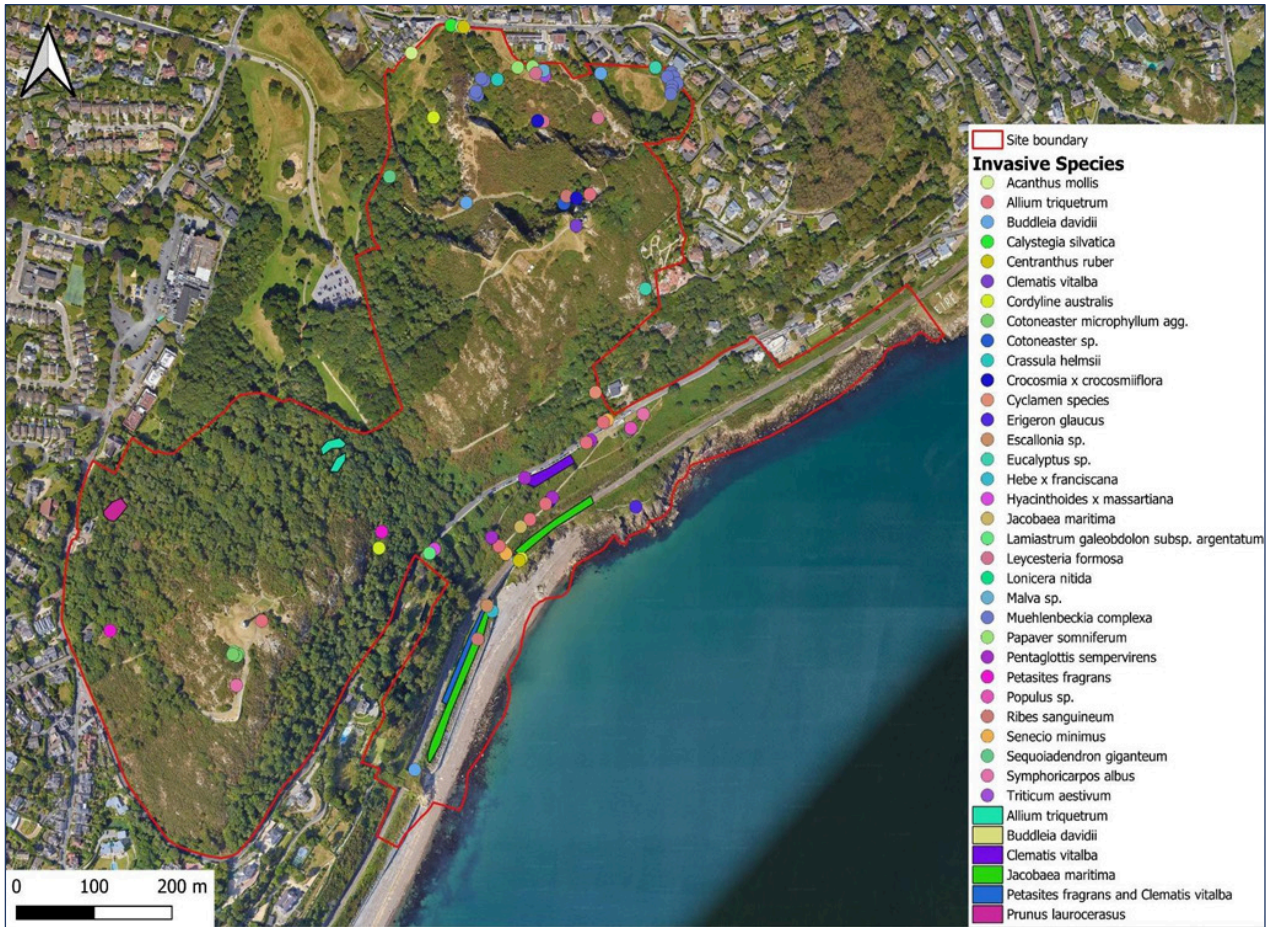
Table 4: Non-native plant species recorded on site in 2023

* denotes species listed on the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations, 2011 to 2021*

Species name	Common name
<i>Acanthus mollis</i>	Bear's-breeches
<i>Acer pseudoplatanus</i>	Sycamore
<i>Aesculus hippocastanum</i>	Horse-chestnut
<i>Allium triquetrum</i> *	Three-cornered leek
<i>Buddleja davidii</i>	Butterfly-bush
<i>Calystegia sylvatica</i>	Large bindweed
<i>Centranthus ruber</i>	Red valerian
<i>Clematis vitalba</i>	Traveller's-joy
<i>Cordyline australis</i>	Cabbage palm
<i>Cotoneaster</i> sp.),	Cotoneaster
<i>Cotoneaster microphyllum</i> agg.	Small-leaved cotoneaster
<i>Crassula helmsii</i> *	New Zealand pigmyweed
<i>Crocosmia × crocosmiiflora</i>	Montbretia
<i>Cupressus</i> sp.	Cypress sp.
<i>Cyclamen</i> sp.	Cyclamen
<i>Epilobium ciliatum</i>	American willowherb
<i>Erigeron glaucus</i>	Seaside daisy
<i>Escallonia</i> sp.	Escallonia
<i>Eucalyptus</i> sp.	Eucalyptus
<i>Hyacinthoides × massartiana</i> (from <i>H. hispanica</i>)	Hybrid bluebell
<i>Jacobaea maritima</i>	Silver ragwort
<i>Jacobaea x albescens</i>	Silver ragwort x Common ragwort
<i>Lamiastrum galeobdolon</i> subsp. <i>Argentatum</i>	Variiegated yellow archangel
<i>Leycesteria formosa</i>	Himalayan honeysuckle
<i>Lonicera nitida</i>	Wilson's honeysuckle
<i>Malva</i> sp.	Mallow sp.
<i>Muehlenbeckia complexa</i>	Maidenhair vine

Species name	Common name
<i>Papaver somniferum</i>	Opium poppy
<i>Pentaglottis sempervirens</i>	Green alkanet
<i>Petasites pyrenaicus</i> (syn. <i>Petasites fragrans</i>)	Winter heliotrope
<i>Pinus radiata</i>	Monterey pine
<i>Populus</i> sp.	Poplar sp.
<i>Prunus laurocerasus</i>	Cherry Laurel
<i>Pseudotsuga menziesii</i>	Douglas fir
<i>Ribes sanguineum</i>	Flowering currant
<i>Senecio minimus</i>	Toothed fireweed
<i>Sequoiadendron giganteum</i>	Giant Redwood
<i>Symphoricarpos albus</i>	Snowberry
<i>Triticum aestivum</i>	Common wheat
<i>Veronica</i> × <i>franciscana</i> (<i>Hebe</i> × <i>franciscana</i>)	Hebe sp.
<i>Veronica persica</i>	Common field-speedwell

Figure 4: Map to show the location of invasive non-native plant species found in 2023 (FitzGerald, 2023)



3.2.1.3 Fauna

Bats

Legal status

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010) and are listed in Annex IV of the EU Habitats Directive (EC, 1992), with the lesser horseshoe bat *Rhinolophus hipposideros* also listed under Annex II. Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) both of which have been ratified by the Irish government.

Under existing legislation, the destruction, alteration or evacuation of a known bat roost is an offence and any works interfering with bats - especially their roosts - may only be carried out under a derogation licence granted by National Parks and Wildlife Service (NPWS) pursuant to Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011) which transposed the EU Habitats Directive into Irish law.

Bats at Killiney

During the 2023 surveys six species of bat (Roche et al. 2014) were detected within the survey area: common pipistrelle, soprano pipistrelle, Leisler's bat, Nathusius' pipistrelle, brown long-eared bat and Daubenton's bat. The bat activity recorded comprised commuting individuals and foraging within the survey area along the treeline boundaries, parkland, open sections (e.g. adjacent to monuments) and woodland tracts. Common pipistrelle was the most frequently recorded bat species followed by soprano pipistrelle and Leisler's bat and these were distributed throughout the survey area while all other bats species were occasionally encountered.

Key habitats for bats at Killiney are:

- *Mixed broadleaved/coniferous woodland*: Many of the trees have Potential Roost Features (PRFs) for bats as well as providing shelter for commuting and foraging bats.
- *Scrub and Dry siliceous heath*: This habitat provides foraging area for bats.
- *Exposed siliceous rock*: Deep crevices and fissures are potential roosting features for bats.
- *Ponds*: Temporary pooling occasionally occurs on the quarry floor. When/if present, this habitat type is a source of aquatic insects for foraging bats.
- *Stonewalls and other stonework*: Ivy and holes and crevices in stonewalls may provide roosting sites.

No bat roosts were recorded in the monuments, buildings and quarry faces surveyed, within the survey area. The survey did not include a survey of mature trees with Potential Roost Features (PRFs) to determine the presence of roosting bats in trees. However, as all bats, but particularly brown long-eared bats and Daubenton's bats, will frequently use PRFs in trees, it is highly likely that there are tree roosts present.

Commuting individuals of Leisler's bats, common pipistrelles and soprano pipistrelles were noted flying into the survey area and therefore there are likely to be bat roosts for these species in buildings in the wider Killiney area.

