Killiney Hill, Killiney, Co. Dublin

Woodland Inventory & Management Plan, 2024 – 2043

FINAL REPORT

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Department of Housing,
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dlr Biodiversity

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1. Introduction

1.1 Background

Faith Wilson, an independent ecologist (Faith Wilson Ecological Consultant) and Donal O' Hare, an independent forester were appointed by Dún Laoghaire-Rathdown County Council to prepare a woodland management plan for the woodlands at Killiney Hill, Killiney, Co. Dublin. This project is co funded by DLR and the Department of Housing, Local Government and Heritage.

This project is one of the actions listed in the Killiney Hill Habitat and Species Management Plan completed by DLR in 2023 and is a related project of the DLR Red Squirrel Restoration Project.

The plan will guide the woodland management efforts of the Council over the next 20 years to ensure the rejuvenation of woodlands on Killiney Hill whilst protecting and ensuring the longevity of the existing woodlands.

Following some preparatory mapping and background research, consultation with DLR Biodiversity Officer and Parks staff, a number of site visits were made by the project team (Faith Wilson and Donal O' Hare). The overall management objectives for the woodland were discussed and a site survey of the existing woodland compartments and habitats was completed.

There are approximately 17.49 Hectares of woodland habitat on Killiney Hill, comprising existing mature and semi-mature deciduous woodlands coupled with some small areas of recent planting completed by the Parks Department in Dun Laoghaire Rathdown County Council. Adjoining these are areas of Scrub which contain scattered naturally regenerated native trees and these have been mapped as (potential) emerging woodland (7.82 Hectares). Areas suitable for the establishment of new native woodland have also been identified (0.87 Hectares).

The woodlands on the hill have been sub divided, as part of this plan, into existing, potential (emerging) and areas suitable for the establishment of new woodland. They are presented as 23 woodland management units (Compartments) which are illustrated on the attached maps in **Appendix A**.

This plan sets out proposals for woodland management, which will help to restore the woodlands on Killiney Hill to a more sustainable structure for management over the next 20 years (2024 - 2043). It is the intention, that the woodlands should be managed using continuous cover forestry (CCF) silviculture, to ensure permanent woodland cover, enhanced biodiversity and as part of the aesthetic and landscape value of Killiney Hill.

This plan presents an overview of the woodlands with a generalised assessment of their ecological condition and related issues. This plan then sets out the woodland management objectives for the woodland habitat on Killiney Hill and briefly describes the methodology used in preparing the plan. A number of high-level management notes and recommendations are then discussed. Maps of the proposed woodland management Compartments are then presented. These are followed by the Woodland Inventory and Plan (**Appendix A**) presented in two stages, 2024 – 2033 and then 2034 - 2043.

1.2 Objectives

The overall woodland management objectives for the woodland on Killiney Hill are as follows:

1. Protect and enhance the existing wooded landscape.
2. Protect and enhance woodland biodiversity.
3. Control invasive species within the woodlands.
4. Identify and draw down funds available through government grant schemes that are compatible with the above forest management objectives and that support the management plan.
5. Respect the historic and heritage value of the woodland habitats on Killiney Hill associated with the former plantings completed by the Earls of Meath.
6. Ensure that the structure and functions of the woodland from the perspective of woodland fauna (including badgers, bats, birds, non-volant mammals and butterflies) are met.
7. Improve the ground flora within the woodland, which is poor in areas dominated by invasive species, through increasing light levels and light disturbance.

In order to achieve these objectives it is proposed to implement a "continuous cover[1]" management system using "close to nature[2]" management techniques resulting in a sustainable long term woodland ecosystem.

[1] A Continuous cover woodland management system is one in which the woodland canopy is maintained at all times and there is no requirement for clear felling and subsequent replanting.

[2] Close to nature management techniques involve either the use or mimicking of natural processes. Examples of this include encouragement of natural regeneration, succession, retention of standing deadwood, and the use of compatible shade tolerant and light demanding species.

1.3 Methodology

1. A woodland management map has been prepared based on a stratification of the existing woodlands into Woodland Management Compartments depending on the woodland habitats present. They have been categorised as existing woodland, emerging woodland (where natural regeneration and natural processes are taking place) and potential new woodland sites. These Compartments have been digitised in ArcGIS and an area calculated for each.
2. An assessment of the overall forest area was made in the context of designated conservation and protection areas and other factors influencing forest management planning and practice.
3. An assessment of the current status of each Compartment was made in terms of woodland type and species.
4. For each Compartment, a 20-year management plan was prepared setting out an annual schedule of operations and identifying where grant assistance is available from the Forest Service in the Department of Agriculture, Food and the Marine.
5. Additional forest management notes and recommendations that are not specific to any individual Compartment were also prepared. These cover the following issues:
    - A vision for the woodlands on Killiney Hill
    - A review of DLRCC policies
    - The Implications of Nature Conservation Listing
    - A proposed Deadwood Policy
    - Ash Dieback Disease
    - Invasive Species
    - Felling Licencing & General Thinning Policy
    - Enrichment Planting
    - Humans Dogs & Impacts on Woodland Habitats and Ground Flora
    - Control of Grey Squirrel
    - Forest Service Schemes
    - Potential Outlets and Markets for any Timber Produced
    - Specific Biodiversity Prescriptions
    - Climate Change Resilience
    - Fire Risk
    - Natural Succession
    - Community Engagement
    - Woodland Biodiversity Surveys
    - Monitoring
    - Staff Training

2. Receiving Environment

2.1 Site Information

The woodlands on Killiney Hill are located in the south-eastern part of County Dublin as shown on **Figure 1**.

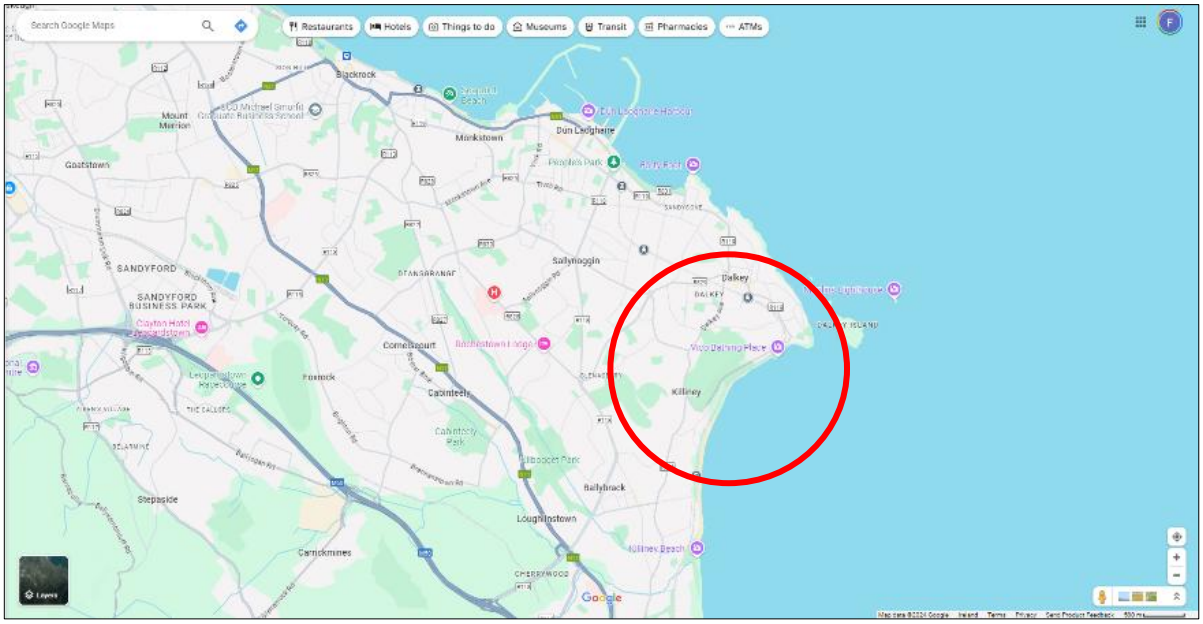

Figure 1. Killiney Hill is located in south east County Dublin (Source: Google Maps).

The extent of the woodlands on the hill can be seen on the aerial imagery available on Google maps (See **Figure 2**). Killiney Hill is bounded by roads and housing on all sides and is found at an elevation of 80-153m.

Figure 2. Aerial imagery showing the extent of the woods on Killiney Hill (Source: Google Maps).

2.2 Nature Conservation Designations

The woodlands on Killiney Hill are listed for nature conservation purposes as a proposed Natural Heritage Area (pNHA) and are included within the boundary of the wider Dalkey Coastal Zone and Killiney Hill (pNHA) (Site Code: 001211) as can be seen on **Figure 3** below.