The evaluation of Killiney Hill for local bat populations is that it has a potential Geographical Importance of "**County Importance**" for local bat populations. The functionality of the site is also important and with Killiney Hill being an isolated area of suitable habitats for roosting, foraging and commuting bats located in a highly urbanised zone it is therefore important that such a resource is retained as it is likely that the

local bat populations are dependent on its resources. It is also important that it is enhanced and managed in a manner that increases the conservation status of the site for local bat populations.

Management measures to protect bats; to increase the connectivity of Killiney Hill; and to increase roosting resource, commuting and foraging habitats are included in the objectives and actions of this Plan (See Section 5 below and Appendix 2).



Plate 9: A bat flying (species unknown) recorded by trail camera during faunal Surveys (Fennessy, 2023)

Non-volant mammals

Legal status

A number of mammal species are protected under the provisions under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010) where it is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal.

Section 23 (5)(d) of the Wildlife Act 1976, as amended, states: *'any person who wilfully interferes with or destroys the breeding place or resting place of any protected wild animal, shall be guilty of an offence'*

Additionally, Otter is protected under European Law, listed under Annex II and Annex IV of the EU Habitats Directive (92/43/EEC) which affords the species additional strict protections of the species and its breeding sites and resting places, inside and outside their designated Special Areas of Conservation (SAC) sites.

Non-volant mammals at Killiney

Techniques used to identify mammal activity followed recognised guidelines (e.g., Clark 1988, Sutherland 1996, Bang & Dahlstrom 2004 and JNCC 2004). Badger setts were identified using guidelines set out in Scottish Badgers (2018).

The presence of a number of mammal species was confirmed during 2023 surveys from direct observations, including signs of activity, and the deployment of trail cameras across the study area.

Protected species recorded included Badger (*Meles meles*), Pygmy Shrew (*Sorex minutus*) and Red Squirrel (*Sciurus vulgaris*).



Plate 10: Badger recorded by trail camera during faunal surveys (Fennessy, 2023)

No breeding sites, sightings or other evidence of the protected mammal species, Irish Hare (*Lepus timidus hibernicus*), Hedgehog (*Erinaceus europaeus*) and Irish Stoat (*Mustela erminea hibernica*) were recorded within the site as part of the 2023 surveys. However, the site is deemed to contain suitable resting and breeding habitat for all of these.

While no sign of Otter presence (prints, spraints, or scats) was recorded during the 2023 survey, there is suitable habitat along the coast where there are historical records for this species (NBDC database). An otter survey, previously commissioned by Dún Laoghaire–Rathdown County Council and carried out in March and April 2020, recorded otter activity including sprainting and the presence of holts and an otter couch (resting place) in steep coastal areas with poor accessibility (Brazier & Macklin, 2020).

Fox prints and droppings were recorded throughout the study area. Foxes were frequently sighted during surveys and recorded by the trail cameras, particularly the overnight trail cameras. Grey Squirrel (*Sciurus carolinensis*), Brown Rat (*Rattus norvegicus*), Domestic Cat (*Felis catus*) and Dog (*Canis lupus familiaris*) were also recorded by the cameras. Dogs were regularly recorded in proximity to, and entering, a badger sett (Plate 11).

The site contains a variety of habitats that are suitable as foraging, breeding and resting places for a range of mammal species. These habitats, especially the areas of mature woodland, are considered to be of particular ecological importance owing to their location within the context of an urban environment, providing refuge for mammal species. However, these habitats have clearly been impacted by visitor pressure, Killiney Hill being a popular public amenity in Dublin - not least because dogs are permitted to be fully off leash within all areas of the site at all times. The high number of off-leash dogs at the park has not only impacted many of the habitats present but has likely contributed to the disturbance of mammals that utilise Killiney Hill.

Off-leash dogs were a regular occurrence during surveys throughout the site - not just on the main public walkways. In fact the level of dog activity in the park was at an intensity that it potentially impeded the survey for mammal tracks and signs. Tracks and signs may be obscured by the intensity of traffic and it is likely that the amount of dog activity in the most visited areas of the park would cause certain wild mammals to avoid these areas entirely.

Management measures to protect mammals, also to enhance and restore their habitats are included in the objectives and actions of this Plan (See Section 5 below). The DLR Red Squirrel Restoration Project 2023 is ongoing. See 3.2.2 below and <https://www.dlrcoco.ie/heritage-biodiversity/biodiversity/dlr-red-squirrel-restoration-project-2023-2030>.



Plate 11: A dog entering a badger sett recorded by trail camera during faunal surveys (Fennessy, 2023)

Birds

The species and composition of family groups/guilds recorded at Killiney Hill Park and along the adjacent coastline during the 2023 breeding bird surveys was broadly as would be expected. Species recorded are listed in Appendix 3, the bulk of which comprise a suite of woodland species. The heathland and gorse scrub areas provided habitat for species more typically associated with open habitats such as Common Linnet (*Linaria cannabina*) and Willow Warbler (*Phylloscopus trochilus*), while the coastal zone hosted species typically associated with marine or intertidal areas such as the European Rock Pipit (*Anthus petrosus*), Northern Fulmar (*Fulmarus glacialis*) and European Shag (*Phalacrocorax aristotelis*).

The breeding status and number of territories was assessed in 2023 for the five ‘Red List’ species recorded, 9 of the 27 ‘Amber List’ species (which showed possible, probable or confirmed breeding behaviours) and 13 of the 39 ‘Green List’ species (which are of note in relation to the context of the survey area). These are summarised in Tables 5 and 6.

Table 5: Summary table showing the number of birds recorded in the study area (Killiney Hill Park and adjacent coastline) between April and July 2023 (categorised by Birds of Conservation Concern in Ireland 4 (BoCCI4, Gilbert et al) classification and breeding status following BTO criteria¹)

BoCCI4 Status	Non-breeding	Possible	Probable	Confirmed	Total
Red	5	0	0	0	5
Amber	18	1	4	4	27
Green	7	3	12	17	39
Total	30	4	16	21	71

¹ British Trust for Ornithology (website accessed April 2023)
<https://www.bto.org/sites/default/files/u36/downloads/breedingcodes.pdf>

Table 6: The five 'Red List', 9 of the 27 'Amber List' species and 13 of the 39 'Green List' BoCCI species recorded in the study area (Killiney Hill Park and adjacent coastline) between April and July 2023 (showing their conservation status, approximate number of territories and breeding status).

Species	Common Name	BoCCI status	Bird Directive Annex I	No. of Territories	Breeding Status
<i>Rissa tridactyla</i>	Black-legged Kittiwake	Red	No	0	Non-breeding
<i>Falco tinnunculus</i>	Common Kestrel	Red	No	0	Non-breeding
<i>Apus apus</i>	Common Swift	Red	No	0	Non-breeding
<i>Haematopus ostralegus</i>	Eurasian Oystercatcher	Red	No	0	Non-breeding
<i>Anthus pratensis</i>	Meadow Pipit	Red	No	0	Non-breeding
<i>Fulmarus glacialis</i>	Northern Fulmar	Amber	No	1	Possible
<i>Regulus regulus</i>	Goldcrest	Amber	No	12	Confirmed
<i>Chloris chloris</i>	European Greenfinch	Amber	No	4	Confirmed
<i>Larus argentatus</i>	European Herring Gull	Amber	No	1	Probable
<i>Passer domesticus</i>	House Sparrow	Amber	No	2	Probable
<i>Linaria cannabina</i>	Common Linnet	Amber	No	8	Confirmed
<i>Anas platyrhynchos</i>	Mallard	Amber	No	1	Probable
<i>Phalacrocorax aristotelis</i>	European Shag	Amber	No	1	Probable
<i>Phylloscopus trochilus</i>	Willow Warbler	Amber	No	4	Confirmed
<i>Sylvia atricapilla</i>	Eurasian Blackcap	Green	No	19	Confirmed
<i>Phylloscopus collybita</i>	Common Chiffchaff	Green	No	5	Probable
<i>Cuculus canorus</i>	Common Cuckoo	Green	No	1	Possible
<i>Locustella naevia</i>	Common Grasshopper Warbler	Green	No	2	Possible
<i>Garrulus glandarius</i>	Eurasian Jay	Green	No	1	Probable
<i>Falco peregrinus</i>	Peregrine Falcon	Green	Yes	1	Probable
<i>Anthus petrosus</i>	European Rock Pipit	Green	No	1	Probable
<i>Corvus corax</i>	Northern Raven	Green	No	1	Probable
<i>Saxicola rubicola</i>	European Stonechat	Green	No	1	Confirmed
<i>Accipiter nisus</i>	Eurasian Sparrowhawk	Green	No	1	Probable
<i>Spinus</i>	Eurasian Siskin	Green	No	1	Probable
<i>Certhia familiaris</i>	Eurasian Treecreeper	Green	No	4	Confirmed
<i>Curruca communis</i>	Common Whitethroat	Green	No	1	Possible

Species undergoing range and abundance increases in recent years appear to be doing well here (for example the Eurasian Blackcap and Eurasian Bullfinch) as well as some other species which are declining nationally and notable locally in the context of the study site such as the Willow Warbler. The seemingly abundant number of warbler territories plus the continued presence of breeding Treecreepers (Plate 12) and other woodland passerines would suggest that the habitat integrity is good, however, the lack of any confirmed breeding by Eurasian Sparrowhawk (*Accipiter nisus*), Long-eared Owl (*Asio otus*) (Plate 13) which had been confirmed as a breeding species in the Park in 2022, and only a brief sighting of Eurasian Jay suggests that this may be a result of impacts such as disturbance. In particular, the lack of understorey and ground flora in some sections of woodland (WD2 in particular) point towards uncontrolled usage by people and dogs which may be having an effect on both habitat and birds.