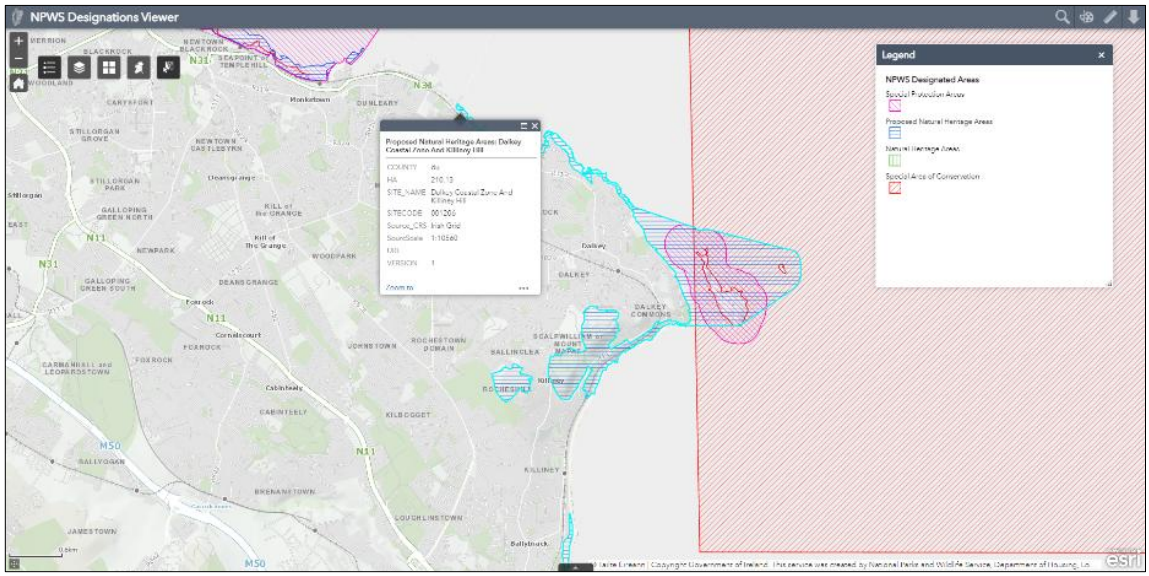

Figure 3. Killiney Hill is currently listed as a proposed Natural Heritage Area (pNHA) (Source: NPWS).

Killiney Hill is also located within the UNESCO-designated Dublin Bay Biosphere.

2.3 Soils and Geology

Killiney Hill has a complex geology and is mostly underlain by Caledonian Granite with some Ordovician Dark blue-grey slate, phyllite & schist (known as the Maulin Formation) on the lower slopes as shown on **Figure 4** below.

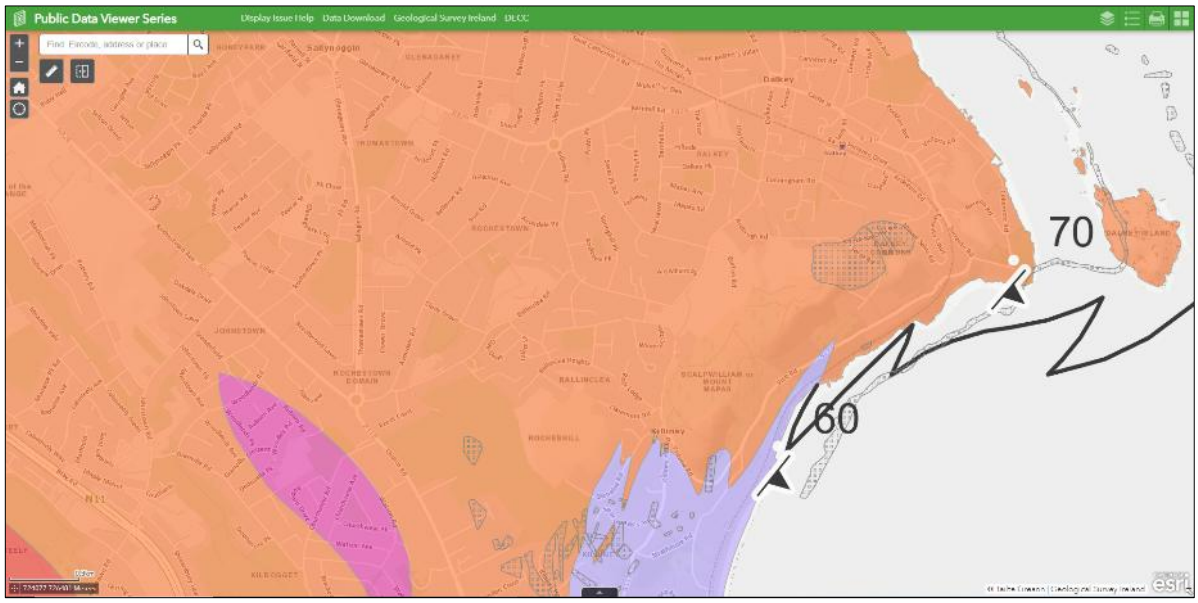

Figure 4. Killiney Hill is underlain by Caledonian Granite (orange band) and Ordovician Schists and Shales (purple band) (Source: Geological Survey of Ireland).

This hill is overlain by a thin layer of peat (which is known as the Carrigvahanagh Formation) while the lower slopes of the hill near the sea are covered by glacial drift which is calcareous in nature as shown in **Figure 5** below.

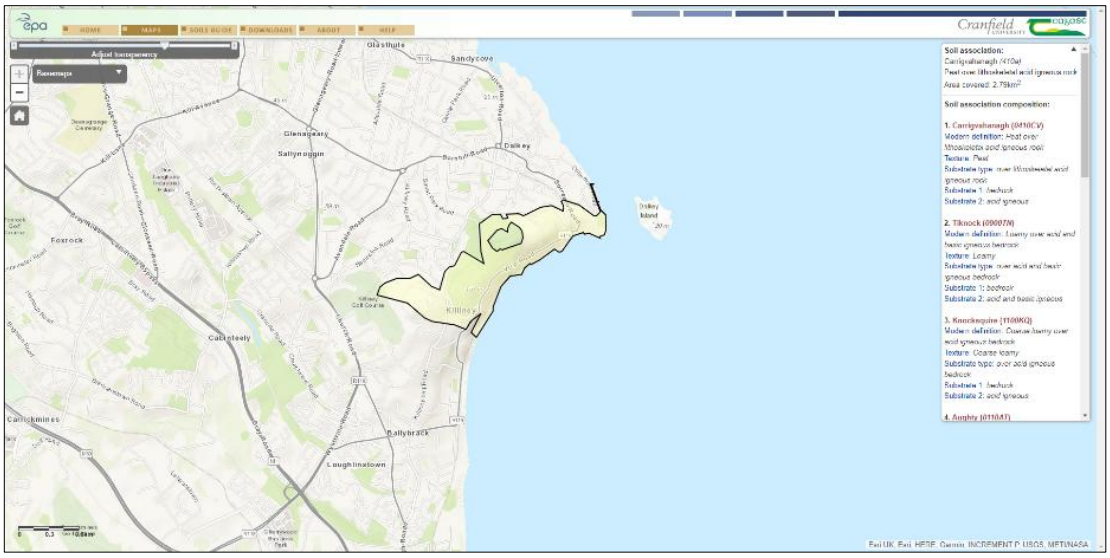

Figure 5. Soils on Killiney Hill (Source: EPA/Teagasc).

2.5 History of Woodland on the Site

Medieval Period
In 1218 the Talbots of Malahide were granted the Rochestown Estate (including Killiney Hill) by the Crown for an annual rent of one Goshawk -or its value, 6s. 8d., which was a substantial sum in those days.

'On account of their use for falconry, hawks were then much prized, especially Irish ones, and the goshawk was one of the largest birds used in the sport. Sometimes the value of the bird was paid, but the owner of Rochestown, in 1369, rendered his rent in kind, and had the effrontery to deliver a useless goshawk, for which he was fined by the Court of Exchequer'[3].

Goshawk are a woodland bird which could indicate that the lands were well wooded at that time to be able to provide this annual resource from the wild.

Downs Survey - 1641
The Downs Survey maps from 1641 show no record of woodland in this part of Dun Laoghaire Rathdown or in the parish of Killiney (or adjoining Ballinclea) as shown on **Figures 6, 7** and **8** below.

1700s
Rocque's Map of south east Dublin from 1760 shows very little woodland present either on or in the general environs of Killiney Hill which is in the townland of Mount Mapas/Scalpwilliam as shown on **Figure 9** below.

'Mount Mapas', which is located on the western slope of Killiney Hill was built in 1740 by Col. John Mapas, on what was a previously developed site in terms of buildings.

In 1755 it was acquired by a Captain Maunsell and was then known as 'Rocksborough' and was mapped on Rocque's map as 'Captain Maunsell's'. Some planting is visible within the grounds of Captain Maunsell's property and treelines are shown along what is now Dalkey Avenue as shown on Figures **10** and **11**.

Captain Maunsell was succeeded by a Colonel Loftus in 1764[4]. Colonel Henry Loftus, MP for Bannow Co. Wexford, (who was later to become Viscount of Ely) renamed it 'Loftus Hill'. It is reported that 'Loftus cut a carriage way around the east side of the hill, still in existence, though now tarred and referred to as 'the green road'. He also planted the west side with tree and shrubs'.
In 1772, Loftus advertised the castle and its 150 acres for sale. It was recorded that he and his nephew converted the barren stoney soil on the hill to meadow and pasture.

The property and lands went through a number of other owners including Mr Medlicott in 1778, before it passed to a Mr Humphry Minchin, who is indicated as a leaseholder on Sherrard's Map in 1787[5] - see **Figure 12** below. On one version of the map (an extract from a 1935 copy of Sherrard's Map of 1787 courtesy of Partners-at-Law Solicitors, Dun Laoghaire) Scalp William or Mount Malpas Estate is numbered 58 (Killiney Hill). This copy does not show any wooded habitat on Killiney Hill. Whereas on a further copy of Sherrard's Map of 1787[6] (**Figure 13**) trees and woodland cover are clearly marked within the Mount Malpas Estate (numbered 58 (Killiney Hill)).

[3] https://killineyhistory.ie/killiney-hill-park/
[4] https://killineyhistory.ie/killiney-castle/
[5] Pearson, P. (1998). 'Between the Mountains and the Sea'.
[6] https://killineyhistory.ie/killiney-hill-park/

In 1790 John Scott, Lord Clonmel also known as ‘Copperfaced Jack’ claimed the property. It is reported that he employed 200 men to work on the estate and stocked it with deer at a cost of £3,000.

This would have put huge pressure on any regenerating or emerging woodland on the hill.

A plate from 1795 of the Obelisk on Killiney Hill by F. Jukes shows some small shrubs/small trees in the area (**Figure 14**).

1816 Taylor’s Map
The map produced by Taylor in 1816 does not show any woodland on Killiney Hill. The most extensive woodland in the environs of Killiney is at Rochestown House as shown on **Figure 15** below.

1821 Duncan’s Map
Duncan’s map from 1821 shows very little woodland on Killiney Hill as shown on **Figure 16** below.

From 1797-1832 the lands were owned by Thomas Bourchier, Clerk of the Crown and Hanaper and Usher of the Black Rod in the Irish House of Commons. It was he who built the small obelisk memorial to the Mapas family on Killiney Hill.

In 1840 Robert Warren enlarged the house and called it Killiney Castle. He also restored and added to the monuments on the hill, repairing the obelisk originally erected by Colonel Mapas and donated land and most of the money for the building of Killiney Parish Church. The land on the hill once part of the estate was purchased from his son, Robert Warren Jnr. by Queen Victoria's jubilee memorial association and subsequently renamed Victoria Hill.

The plate (see **Figure 17**) showing a View of the Obelisk at Killiney with Killiney Bay in background created by J. Newman & Co. (engravers), 1838-1880 shows the wall of the deer park and the scrubby nature of the steeply sloping lands to the east.

Ordnance Survey Ireland Maps
A review of the various mapping and datasets available from the Ordnance Survey Ireland show that the main areas of woodland which were mapped on Killiney Hill in the mid-1800s remain extant today as shown on **Figures 18** to **26** below.

Figure 6. Downs Survey map from 1641 of the 'Barony of Rathdowne' shows no evidence of significant woodland in this part of the county (Source: https://downsurvey.tchpc.tcd.ie/down-survey-maps.php#c=Dublin).

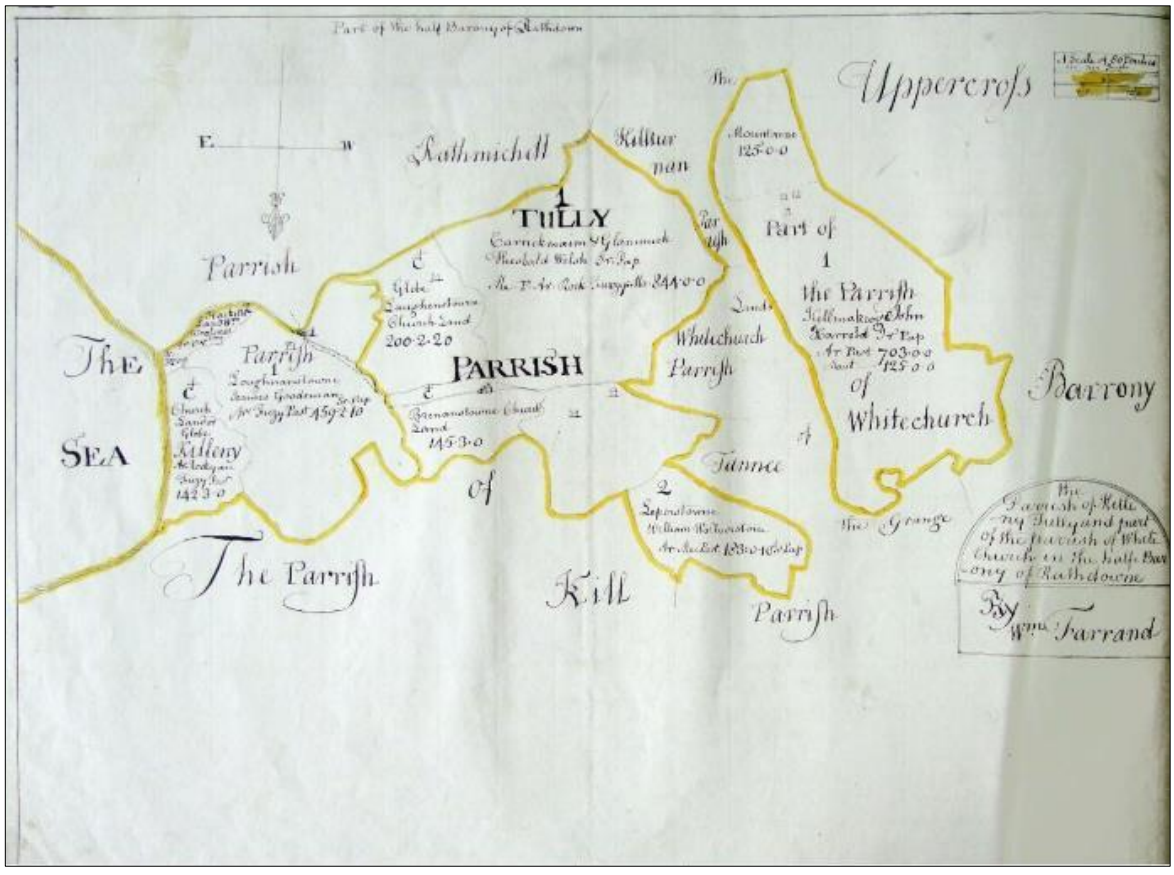

Figure 7. Downs Survey map from 1641 of the 'Parish of Killiny, Tully and part of Whitechurch' shows no evidence of significant woodland in the area (Source: https://downsurvey.tchpc.tcd.ie/down-survey-maps.php#c=Dublin). Confusingly the east coast is shown on the left hand side of the map.