Significantly, certain woodland species recorded on the site in previous years were not recorded during the 2023 surveys. These included: Common Buzzard (*Buteo buteo*), Stock Dove (*Columba oenas*), Great Spotted Woodpecker (*Dendrocopus major*) and Spotted Flycatcher (*Muscicapa striata*). Of these species, Stock Dove and Spotted Flycatcher are former breeders (Coombes, 1989) while Common Buzzard and Great Spotted Woodpecker are both present elsewhere in County Dublin, expanding in the general area of South County Dublin after colonising in recent decades (Mcdevitt et al., 2011 and Hobbs, 2022) . The fact that these species are missing from the site might suggest that habitat quality is lacking, disturbance is a limiting factor, or possibly that the isolated nature of the woodland here (surrounded by suburban areas) is a barrier to successful establishment.

Several pairs of Common Linnets and some Willow Warblers were found to be present in heathland and gorse scrub habitats, the latter often where small broadleaf trees grow in patches or around the periphery. However, species such as Common Whitethroat and Meadow Pipit are notable in their absence here, which might be explained by the lack of a diverse vegetation structure - the homogenous height and age class of the gorse reducing the possible extent of area where some ground nesting birds might establish a territory. Also, it appears that enrichment of the soil in areas close to public access, through fouling by dog faeces and other organic input (litter), is creating a grassy sward in many parts of the heathland, furthering the reduction in habitat quality there.



Plate 12: Eurasian Treecreeper (*Certhia familiaris*) at Killiney Hill (Keogh, 2023)



Plate 13: Long-eared owl at Killiney Hill (Photograph courtesy of Michael and Lucy Ryan)

In terms of the coastal zone, European Rock Pipit likely bred, and a European Stonechat pair successfully bred. Prospecting pairs of European Shag and European Herring Gull were noted in suitable habitat of the coast early in the season, but no nesting attempts were known to occur. A few

prospecting Northern Fulmars were observed at the tradition nest site but no nesting was known to occur here in 2023. This site once held between 5 and 10 pairs of nesting Fulmar, with as many as 30-40 birds seen in flight around the site early in the season during nest site prospecting time (Coombes, 1989).



Plate14: Cormorant (Phalacrocorax carbo) at Killiney Beach (Keogh, 2023)

Peregrine Falcon and Northern Raven have traditionally bred successfully in the Killiney Hill area, with pairs of both still present in 2023. However, neither species appeared to have bred successfully this year.

The Killiney Hill Park and adjacent coastal zone continues to support a wide variety of breeding and migrating bird species, many of which are notable in a local context. However, it is apparent that certain aspects of the habitat there are becoming degraded and use of the site by visitors and their dogs may be introducing a level of disturbance which is beginning to influence some species.

Management measures to protect birds and their habitats, also to enhance habitats, are included in the objectives and actions of this Plan (See Section 5 below).

Reptiles and amphibians

A total of 26 Common lizard (*Zootoca vivipara*) were detected in two of the three main survey areas in 2023, with only one sighting being made within the Killiney Hill-Dalkey Quarry public amenity parkland.

The survey results suggest that the resident population of *Z. vivipara* has markedly declined within the last few years. Juvenile lizards were not detected in formerly prime locations. This apparent population collapse is likely a direct result of the decline in quality of the heathland and edge habitats within the park. These habitats are under significant pressure from extensive natural succession, over-shading, destruction from recreational users, excessive nutrient input, and fire. The highest densities for Common lizards within the pNHA is along the coastal cliff grasslands and managed access trails.

The almost complete lack of encounters in formerly occupied parts of the park cannot be explained by the weather as sightings were made on the same survey dates only a short distance away at the coast. It is hoped that any remnant lizard population within the park has moved to small areas of hard-to-access patches of habitats that may remain in good condition.

This study has generated a baseline dataset for common lizards in the wider Dalkey Coastal Zone & Killiney Hill pNHA from which a long-term monitoring framework can now be created and against which

the effectiveness of restorative interventions can be compared. If such interventions are not rapidly forthcoming, it is likely that the common lizard will become functionally extinct in the Killiney Hill & Dalkey Quarry parkland section of pNHA, if they are not so already.



Plate 15: Common lizard, *Zootoca vivipara* (Gandola 2023)

Neither of the two widespread native amphibians, the Common frog (*Rana temporaria*) and Smooth newt (*Lissotriton vulgaris*) had been recorded during the 2023 surveys, though this was considered to be in part due to the timing of surveys outside their breeding seasons. For this reason, a targeted amphibian breeding survey was carried out in early 2024 which confirmed that both sides of Dalkey Quarry offer wetland habitat suitable for common frogs, as evidenced by the presence of spawn in both areas (Figure 5). As described above at section 3.2.1.1 Habitats, Ponds (FL8), this habitat occurs as a temporary feature, occurring in close association with the wet grassland habitat at Dalkey Quarry when the quarry floor floods. Water levels are not maintained and levels drop quickly, drying out completely over a short period in dry weather. A means of maintaining water levels on the quarry floor for longer in order to sustain amphibians is currently being investigated.

Measures to protect reptiles and amphibians, also to enhance and restore their habitats are included in the objectives and actions of this Plan (See Section 5 below).

Figure 5: Suitable breeding habitat for Common frog (Gandola, 2024)



Invertebrates

Limited information is available on the invertebrate diversity of the area and no dedicated invertebrate surveys were undertaken in 2023, with the exception of the annual butterfly transect at Killiney Hill Park. Occasional sightings of invertebrates were noted during the various specialist surveys, including for example, the presence of dragonflies around the temporary flooded area and wet grassland at Dalkey Quarry. Invertebrate surveys are planned for 2024/2025.

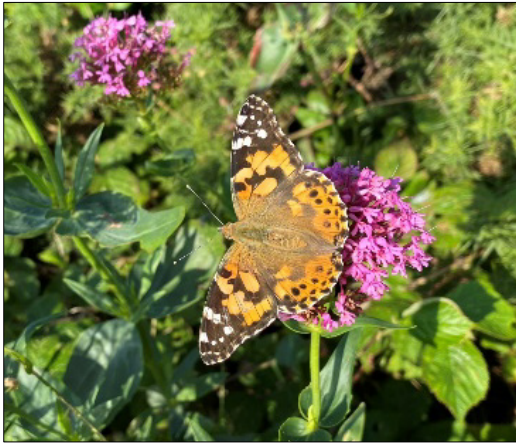


Plate 16: Painted Lady Butterfly (Vanessa cardui) on Dalkey Hill July 2023 (Keogh, 2023)

3.2.2 DLR Red Squirrel Project

3.2.2.1 Background and Aim of the Project

The DLR Red Squirrel Conservation Project commenced in Killiney Hill Park when it became apparent that the small population of red squirrels had reached critically low levels. The project started in 2007 with an assessment of the red squirrel and the removal of grey squirrels that had just arrived in the Park. By 2011, it became apparent that the red squirrel population was in trouble and that if action was not taken this native endangered species might be lost to Killiney. Killiney Hill Park is one of the last urban areas in Dublin where the native red squirrel remains (the other being Howth where in 2018 it was also at risk of being lost). The project involved the translocation of fifteen red squirrels from Wexford to Killiney and their managed release in early September 2012, with assistance from NPWS and UCD.

The aim of the project was to supplement the local red squirrels at Killiney with the objective of building a sustainable population as part of the conservation of red squirrel and to help achieve the targets of the All-Ireland Species Action Plan for Red Squirrel (NPWS/EHS, 2008). The red squirrel is our native squirrel species that has been present since before the last ice age and it is protected under the Wildlife Act 1976 & 2000 (as amended). The project also involves the control of the grey squirrels that are invading the red squirrel's habitat in the County. Reds are smaller than greys and are very vulnerable to the squirrel poxvirus which greys carry. Not only are greys larger and more prolific breeders than reds but they compete with Reds for food resources.