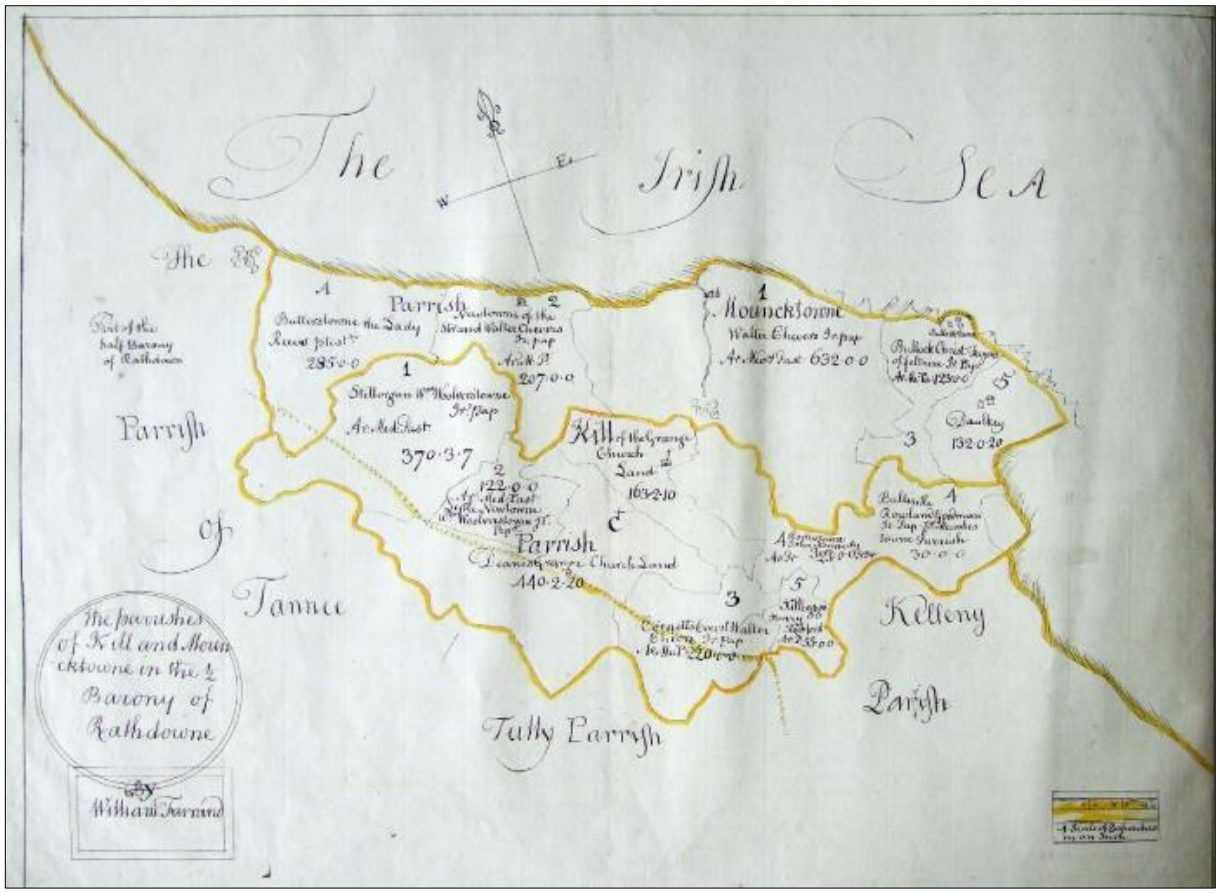

Figure 8. Downs Survey map from 1641 of the 'Parish of Kill and Monkstown' shows no evidence of significant woodland in the area (Source: https://downsurvey.tchpc.tcd.ie/down-survey-maps.php#c=Dublin).

Figure 9. Rocque's map from 1760 of the environs of South East Dublin shows no evidence of woodland on Killiney Hill (Source: South Dublin Historical Mapping).

Figure 10. Rocque's map from 1760 (Source: https://www.dublinhistoricmaps.ie/maps/1600-1799/index.html).

Figure 11. Rocque's map from 1760 shows some trees associated with Captain Maunsell's property (now Fitzpatricks' Castle Hotel) and trees along what is now Dalkey Avenue with further planting to the west around field boundaries either side of the New Road and around Rochestown House.

Figure 12. An extract from a 1935 copy of Sherrard's Map of 1787 courtesy of Partners-at-Law Solicitors, Dun Laoghaire. Scalp William or Mount Malpas Estate is numbered 58 (Killiney Hill). This map does not show any wooded habitat on Killiney Hill. (Source: Peter Pearson 'Between the Mountains and the Sea'. (1998)).

Figure 13. A further copy of Sherrard's Map of 1787 shows significant tree cover on Killiney Hill in the lands around Roxborough House to the north of the Obelisk. (Source : https://killineyhistory.ie/killiney-hill-park/). The number 3 indicates the current location of the Killiney Castle Hotel.

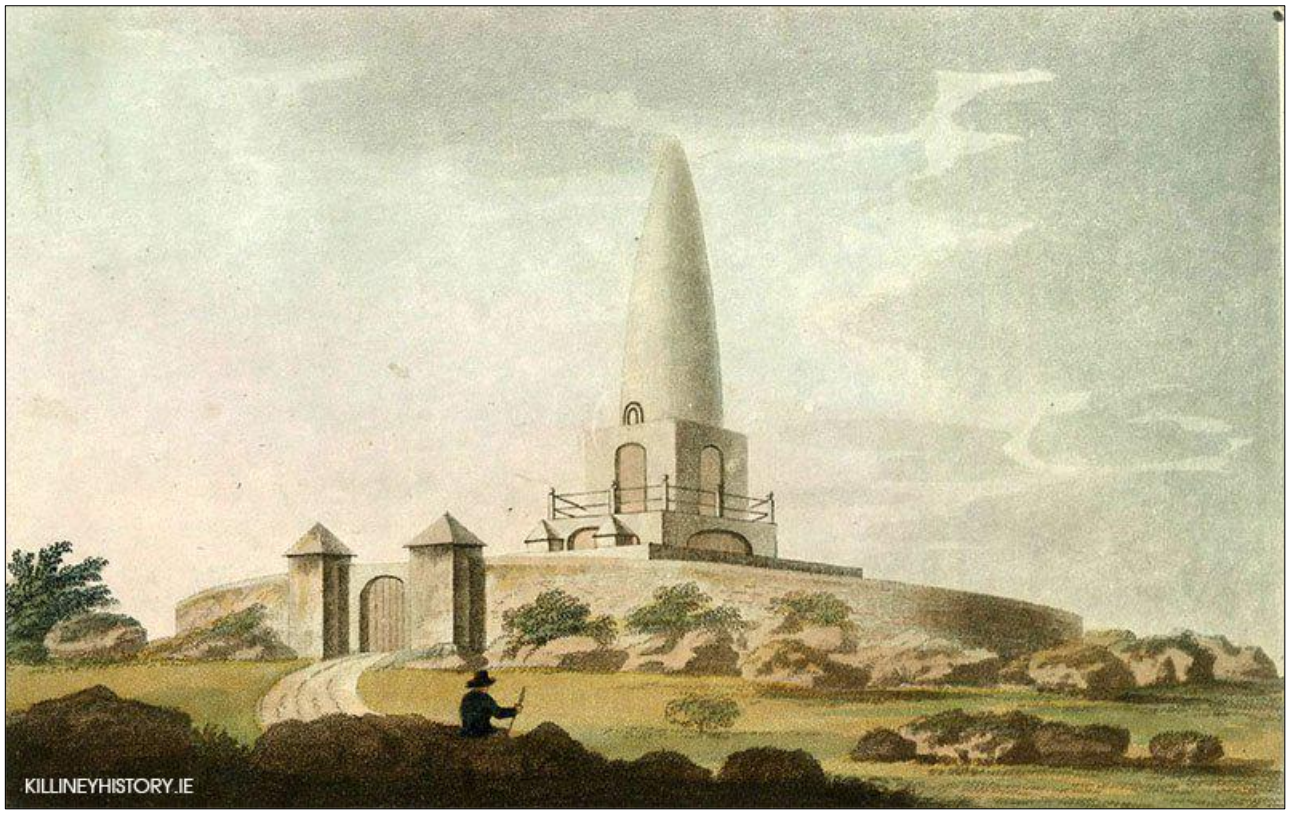

Figure 14. Obelisk on Killiney Hill in 1795 from a Plate by F. Jukes.

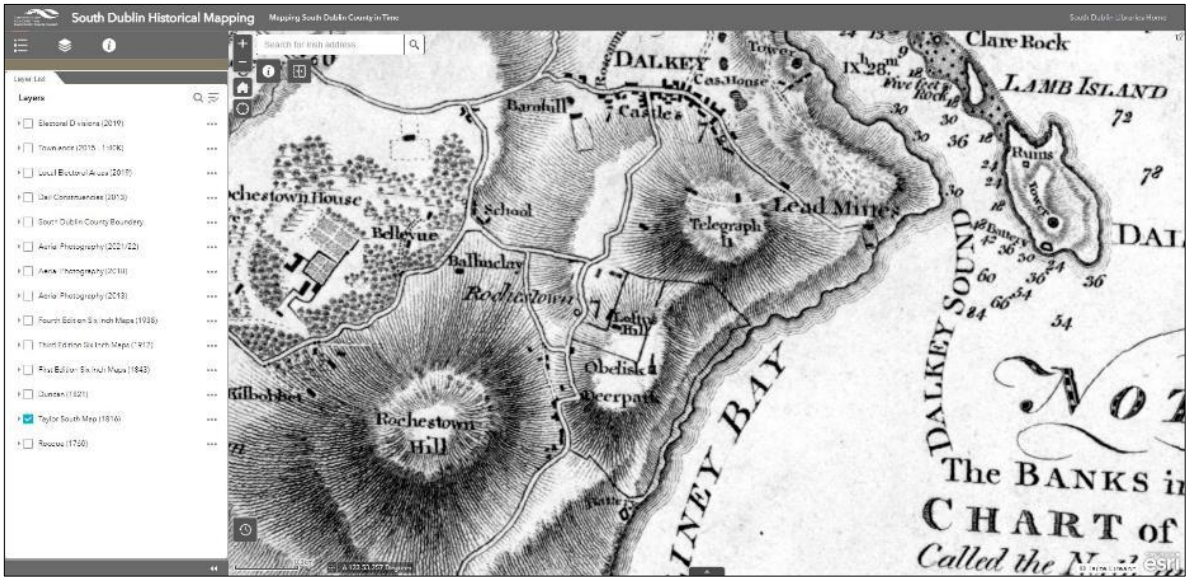

Figure 15. Taylor's map from 1816 of the environs of Dublin does not show any wooded habitat on Killiney Hill. The closest significant areas of woodlands are shown at Rochestown House and Bellevue to the west (Source: South Dublin Historical Mapping). Loftus Hall is where the Killiney Castle Hotel is presently located and the obelisk and deer park on Killiney Hill is clearly shown.

The development of the granite quarries on Killiney (Telegraph) Hill are not shown on this (or on Taylor's map). Granite from Dalkey Quarry was used for the building of Dun Laoghaire harbour and infrastructure between 1815 and 1859.

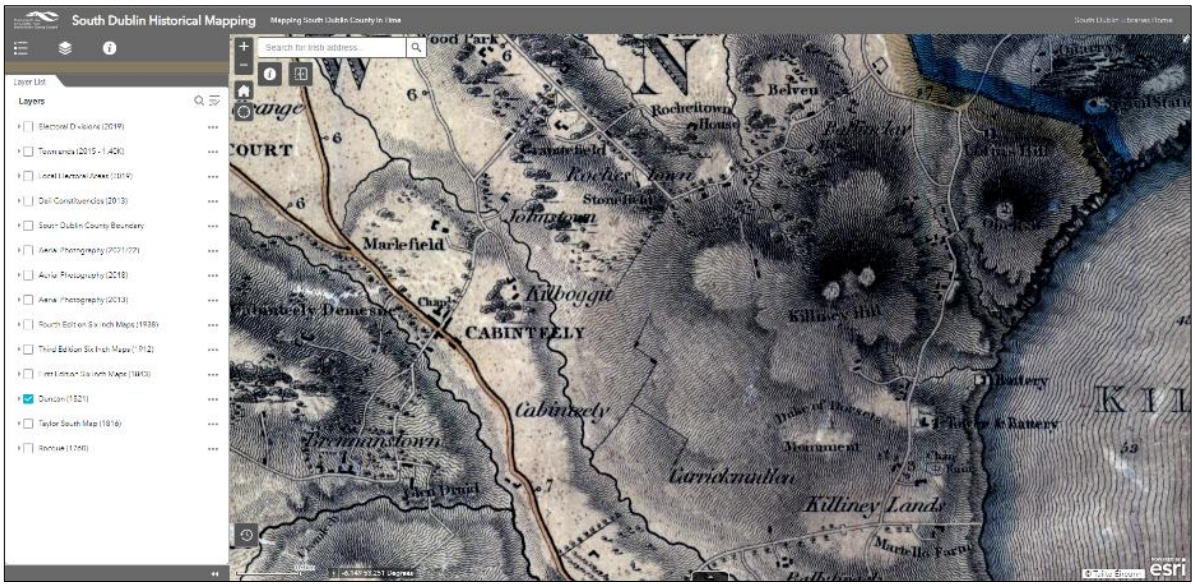

Figure 16. Duncan's map from 1821 of the environs of Dublin shows scattered trees on Killiney Hill in the environs of the current location of Dalkey Quarry and along the banks of a watercourse which previously rose on the hill and is shown flowing between the Rochestown House and Bellevue properties. There are also small copses of trees on the lower eastern slopes below the Obelisk (marked as the Duke of Dorset's monument). (Source: South Dublin Historical Mapping).

Figure 17. Plate showing a view of the Obelisk at Killiney with Killiney Bay in background (created by J. Newman & Co. (engravers), 1838-1880 – exact date unknown) shows the wall of the deer park and some trees on the steeply sloping lands to the east.

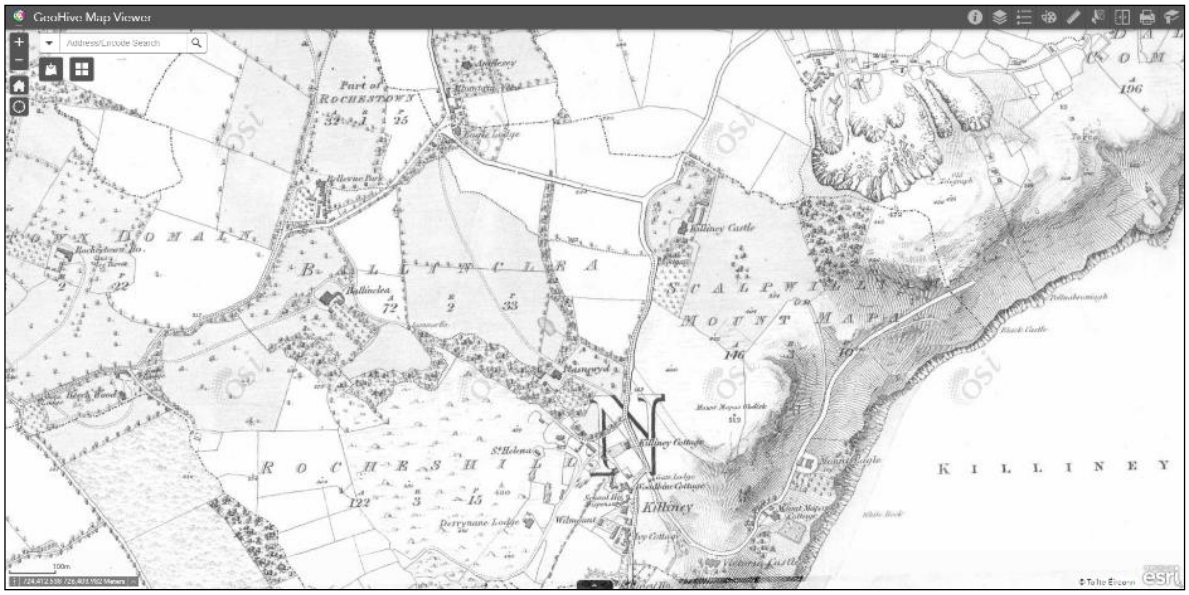

Figure 18. Woodland on Killiney Hill in the 1840s (Source: Ordnance Survey Ireland 6" Mapping First Edition). The wall of the deer park is mapped. The large block of woodland, which was marked as being present on both Sherrard's and Duncan's maps, to the north east of the Obelisk (between it and the Dalkey Quarry) remains extant. Smaller stands of trees are present to the north of the Obelisk, surrounding Killiney Castle and on the slopes above Mount Mapas Cottage. Note the Vico Road did not continue north along the eastern length of the hill until 1889 when it was opened to the public by the Lord Lieutenant. At this time the Dalkey Quarries were well developed on the north western side of the hill.

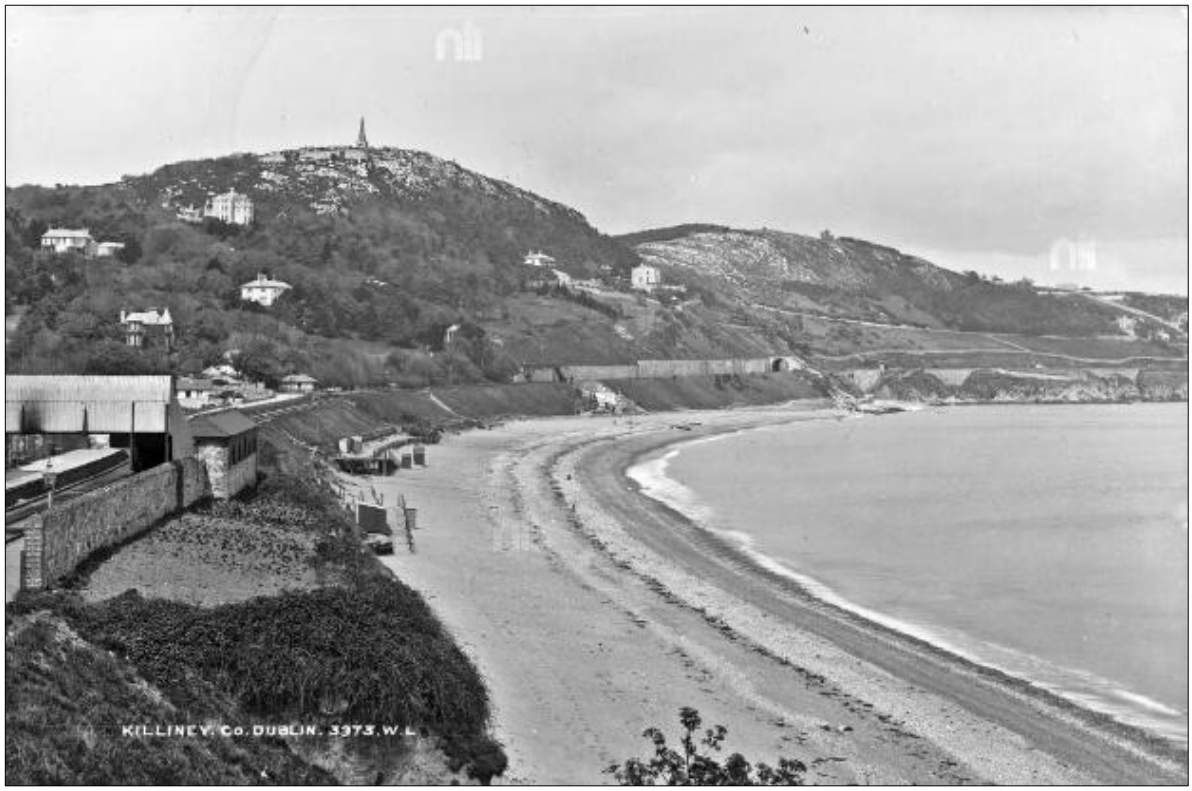

Plate 1. A photograph of Killiney Hill from Killiney Beach, published in 1865 showing the woodlands on the southern and eastern slopes of Killiney hill, as well as on the north western slopes below the summit of Telegraph Hill (Source: Lawrence Collection, National Library of Ireland).