DLR Council staff, with the assistance of a Red Squirrel specialist from UCD and in consultation with National Parks and Wildlife Service, have managed the project on the ground. The following management actions have been undertaken:

- a. Raising Awareness

An awareness campaign was initiated to educate the public and raise interest in helping to protect the Red Squirrel. A Killiney Hill Red Squirrel Group was set up and this group monitors squirrels in the areas surrounding the park. Residents and schools in the area between Dalkey, Killiney and Ballybrack Village also contribute to the project by taking part in the DLR Garden/School Squirrel Survey which involves regular monitoring of squirrels.

b. Scientific Monitoring

Scientific monitoring is ongoing by the council with assistance from UCD and is considered a very important aspect of the success of the project. Monitoring aims to:

- collect annual data on grey squirrel control in order to monitor the control effort and target future control;
- collect annual data on red squirrel numbers to ensure the population is viable and surviving.
- carry out any recommendations as a result of monitoring

c. Supplementary Feeding where appropriate

3.2.2.2 Monitoring results

Monitoring from 2014 showed a good result with the recruitment of four new females into the population. In an attempt to add to the genetic diversity of the population, two rescued red squirrels from the Kildare were added during 2015 and were still there at the end 2015. During 2015 one female showed signs of breeding. Eight new red squirrels were captured and tagged in 2015. In 2017 a female that was introduced from Wexford was still on the hill and showed signs of breeding. A male captured in 2016 was still on the hill and two new reds, (one male and one female) in 2017. These new reds were tagged and there were reported sightings of two more without tags. April 2018 a female introduced from Wexford was lactating and the other female was heavily pregnant. Monitoring was halted during 2019 and 2020 owing to the Covid pandemic which also saw an increase in visitors to Killiney Hill during that time. Monitoring post-Covid has shown a decline in the red squirrel population on Killiney Hill which is attributed to increased visitor pressure and increased numbers of dogs off leash. Grey squirrel are managed annually on the hill but greys would also have increased during Covid and their management is ongoing.



***Plate 17: Red Squirrel (Sciurus vulgaris) at Killiney Hill
(Photograph courtesy of Michael and Lucy Ryan)***

3.2.2.3 Red Squirrel Restoration Project 2023 – 2030

The decline in the red squirrel population was reported to DLR following monitoring in 2022 (Carr, 2022). DLR have commenced the Red Squirrel Restoration Project 2023- 2030 in response to the decline as it is considered urgent to ensure the protection of such an iconic and important species. In 2023 DLR Biodiversity commissioned the fencing of areas identified as most sensitive for red squirrels. The aim is to allow these areas to recover and for vegetation to recolonise to provide cover, not only for red squirrel but also for other mammals impacted by the degradation of these important areas.

An awareness campaign was initiated in 2023 using DLR's website, social media, talks by DLR Biodiversity Officer, leaflets were distributed to the surrounding Killiney residents and information signs were placed at the Killiney tea rooms and on the hill. NPWS were also consulted in relation to the project.

Fencing has been erected in places and signs have been placed on the fencing explaining its purpose. This work will continue over coming years and the restoration areas will be monitored to examine their recovery along with the ongoing red squirrel annual monitoring.

4 KNOWN IMPACTS ON HABITATS AND SPECIES

A number of problems and impacts have been identified, including:

- Nutrient enrichment from dog faeces (dog poo), human littering etc.
- Disturbance of protected and important species – most commonly as a result of some humans and off-leash dogs not keeping to the paths provided by Parks and going into areas used by these species.
- Destruction and degradation of protected species habitat, also largely owing to some humans and off-leash dogs not keeping to the paths provided and in doing so trampling / damaging habitats and sensitive areas, including those used by protected species.
- Displacement of protected and important species as a result of destruction and deterioration of their habitats.
- Dogs trying to enter badger setts and displaying hunting behaviour that is perceived as threats by this protected species.
- Loss of important and protected habitat from the Hill.
- Fire is a known serious threat for humans but also for habitats and their constituent species – both from fire itself and from fire management.
- The presence of a large number of invasive alien plant species.

Plate 18 shows examples of areas with little or no ground flora as a result of damage by trampling.

Known impacts on habitat types and species groups at Killiney Hill identified during the 2023 surveys are summarised in Table 7.



Plate 18a (left): Heavy trampling activity in the root zone of Birch. Plate18b (right): Trampling damage around and under Hazel trees, along the margins of the path from the tea rooms. (Faith Wilson, 2024)

Table 7: Summary of known impacts on habitats and species in 2023

Habitat /species	Impact
Habitat	
Exposed siliceous rock (ER1)	Spread of invasive alien species
Dry meadows and grassy verges (GS2)	No notable impact
Scrub (WS1)	Spread of invasive alien species
Dry-humid acid grassland (GS3)	No notable impact
Dense bracken (HD1)	No notable impact
Oak-ash-hazel woodland (WN2)	Three-cornered leek occurs nearby and has the potential to negatively affect this habitat if it were to spread into the woodland
Dry siliceous heath (HH1)	Scrub encroachment due to lack of grazing/management
Buildings and artificial surfaces (BL3)	No notable impact
Shingle and gravel banks (CB1)	Trampling from heavy beach visitor traffic
Rocky sea cliffs (CS1)	Invasive alien species spread
Recolonising bare ground (ED3)	No notable impact
Amenity grassland (improved) (GA2)	No notable impact
Dry calcareous and neutral grassland (GS1)	Trampling from excessive visitor and dog access
Wet grassland (GS4)	Invasive species spread and scrub encroachment
Ponds (F8)	Invasive species spread and scrub encroachment
(Mixed) broadleaved woodland (WD1)	Invasive species spread and vegetation trampling/fertilisation(dog poo) from excessive visitor access and dogs
Mixed broadleaved/conifer woodland (WD2)	Invasive species spread and vegetation trampling/fertilisation (dog poo) from excessive visitor access and domestic dogs
(Mixed) conifer woodland (WD3)	Vegetation trampling/fertilisation (dog poo) from excessive visitor and dog access.
Sand shores (LS2)	Trampling of the colonising drift line vegetation from heavy beach visitor traffic
Embryonic dunes (CD1)	Trampling of the dune vegetation from heavy beach visitor traffic
Faunal species	
Bats	Potential for loss of on the functionality of the site for bats as a result of habitat degradation.
Mammals (non-volant)	Habitat degradation and disturbance of mammals - including as a result of trampling/ fertilisation (dog poo) from excessive visitor access and dogs.
Birds	Habitat degradation and excessive visitor access and dogs.
Amphibians and Reptiles	Decline in quality of the heathland and edge habitats. Scrub encroachment due to lack of grazing/management.

5 FIRE STRATEGY AND VEGETATION MANAGEMENT

The Wildfire Management Plan for Killiney Hill and Mullins/Roche's Hill Phase 2 Report (Gibson & Tubridy, 2023) sets out a strategy for managing vegetation.

This includes the identification of buffers, management areas and breaking axes in order to lower fire intensity and rate of spread so that it is within the containment capacity of responders. At the same time it is important to maintain a balance between managing for fire risk and other parameters whether they are biodiversity or public safety.

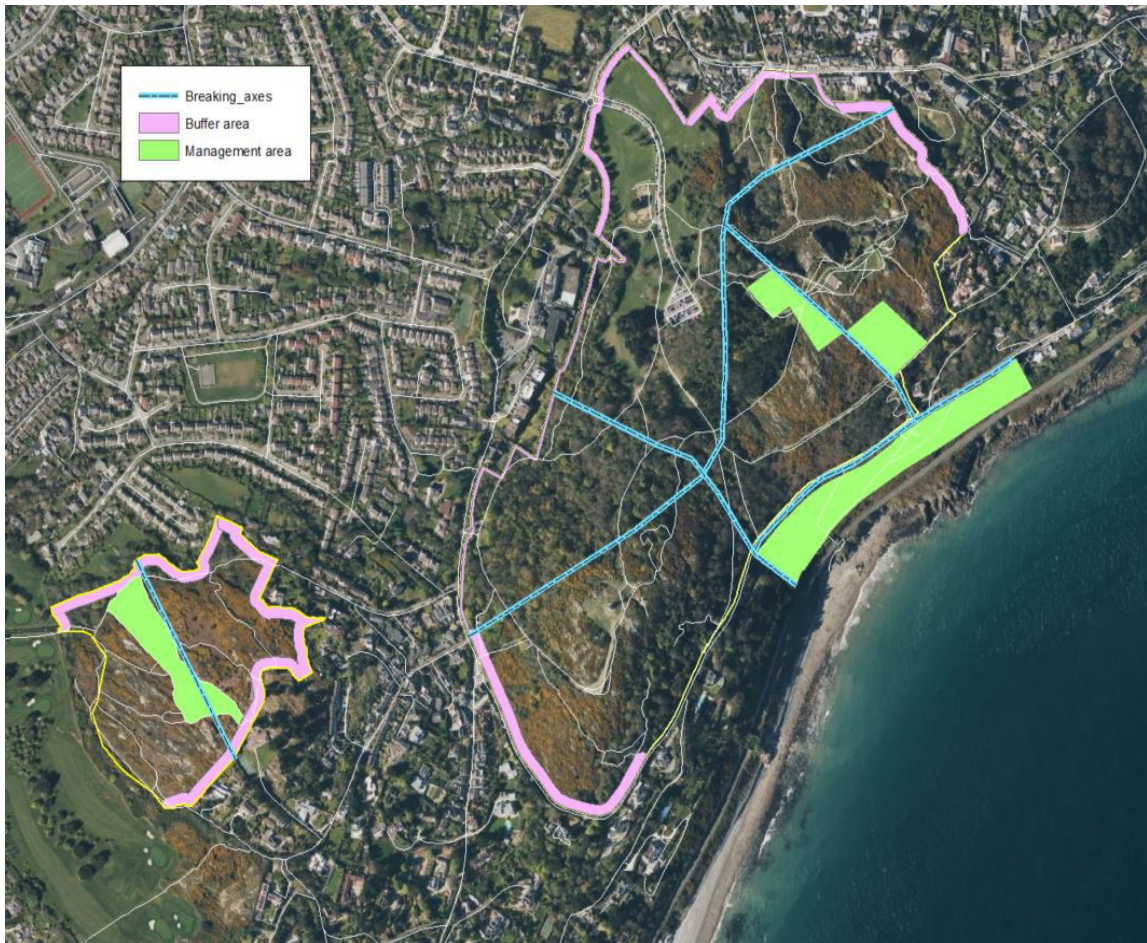
- Buffer zones are areas of managed vegetation around the perimeter of the sites where the fuel load is significantly reduced in order to reduce the potential fire intensity. Usually created to reduce the likelihood of fire spread, ideally they should comprise diverse natural grassland with all shrubs being removed.
- Management Areas *“are areas of strategic importance where greater fire resilience is built across the landscape so that fire responders can more easily limit fire spread and reduce the potential scale of fire events”* (Gibson, 2023). DLR aims to introduce goat grazing for these areas which will create habitat diversity. These areas are not buffers and so do not require shrub removal. They will be managed as habitat mosaics with natural grassland and heath which already occur naturally on Killiney Hill.
- The Dividing (breaking) Axis *“is of particular relevance to fire fighting. They define where the fuel loading should be reduced to a point where in the event of fire; responders would be provided with an opportunity to prevent fire from spreading from one area to another”*. (Gibson, 2023). These need to be managed in the same way as Management Areas, creating a habitat mosaic of natural grassland and heath.

The proposed fire breaks, axes and management areas are shown in Figure 6.

The future management of fire breaks, management areas and axes may be addressed in part through goat grazing which is suggested in the Wildfire Strategy. This would be less destructive than frequent use of machinery, with a lower carbon footprint and more sensitive to wildlife once managed appropriately. Goat grazing would assist in accessing some of the more difficult areas of the hill. It is also envisaged that goat grazing would extend to other areas of Killiney hill as part of the HSMP for conservation grazing, for example, to assist in the management of heath and prevent scrub invading the areas of heath and grassland that have been identified as important habitats that require management. Goat grazing would be managed by a trained goat herder of the Irish Goat Society and DLR hope to involve the local community also.

A pilot goat grazing project has been completed on Killiney Hill in early 2024 by the Irish Goat Society, on behalf of DLR. This has shown to be very successful with a lot of public interest and cooperation regarding the need to keep dogs on the lead in the area allocated to the goats (the goats are not a free roaming herd across the entire hill area but located in particular locations which require grazing). It is envisaged that this approach of a mobile group of goats fenced in temporarily as they move to various areas of both Killiney and Roches hill to graze particular areas, will be implemented.

Figure 6: Wildfire Plan: proposed buffers, breaking axes and vegetation management areas (Gibson & Tubridy, 2023)



6 AMENITY AND RECREATION

Killiney Hill Park is a public park which receives high visitor numbers throughout the year - the primary recreational activity being walking. Designated public footpaths, a mix of formal paths and informal trails, run through the park, with a number of pedestrian access points at various locations. There is a car park and tea rooms.

Dalkey Quarry, a disused granite quarry is located within the north section of the site, overlooked by the Dalkey Hill Semaphore tower, is an important rock climbing location, attracting large numbers of climbers.

A number of features of cultural interest, including five protected structures, are present in the area. These are: The Obelisk built, The Telegraph Tower, Boucher's Monument (The Pyramid), The Druids Chair, The Gate Tower (The Tea Rooms) and starting point (Dalkey Quarry) for The Metals (Goodbody, 2010).

The DLR county council launched a Biodiversity Education Pack in 2010 (DLRCC 2010), the aim of which was to *"...highlight the value of and to promote the use and care of biodiversity in the local area through learning exercises and activities taking place on Killiney Hill"*

Visitor facilities, heritage features and paths are shown in Figure 7.

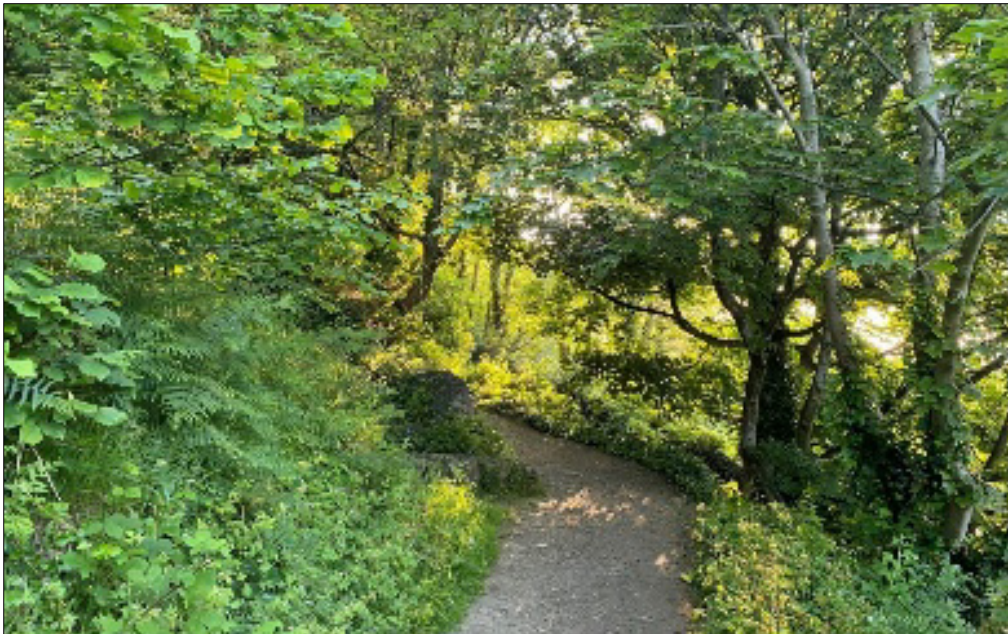
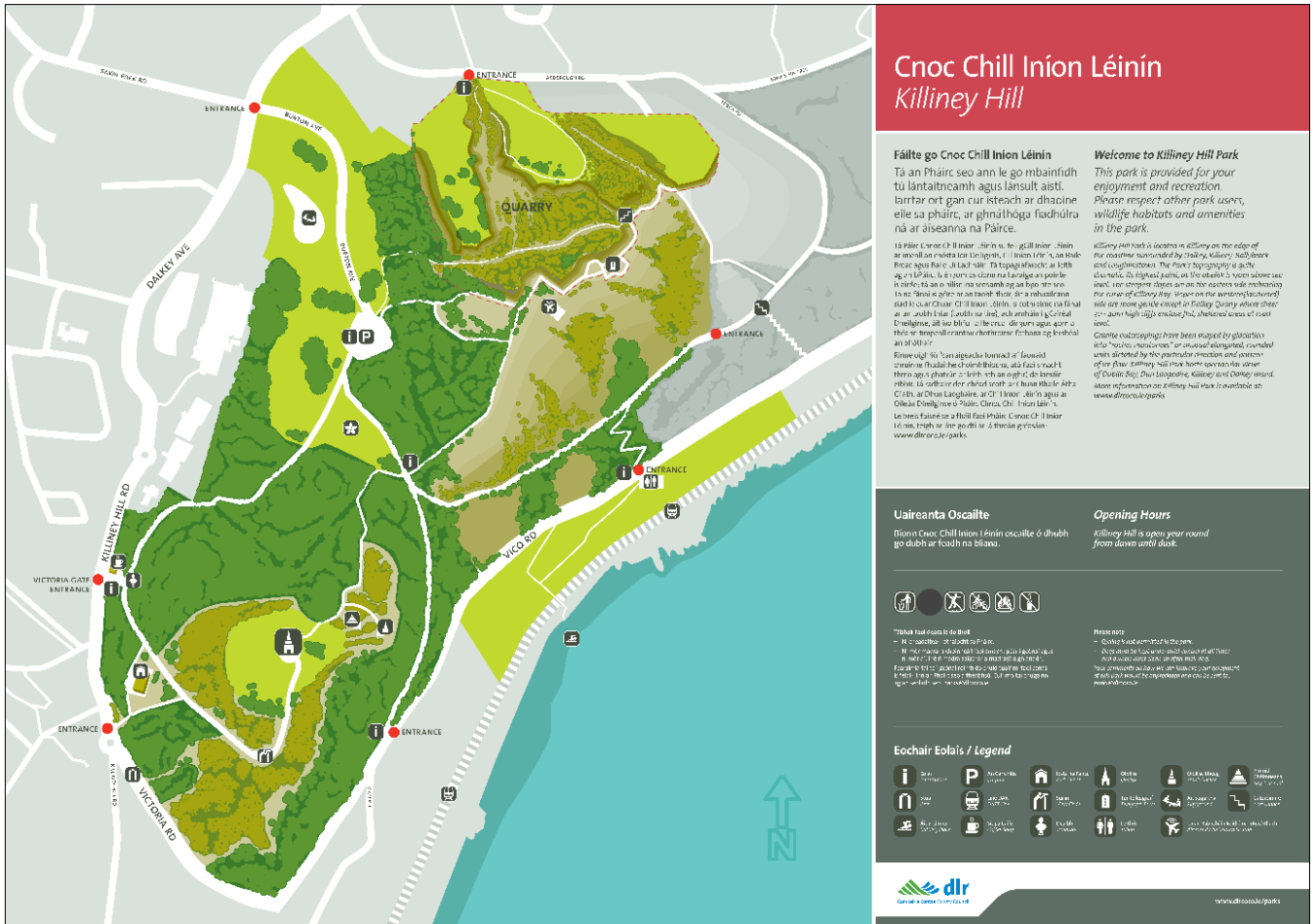


Plate 19: Path through an area of deciduous woodland (Keogh, 2023)

Figure 7: Map to show Heritage Features, Paths and Trails and Visitor Facilities (Source: DLR)



7 MANAGEMENT OBJECTIVES AND ACTIONS

The area covered by the Killiney Hill Habitat and Species Management Plan is nationally important in terms of physical and biological diversity as set out in Section 3 above. Killiney also has a strong cultural and built heritage; and high amenity value. The amenity value has led to the intrinsic biodiversity value of the site being severely compromised by the effects of high visitor numbers and dog walking leading to excess trampling and deterioration habitat quality and species disturbance. The spread of non-native invasive plant species has also impacted on the quality of some habitats and the suitability of habitats for certain species.