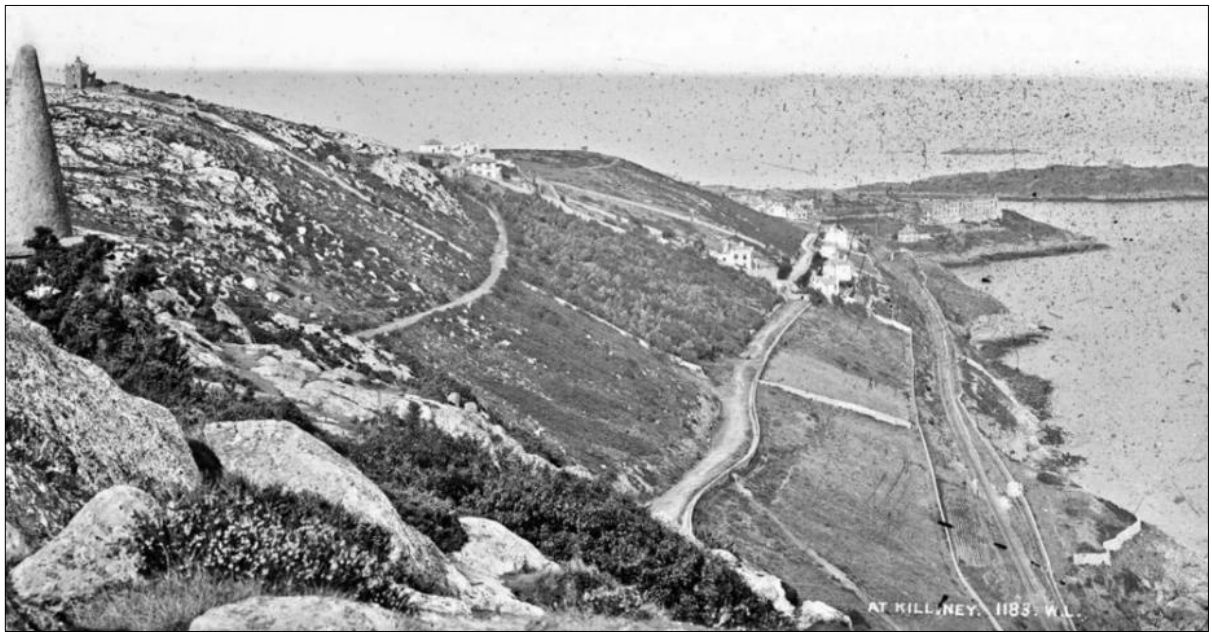

Plate 2. A photograph taken from Killiney Hill showing the Obelisk in the left foreground and the Telegraph house on Telegraph Hill in the distance. Note the extensive woodlands between the Vico Road and the track leading from Torca Road. Much of this has been lost to housing developments. (Source: Lawrence Collection, National Library of Ireland).

The second edition of the Ordnance Survey 6" Mapping shows that woodland cover had significantly increased on the hill since the mid-1800s probably associated with it's development as a public park which opened on the 30th June 1887. This included the establishment of both broadleaved and conifer stands of trees on the lower eastern and south western slopes of the hill, as shown on **Figure 19** below. The original block of woodland to the north east of the Obelisk (between it and the Dalkey Quarry) also remained extant.

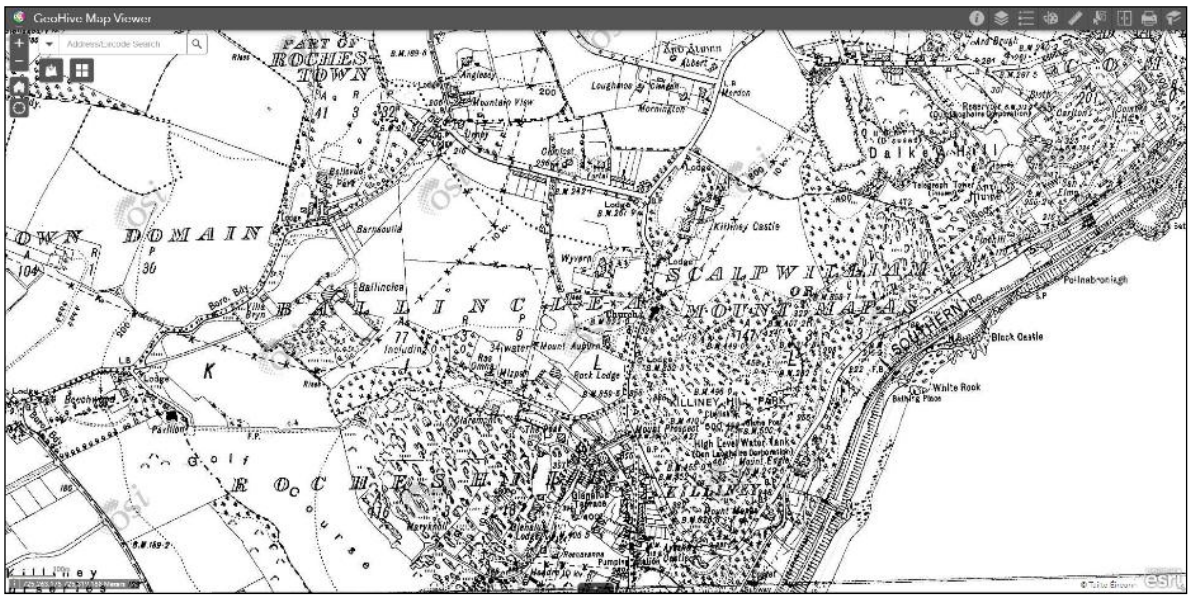

Figure 19. Woodland cover had increased on Killiney Hill in the early 1900s as part of its development as a public park (Source: Ordnance Survey Ireland 6" Mapping (Last Edition)).

Woodland cover remained mostly the same by the time the Ordnance Survey Ireland 25" series mapping was produced when 'Killiney Hill' was known as 'Victoria Hill' and the 'Telegraph Hill' was known as 'Dalkey Hill' as can be seen on **Figure 20** below.

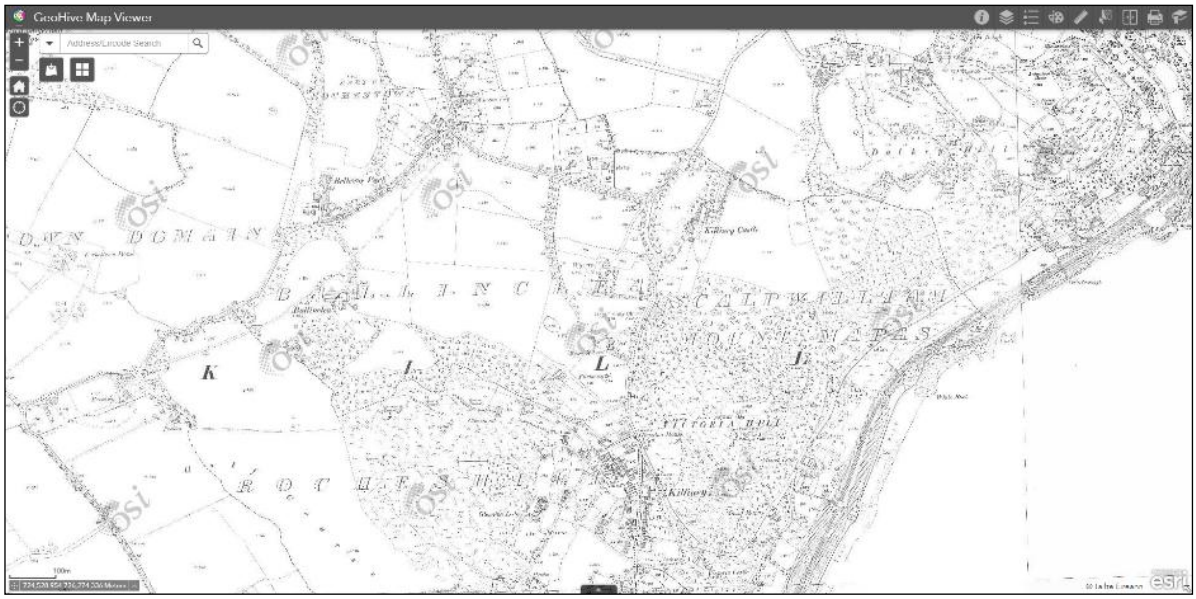

Figure 20. Woodland on Killiney Hill in the early 1900s (Source: Ordnance Survey Ireland 25" Mapping).