As stated above, it is hoped that appropriate conservation management régimes will result in habitats and species biodiversity being restored and enhanced. In order to achieve a balance between the protection of natural heritage alongside the recreational and amenity uses of the site it is hoped to explore opportunities.

Arising from the many recommendations provided in the 2023 habitats and species reports, fourteen objectives have been identified for the management, protection of and restoration of habitats and species. The actions associated with the following fourteen objectives are set out in Table 8 below.

Objective 1: Increase cover of native species in woodlands will be implemented where appropriate.

Objective 2: Increase the extent of dry heath and wet grassland areas

Objective 3: Appropriate management of semi-natural grasslands including rare species

Objective 4: Management of shoreline and coastal habitats

Objective 5: Develop an Invasive Alien Species Management Plan (IASMP) for Killiney Hill

Objective 6: Protect and enhance Killiney Hill for bat species and their roosts

Objective 7: Restore areas for non-volant mammals and implement measures to reduce disturbance impacts from humans and dogs

Objective 8: Restore habitats for reptiles and protect reptiles

Objective 9: Restore habitats for amphibians and protect amphibians

Objective 10: Restore areas for birds and implement measures to reduce disturbance impacts from humans and dogs

Objective 11: Implement grazing

Objective 12: Develop a Vegetation Management Methodology for Killiney Hill

Objective 13: Stakeholder engagement

Objective 14: Monitor the effectiveness of the HSMP actions

Table 8: Killiney Hill Habitat and Species Management Plan: Objectives and their associated Actions

	Objective / Action	Indicators	Timeline
1	INCREASE COVER OF NATIVE SPECIES IN WOODLANDS WILL BE IMPLEMENTED WHERE APPROPRIATE		
1.1	Identify and map areas suitable for increasing cover of native species		2024
1.2	Commission woodland specialist to examine the potential for woodland restoration (WD1 & WD2) and to develop a method statement for woodland restoration	Specialist Commissioned	2024 - 2025
1.3	The woodland specialist will liaise with staff to identify veteran trees. An appropriate approach to the management of veteran trees will be explored and developed.	Specialist Commissioned	2024-2025
1.4	Implement the planting of native species	Annual quantitative botanical monitoring Area of restored woodland with reporting deadline of 2029.	2026 – 2030
1.5	Monitoring programme for woodland area to be developed by woodland specialist	Aim for regular reporting with final report Q4 2029	2024-2025
2	INCREASE THE EXTENT OF DRY HEATH AND WET GRASSLAND AREAS		
2.1	Develop a suitable vegetation management regime for management of heath and grassland areas	Define areas to be managed	2024
2.2	Cut back scrub from small areas of nascent dry heath (HH1) and wet grassland (GS4) within the site	Habitat areas	2024
2.3	Goat grazing and/or other appropriate grazing will be implemented as part of conservation grazing for these areas	Habitat areas managed by goat grazing or other appropriate grazing	2024 onward
3	APPROPRIATE MANAGEMENT OF SEMI-NATURAL GRASSLANDS INCLUDING RARE SPECIES		
3.1	Develop a suitable vegetation management regime for management of semi-natural dry grassland areas	Vegetation Management Plan	2024
3.2	Goat grazing and other appropriate grazing will be implemented as part of conservation grazing for these semi natural grassland areas	Habitat areas managed by goat grazing or other appropriate grazing	2025

	Objective / Action	Indicators	Timeline
3.3	Areas of semi-natural grasslands where there should be no re-seeding will be identified to Parks Staff	Locations of semi-natural grasslands provided to staff. Current staff are trained, aware and implementing this no-re-seeding action.	2024
3.4	A monitoring programme will be developed for the populations of rare species such as Knotted Clover (<i>Trifolium striatum</i>) and Bird's-foot Clover (<i>T. ornithopodioides</i>)	See Objective 14 monitoring programme	2025- 2030
4	MANAGEMENT OF SHORELINE AND COASTAL HABITATS		
4.1	Signage to explain vulnerability of habitat and to discourage trampling etc.	Map current areas of sand dune and shingle habitats	2024 onward
4.2	Monitor vegetation development in these habitats	See Objective 14 monitoring programme	2024-2029
5	DEVELOP AN INVASIVE ALIEN SPECIES MANAGEMENT PLAN (IASMP) FOR KILLINEY HILL		
5.1	Appoint an Invasive species specialist to develop the IAS Plan and to assist Parks staff with the implementation of the IAS Plan - being cognisant of the 2021 Dún Laoghaire-Rathdown Invasive Species Action Plan - including: <ul style="list-style-type: none"> a. Manage invasive species in grassland areas, including the removal of New Zealand Pygmyweed (<i>Crassula helmsii</i>) from wet grassland habitat b. The periodic removal of Three-cornered leek (<i>Allium triquetrum</i>) c. Manage Winter Heliotrope Removal of other species such as <i>Cotoneaster</i> spp. and <i>Cordyline australis</i> in order to reduce the potential for further spread	IAS Management Plan	2024-2029
5.2	Monitor the effectiveness of these measures	Monitor the outcome of IAS treatments and management under the IAS specialist advice	Annual
6	PROTECT AND ENHANCE KILLINEY HILL FOR BAT SPECIES AND THEIR ROOSTS		
6.1	GIS querying at landscape scale: Develop management strategies to improve connectivity and provide suitable dark corridors along linear habitats for wildlife (including bats) to move safely through the landscape as part of our Ecological Network	Map of dark corridors for nocturnal species including bats	2024 - 2025

	Objective / Action	Indicators	Timeline
6.2	Conduct a survey to identify those areas with the greatest numbers of potential bat roosts (PBRs)		2026
6.3	Where feasible, survey (radio tracking and /or thermal imagery filming) of Category 1 PBRs (if found to be present) to determine presence of bats, the species and type of roost		2027
6.4	Tree surgery works will only be carried out by arborists and staff trained in PBR and bat identification and will include an assessment of the tree for bats and PBRs; and will ensure that only essential works are carried out and the PBRs are retained	Arborists and Parks staff trained in PBR protocols including licensing.	Continue /ongoing
6.5	Increase connectivity by planting native tree and hedgerow species that are already present on site for bats (as detailed in Objective 1)	Areas of native tree and hedgerow species planted	2026 - 20230
6.6	Develop a bat box scheme in consultation with a bat specialist and include a summer bat box scheme	Bat box scheme provided - In line with recommendations in the Killiney Hill Bat Report 2023 (Aughney, T. 2023)	2025
6.7	Existing and proposed lighting will be assessed by a bat specialist and where /if possible replace with recommended bat friendly lighting in line with BCT Guidance: <ul style="list-style-type: none"> Security lighting to be put onto a timer system Where 24hr lighting is required consider the use of IR CCTV instead Assess lighting adjacent to the boundary of the site and consider changing to 'wildlife friendly' lighting to reduce spill	Assessment of lighting by a bat specialist - In line with current BCT Guidance ²³	2025
6.8	Register bat box scheme with BCI	Registration of bat scheme with BCI	2026
6.9	Set up a monitoring and maintenance programme for bat boxes	See Objective 14 Monitoring programme	2026

² <https://cdn.bats.org.uk/uploads/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?v=1542109349#:~:text=Lighting%20in%20the%20vicinity%20of,Garland%20and%20Markham%2C%202007>

³ <https://www.bats.org.uk/news/2023/08/bats-and-artificial-lighting-at-night-ilp-guidance-note-update-released>

	Objective / Action	Indicators	Timeline
7	RESTORE AREAS FOR NON-VOLANT MAMMALS AND IMPLEMENT MEASURES TO REDUCE DISTURBANCE IMPACTS FROM HUMANS AND DOGS		
7.1	Restore areas and reduce access to sensitive locations to allow them to recover	See also Objective 1	2025 – 2030
7.2	Investigate ways of protecting badger setts from disturbance from humans and dogs without the measures being a disturbance to badgers in themselves	Current known disturbance to badgers by dogs and humans including trail camera images. Restoration of areas for badgers Protection of badgers and their setts	2024 – 2026
7.3	Manage and protect the condition of the habitat identified as being the least disturbed	Area protected	2025 -2030
7.4	Continue the Red Squirrel Restoration Project to help protect Red Squirrel: https://www.dlrco.ie/heritage-biodiversity/biodiversity/dlr-red-squirrel-restoration-project-2023-2030	Red Squirrel area restored Viable Red squirrel population maintained	2023 – 2030
7.5	Investigate ways of protecting red squirrel from disturbance from humans and dogs without the measures being a disturbance in themselves	Red Squirrel area restored	2024 – 2026
7.6	Set up a monitoring programme for non-volant mammals to include monitoring during vegetation clearance and also in connection with the Wildfire Plan	Objective 14 monitoring programme	2024-26
8	RESTORE HABITATS FOR REPTILES AND PROTECT REPTILES		
8.1	Develop a suitable vegetation management regime for management of scrub to restore areas of heath and grassland outlined in the Herpetofauna Report (2023) for the creation of habitat for lizards in consultation a reptile specialist	Map the identified areas of importance	2024-2025
8.2	Clearance of vegetation or development of a grazing regime will be carried out in consultation with a reptile specialist	Reptile specialist consultation before vegetation clearance	2024-2025
8.3	Fence off the gorse and rocky outcrops to the SW & E of the obelisk after restoration works to allow the area to restore and to protect reptiles and other species	Extent of area to be mapped and any overlap with other areas of restoration and management to be determined	2024 onwards
8.4	Maintain the east facing aspect around the Pyramid as open heathland, with a reduction to the amount of amenity grassland (to deter dog fouling)	Extent of area to be mapped	2024 onwards

	Objective / Action	Indicators	Timeline
8.5	<p><i>Dalkey Quarry Zone:</i></p> <ul style="list-style-type: none"> a. Remove over-shading scrub and Sycamore and cut back gorse to leave a 3m buffer, where possible, between the heathland edge and the pathway b. Install exclusion fencing to limit access to the heathland to the south of the aerals and depot installations c. Reduce rank grassland d. Deploy artificial refugia in areas with remaining heathland elements to determine status of the lizard population in the south facing part of this zone.[monitoring] e. Set up a mowing régime in the grassy areas to the north of the quarry f. Scrub clearance between the signal towers and the Quarry floor in order to restore heathland <p>Consider sealing the quarry floor where it floods to create a semi-permanent freshwater feature within the parkland</p>	TBC	2025-2030
8.6	<p><i>Coastal Zone:</i></p> <ul style="list-style-type: none"> a. Clear bracken and scrub from the area between the Vico Road and the beach access pathways b. Cut back sections of the area between the pathway and the rail embankment to allow the cliff grassland habitat to regrow 	As described in the Herpetofauna Report (2023)	
8.7	Set up a monitoring programme for the common lizard to include monitoring during vegetation clearance activities	See Objective 14 monitoring programme	2025-2030
9	RESTORE HABITATS FOR AMPHIBIANS AND PROTECT AMPHIBIANS		
9.1	Conduct Common Frog and Smooth Newt surveys at Dalkey Quarry during the breeding season	Baseline surveys during appropriate season	2024
9.2	Consider creating suitable wetland habitat where appropriate in Dalkey Quarry with a wetland specialist	Wetland creation	2025
9.3	Set up a monitoring programme for amphibians, if present, to include water level and water quality monitoring	See Objective 14 monitoring programme	2025-2030

	Objective / Action	Indicators	Timeline
10	RESTORE AREAS FOR BIRDS AND IMPLEMENT MEASURES TO REDUCE DISTURBANCE IMPACTS FROM HUMANS AND DOGS		
10.1	Liaise with our Parks staff to address the provision of a designated dog off leash area		2025
10.2	Develop measures to protect important birds nesting at Killiney Hill		2024
10.3	Create a more focussed walking route away from the important birds nest sites		
10.4	Extend the Killiney Hill "Leave No Trace" campaign to Dalkey Quarry and the coastal zone	Campaign developed and delivered	2026
10.5	Create a bird box scheme for buildings	Number of bird box schemes	2025
10.6	Set up a monitoring and maintenance programme for bird boxes.	Objective 14 monitoring programme	2026
10.7	Continue the annual grey squirrel management scheme	Ongoing	
11	IMPLEMENT GRAZING		
11.1	Implement a grazing régime by goats and other grazing animals on Killiney Hill	Wildfire Plan and link to habitat restoration	2024
11.2	Monitor the effects of grazing and adjust régime accordingly	Objective 14 monitoring programme	2024 onwards
12	DEVELOP A VEGETATION MANAGEMENT METHODOLOGY FOR KILLINEY HILL		
12.1	Develop an overall Vegetation Management Plan for Killiney Hill	Vegetation Management Plan	2024-2025
13	STAKEHOLDER ENGAGEMENT		
13.1	Implement a 'Raising Awareness' campaign for the HSMP objectives, including signage and presentations to public (residents groups etc)	Campaign developed and delivered	2024
13.2	Explore opportunities and establish a research project on invertebrates and soils in collaboration with one of the universities.	Project established	2025
14	MONITOR THE EFFECTIVENESS OF THE HSMP ACTIONS		
14.1	Develop an overall programme to monitor the effectiveness of the actions set out in the HSMP	Monitoring programme	2024

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9 APPENDICES

Appendix 9.1: Dalkey Coastal Zone and Killiney Hill pNHA Site Synopsis

Appendix 9.2: Bats And Lighting At Killiney

Appendix 9.3: Bird Species Recorded During The 2023 Killiney Hill Breeding Bird Survey

Appendix 9.4: Glossary of abbreviations

APPENDIX 9.1: DALKEY COASTAL ZONE AND KILLINEY HILL pNHA SITE SYNOPSIS

Site Name: Dalkey Coastal Zone and Killiney Hill Site Code: 001206

This site includes the coastal stretch from Scotman's Bay to south of White Rock, the Dalkey Island group and Dalkey Sound, and Killiney Hill. Killiney Hill is at the edge of the Wicklow mountain intrusion and so it is formed of a mixture of granite and mica schist. It provides one of the best exposed junctions of these rock types, on the beach at White Rock, at which mineralisation has taken place due to contact metamorphism. The minerals include biotite, andalusite and garnet, with aplite and pegmatite veins also exposed. The seaward parts of Killiney Hill have in addition a covering of calcareous glacial drift. The rocky shore is mainly of granite.

Dalkey Sound and its environs have been highly regarded as a valuable marine collecting area for many years. The Sound is especially noteworthy for the occurrence of west and south coast invertebrates. Species taken include squat lobsters (*Galathea* spp.), swimming crabs (*Portunus* spp.) and the crawfish *Palinurus vulgaris*. The area is also noted for the occurrence of gymnoblastic hydroids, with the rare *Antedon bifida* being taken regularly. Some rare European species which occur are members of the Order Nudibranchia and the Spiny Starfish (*Marthasterias glacialis*).

Dalkey Island lies c. 400m off Sorrento Point. The island is low-lying, the highest point at c.15m is dominated by a Martello Tower. Soil cover consists mainly of a thin peaty layer, though in a few places there are boulder clay deposits. Vegetation cover is low, consisting mainly of grasses. No woody plants have become established, probably due to constant grazing by goats. Dense patches of bracken (*Pteridium aquilinum*) and Hogweed (*Heracleum sphondylium*) occur in places.

Lamb Island lies to the north of Dalkey Island, attached at low-tide by a line of rocks. It has a thin soil cover and some vegetation, mainly grasses, Common Nettle (*Urtica dioica*) and Hogweed. Further north lies Maiden Rock, a bare angular granite rock up to 5m high. There is no vegetation cover. Muglins, a small granite rock, lies about 1km north-east of Dalkey Island. A small lighthouse is on the rock.

Herring Gulls nest on Dalkey Island (17 pairs in 1986), Lamb Island (29 pairs in 1986) and Muglins (207 nests in 1982). Great Black-backed Gull nests on Dalkey Island (maximum 62 nests in 1982-88), and two pairs of Lesser Black-backed Gull nested there in 1981.

Common Terns breed annually on Maiden Rock, with a maximum of 54 nests between 1980 and 1986. One pair of Arctic Tern bred on Maiden Rock in several years and in 1986 two pairs of Roseate Terns nested but were unsuccessful. Manx Shearwater is suspected of breeding on Dalkey Island.

Shelduck, Mallard and Oystercatcher nest on Dalkey and Lamb Island. Meadow and Rock Pipits breed on Dalkey Island. Maiden Rock is an important autumn roosting site for up to 2,000 terns, including Roseates from the Rockabill colony. In autumn and winter Dalkey Island is an evening roosting site for Cormorants, Shags, Curlew and large gulls. Up to 50 Turnstones and 15 Purple Sandpipers occur in winter.