The lands surrounding Killiney Hill to the north and north west were extensively developed with housing estates particularly in the mid-late 1900s and the current extent of woodland remains relatively unchanged from recent years as can be seen on **Figures 21 to 24** beginning in 1995 below.

Figure 21. Aerial imagery from 1995 showing the woodland on the hill (Source: Ordnance Survey Ireland Aerial Photography 1995).

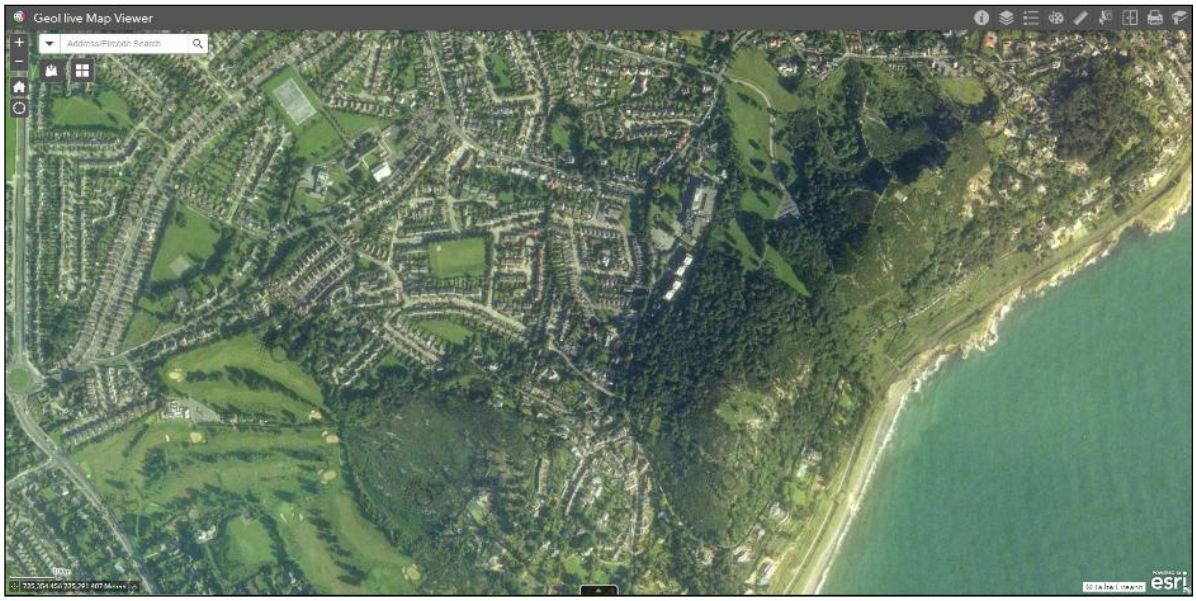

Figure 22. The current extent of woodland (Source: Ordnance Survey Ireland Aerial Photography 2000s).

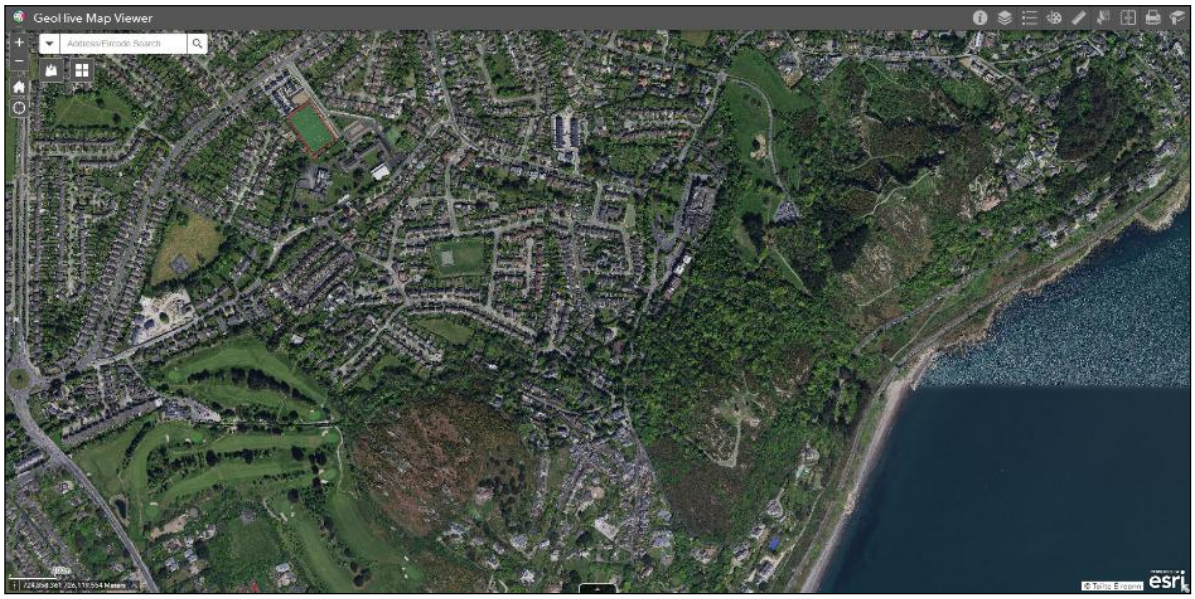

Figure 23. The hill and it's woodlands in the mid 2010s. The conifer stands can more clearly be seen (Source: Ordnance Survey Ireland Aerial Photography 2010s).

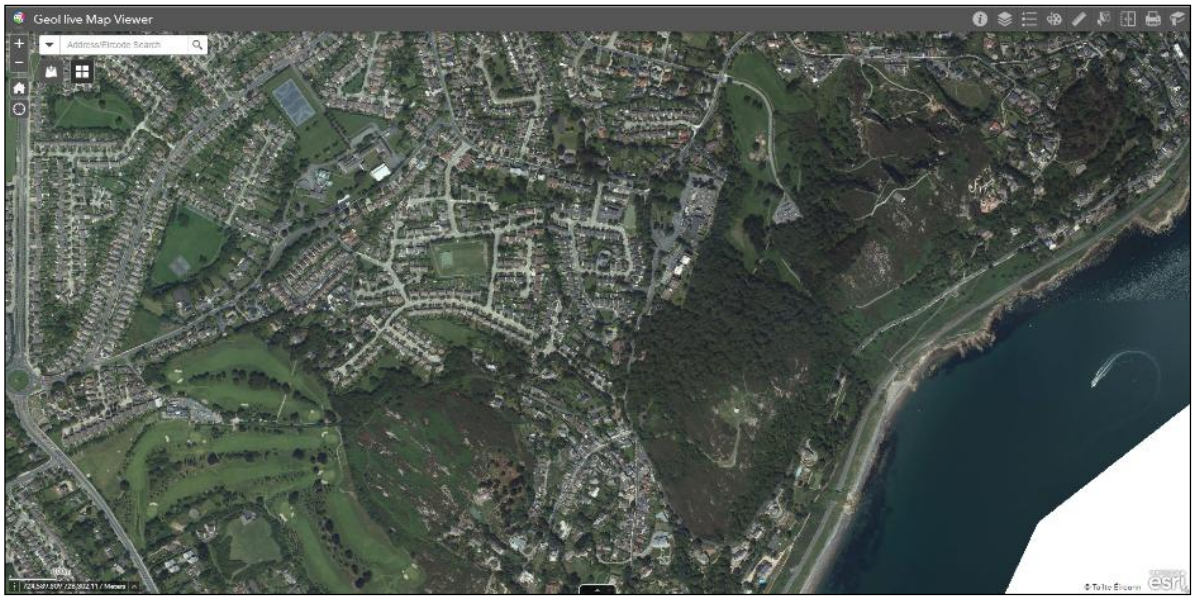

Figure 24. The hill and it's woodlands in the present day. (Source: Ordnance Survey Ireland Aerial Photography).

Figure 25. Woodland in the northern portion of Killiney Hill in the early 1900s (above) and today (below). (Source: Ordnance Survey Ireland).

Figure 26. Woodland in the southern portion of Killiney Hill in the early 1900s (above) and today (below). (Source: Ordnance Survey Ireland).

2.7 Previous Woodland Surveys

2.7.1 National Parks and Wildlife Service NHA Survey

The woodlands on Killiney Hill were surveyed as part of the Natural Heritage Area surveys completed by National Parks and Wildlife Service in the mid-1990s. They are listed as a proposed Natural Heritage Area (pNHA) (Dalkey Coastal Zone and Killiney Hill pNHA (Site Code: 001206)) on the basis of the woodland habitats present. The Site Synopsis for the site is presented below.