Killiney Hill is a complex of coastal heath and mixed woodland. The woods are mostly planted and include Sycamore (*Acer pseudoplatanus*), Horse Chestnut (*Aesculus hippocastanum*), some oak (*Quercus* spp.), Ash (*Fraxinus excelsior*) and Holly (*Ilex aquifolium*). The ground flora is mainly Ivy (*Hedera helix*) and bramble (*Rubus* spp.) but there are some areas with more typical woodland species such as Wood-sorrel (*Oxalis acetosella*) and Herb-Robert (*Geranium robertianum*).

Many of the rock surfaces on the open and bushy areas on the east side of the summit of the hill are roches moutonnes while near the summit spodumene is found in a small scarp exposure. This results in an interesting flora, with Wood Vetch (*Vicia sylvatica*), Climbing Corydalis (*Corydalis claviculata*) and Wild Madder (*Rubia peregrina*) growing amongst the Gorse (*Ulex europaeus*). The shallow soils overlying the rock support a community of winter annuals and early flowering perennials such as Spring Squill (*Scilla verna*) and Wild Onion (*Allium vineale*).

The drift banks above and below the railway have warm shallow soils. Here grow scarce plants such as Bloody Crane's-bill (*Geranium sanguineum*), Bee Orchid (*Ophrys apifera*), Sea Stork's-bill (*Erodium*

maritimum) and clovers (*Trifolium ornithopodioides*, *T. striatum* and *T. scabrum*). The naturalised Silver Ragwort (*Senecio cineraria*) is widespread.

Up to five pairs of Fulmar breed on the cliffs below the railway line. Kestrel breeds in the area, as well as Stonechat.

This site represents a fine example of a coastal system with habitats ranging from the sub-littoral to coastal heath. The flora is well developed and includes some scarce species. The islands are important bird sites. The site also has geological importance.

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APPENDIX 9. 2

BATS AND LIGHTING AT KILLINEY

The following recommendations are taken from the 2023 report: Bat Baseline Data Killiney Hill (Aughney, 2023).

Outdoor Lighting

Bats are light sensitive bats species, hence their nocturnal activities.

Luminaire design is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select.

The following should be considered when choosing luminaires. This BCT (2018¹) guidelines provided a list of recommendations in relation to luminaire design, which was based on the extensive research completed at the time on the potential impact of lighting on bats, and therefore provides best practice mitigation measures. These recommendations have been updated with the new BCT (2023²) guidelines:

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp-cut-off, lower intensity, good colour rendition and dimming capability,
- A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

There is external lighting on a number of buildings within the survey areas (Co. Co. storage buildings and coffee shop) that consist of very bright spot lighting that is impacting on local bat populations.

- It is recommended that these are assessed to determine if changes can be made to reduce their impact. Specific changes are required in relation to the LUX levels which are currently >100 LUX, the spill of the lighting onto adjacent mature trees (i.e. the downward angle of the luminaire), colour of lighting (currently blue white light) and spectrum of lighting.
- It is recommended that security lighting is on a timer system instead of being on continuously. It is recommended that if 24 hr security lighting is required, then IR CCTV may be more appropriate in order to reduce lighting impact on biodiversity usage.
- It is recommended that lighting adjacent to the red line boundary are also assessed. There is a large degree of aesthetic lighting associated with structures and apartment blocks that is currently spilling onto boundary of the woodland. Again this should be assessed to determine if it is needed and changed to reduce lighting spill and to more “wildlife” friendly lighting.

¹ <https://cdn.bats.org.uk/uploads/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?v=1542109349>

² <https://www.bats.org.uk/news/2023/08/bats-and-artificial-lighting-at-night-ilp-guidance-note-update-released>

APPENDIX 9.3

BIRD SPECIES RECORDED DURING THE 2023 KILLINEY HILL BREEDING BIRD SURVEY

From Keogh, N.T. and Delaney, H. (2023), with common names, scientific names and BTO species codes. Taxonomy and nomenclature follows that of the Irish Rare Birds Committee⁴.

Common Name	Scientific Name	BTO Species Code
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	PB
Mallard	<i>Anas platyrhynchos</i>	MA
Common Swift	<i>Apus</i>	SI
Common Cuckoo	<i>Cuculus canorus</i>	CK
Feral Pigeon	<i>Columba livia</i>	FP
Common Wood Pigeon	<i>Columba palumbus</i>	WP
Eurasian Collared Dove	<i>Streptopelia decaocto</i>	CD
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	OC
Black-legged Kittiwake	<i>Rissa tridactyla</i>	KI
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	BH
Mediterranean Gull	<i>Ichthyaetus melanocephalus</i>	MU
Common Gull	<i>Larus canus</i>	CG
Great Black-backed Gull	<i>Larus marinus</i>	GB
European Herring Gull	<i>Larus argentatus</i>	HG
Lesser Black-backed Gull	<i>Larus fuscus</i>	LB
Sandwich Tern	<i>Thalasseus sandvicensis</i>	TE
Common Tern	<i>Sterna hirundo</i>	CN
Arctic Tern	<i>Sterna paradisaea</i>	AE
Common Guillemot	<i>Uria aalge</i>	GU
Black Guillemot	<i>Cepphus grylle</i>	TY
Great Northern Diver	<i>Gavia immer</i>	ND
Northern Fulmar	<i>Fulmarus glacialis</i>	F.
Northern Gannet	<i>Morus bassanus</i>	GX
Great Cormorant	<i>Phalacrocorax carbo</i>	CA
European Shag	<i>Phalacrocorax aristotelis</i>	SA
Grey Heron	<i>Ardea cinerea</i>	H.
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	SH
Common Kestrel	<i>Falco tinnunculus</i>	K.
Peregrine Falcon	<i>Falco peregrinus</i>	PE
Eurasian Jay	<i>Garrulus glandarius</i>	J.
Eurasian Magpie	<i>Pica</i>	MG
Western Jackdaw	<i>Coloeus monedula</i>	JD
Rook	<i>Corvus frugilegus</i>	RO
Hooded Crow	<i>Corvus cornix</i>	HC

⁴ Irish Rare Birds Committee (2022) The Irish List <http://www.irbc.ie/topbar/categories.php>

Common Name	Scientific Name	BTO Species Code
Northern Raven	<i>Corvus corax</i>	RN
Coal Tit	<i>Periparus ater</i>	CT
Eurasian Blue Tit	<i>Cyanistes caeruleus</i>	BT
Great Tit	<i>Parus major</i>	GT
Sand Martin	<i>Riparia</i>	SM
Barn Swallow	<i>Hirundo rustica</i>	SL
Common House Martin	<i>Delichon urbicum</i>	HM
Long-tailed Tit	<i>Aegithalos caudatus</i>	LT
Willow Warbler	<i>Phylloscopus trochilus</i>	WW
Common Chiffchaff	<i>Phylloscopus collybita</i>	CC
Common Grasshopper Warbler	<i>Locustella naevia</i>	GH
Eurasian Blackcap	<i>Sylvia atricapilla</i>	BC
Common Whitethroat	<i>Curruca communis</i>	WH
Goldcrest	<i>Regulus</i>	GC
Eurasian Wren	<i>Troglodytes</i>	WR
Eurasian Treecreeper	<i>Certhia familiaris</i>	TE
Common Starling	<i>Sturnus vulgaris</i>	SG
Song Thrush	<i>Turdus philomelos</i>	ST
Mistle Thrush	<i>Turdus viscivorus</i>	M.
Common Blackbird	<i>Turdus merula</i>	B.
Fieldfare	<i>Turdus pilaris</i>	FF
European Robin	<i>Erithacus rubecula</i>	R.
European Stonechat	<i>Saxicola rubicola</i>	SC
Northern Wheatear	<i>Oenanthe</i>	W.
House Sparrow	<i>Passer domesticus</i>	HS
Dunnock	<i>Prunella modularis</i>	D.
Pied Wagtail	<i>Motacilla alba yarrellii</i>	PW
Meadow Pipit	<i>Anthus pratensis</i>	MP
European Rock Pipit	<i>Anthus petrosus</i>	RC
Common Chaffinch	<i>Fringilla coelebs</i>	CH
Eurasian Bullfinch	<i>Pyrrhula</i>	BF
European Greenfinch	<i>Chloris</i>	GR
Common Linnet	<i>Linaria cannabina</i>	LI
Lesser Redpoll	<i>Acanthis cabaret</i>	LR
Crossbill	<i>Loxia curvirostra</i>	CR
European Goldfinch	<i>Carduelis</i>	GO
Eurasian Siskin	<i>Spinus</i>	SK

APPENDIX 9.4: GLOSSARY OF ABBREVIATIONS

BCI	Bat Conservation Ireland
BoCCI	Birds of Conservation Concern in Ireland
BTO	British Ornithological Society
CIEEM	Chartered Institute of Ecology and Environmental Management
DLR	Dún Laoghaire-Rathdown
FPO	Flora Protection Order
HSMP	Habitat and Species Management Plan
IAS	Invasive Alien Species
NHA	Natural Heritage Area
pNHA	proposed Natural Heritage Area
NPWS	National Parks and Wildlife Service
PBR	Potential Bat Roost
PRF	Potential Roost Feature
SAC	Special Area of Conservation
SI	Statutory Instrument
SPA	Special Protection Area
UNESCO	United Nations Educational, Scientific and Cultural Organisation