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 mineralization has taken place due to contact metamorphism. The minerals include biotite, andelusite and garnet, with aplite and pegmatite veins also exposed. The seaward parts of Killiney Hill have in addition a covering of calareous 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 Nudibrachia 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, Nettles (*Urtica dioica*) and Hogweed (Heracleum sphondylium). Further north lies Maiden's 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's Rock, with a maximum of 54 nests between 1980 and 1986. One pair of Arctic Tern bred on Maiden's 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's 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 aquilinum*). The ground flora is mainly Ivy (*Hedera helix*) and Brambles (*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 mountonnes while near the summit spodumene is found in a small scarp exposure. This results in an interesting flora, with Wood Vetch (*Vicia sylvatica*), Yellow Fumitory (*Corydalis claviculata*) and 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 Crow Garlic (*Allium vineale*).

The drift banks above and below the railway have warm shallow soils. Here grow scarce plants such as Bloody Cranesbill (*Geranium sanguineum*), Bee Orchid (*Ophrys apifera*), Sea Storks-bill (*Erodium maritimum*) and Clovers (*Trifolium ornithopodioides*, *T. striatum* and *T. scabrum*). The naturalized 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.

16 February, 1995

2.8 Flora Study of Killiney Hill, Co. Dublin (Fitzgerald (2023))

The habitats and flora of Killiney Hill was recently surveyed by Alexi Fitzgerald in 2023 in a study commissioned by Dun Laoghaire Rathdown County Council. The aim of the study was to inform a wider biodiversity assessment of the site as part of a Habitat and Species Conservation Management Plan for Killiney Hill.

Fitzgerald (2023) described the woodland habitats present on the hill as follows:

Oak-ash-hazel woodland (WN2)

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

The Third Schedule invasive species *Allium triquetrum* occurs less than ten metres from an area of WN2, and this species has the potential to negatively affect this habitat if it were to escape within the woodland. Other non-native species recorded include *Cotoneaster* sp., *Crocosmia* x *crocosmiiflora* and *Ribes sanguineum.*

The understorey of the woodland here contains frequent *Rubus fruticosus* agg., *Brachypodium sylvaticum* and *Hedera helix* with lesser quantities of *Heracleum sphondylium, Calystegia sepium, Geranium robertianum, Geum urbanum, Urtica dioica, Polystichum setiferum, Metzgeria furcata* and *Stellaria holostea*.

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 as such due to the lack of sufficient key indicator species for this habitat type, including *Quercus* species. This habitat is considered to be of **County importance**, due to its relatively well-developed woodland vegetation, which is locally scarce and is within a nationally designated site.

(Mixed) broadleaved woodland (WD1)

(Mixed) broadleaved woodland (WD1) refers to 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.

Acer pseudoplatanus and *Fagus sylvatica* are the main canopy-forming species. Both *Quercus robur* and *Fraxinus excelsior* were found 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 quarry works here.

The understorey contains ferns such as *Asplenium scolopendrium*, *Dryopteris dilatata* and *Polystichum setiferum*. The woody species *Rubus fruticosus* agg. and *Hedera helix* are abundant.

The bryophyte component of the vegetation includes *Kindbergia praelonga*, *Mnium hornum* and *Rhizomnium punctatum*. The Third Schedule invasive *Allium*

triquetrum and the locally rare native *Taxus baccata* occur in this habitat (although it is unclear whether the latter is escaped from cultivation or not here).

This habitat is considered to be of **Local importance (higher value)** due 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 domestic dog access were the primary impacts on this habitat which were recorded during the 2023 field surveys.

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 *Acer pseudoplatanus*, *Pinus sylvestris*, *Fagus sylvatica*, *Larix* sp., *Quercus robur* and *Quercus petraea*.

The understorey contains herbs like *Stellaria holostea*, *Glechoma hederacea*, *Polystichum setiferum* and *Dryopteris dilatata*. The woody species *Rubus fruticosus* agg. and *Hedera helix* are quite frequent. Typical woodland bryophytes are present including *Kindbergia praelonga*, *Mnium hornum* and *Brachythecium rutabulum*.

Cordyline australis and *Petasites pyrenaicus* (*Petasites fragrans*), both non-native taxa, have been recorded in this habitat.

Additionally, high levels of trampling from human visitors to the park are negatively impacting the ground vegetation in some areas. Finally, 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)** due 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 domestic dog access were the primary impacts on this habitat which were recorded during the 2023 field surveys.

(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 *Pinus sylvestris*. The ground vegetation here is rocky and very sparse, with few plant species growing. *Hedera helix* is a shade-tolerant species which occurs scattered.

This habitat is assessed as being of **Local importance (higher value)** due 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 domestic dog access was the primary impact on this habitat which was recorded during the 2023 field surveys.

Scrub (WS1)

Scrub (WS1) habitat was recorded widely across the site and constitutes the most dominant habitat type by area. It frequently colonises 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 *Rubus fruticosus* agg.*, Ulex europaeus, Sambucus nigra, Salix cinerea* subsp. *oleifolia,* as well as the tall fern species *Pteridium aquilinum*. Non-native shrub species also occur scattered within the vegetation, including *Buddleia davidii* and *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 *Galium aparine* and *Vicia sepium*. Other herbaceous species occur at the more exposed edges of the scrub vegetation, including *Stellaria holostea* and *Smyrnium olusatrum.* The rare Dublin vascular plant *Ceratocapnos 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)**, due to its relatively high species diversity and broad habitat potential, and its presence within a nationally designated site.

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

Habitat Maps

The woodland habitats recorded by Fitzgerald (2023) were mapped as shown on **Figures 27** to **30** below.

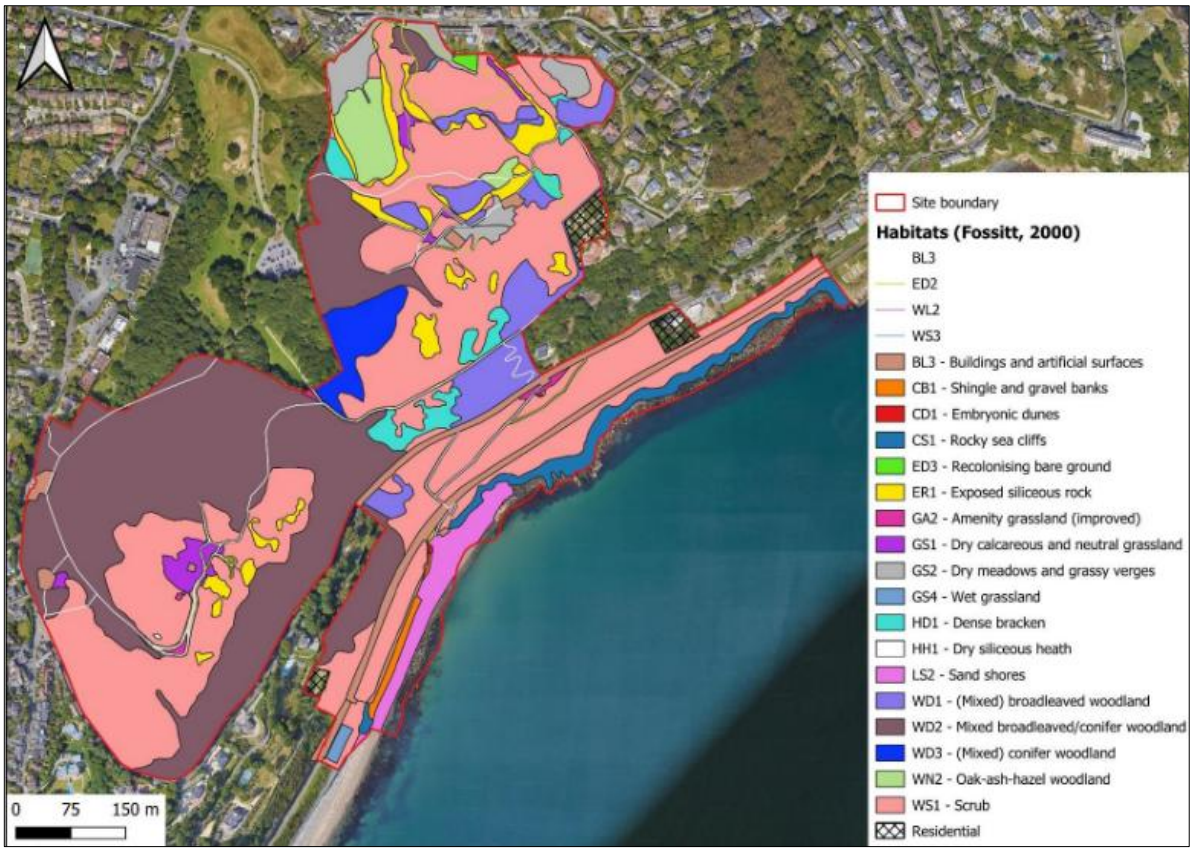

Figure 27. Overview Habitat Map of Killiney Hill (Fitzgerald, 2023).

Figure 28. Habitat Map of the south western portion of Killiney Hill (Fitzgerald, 2023).

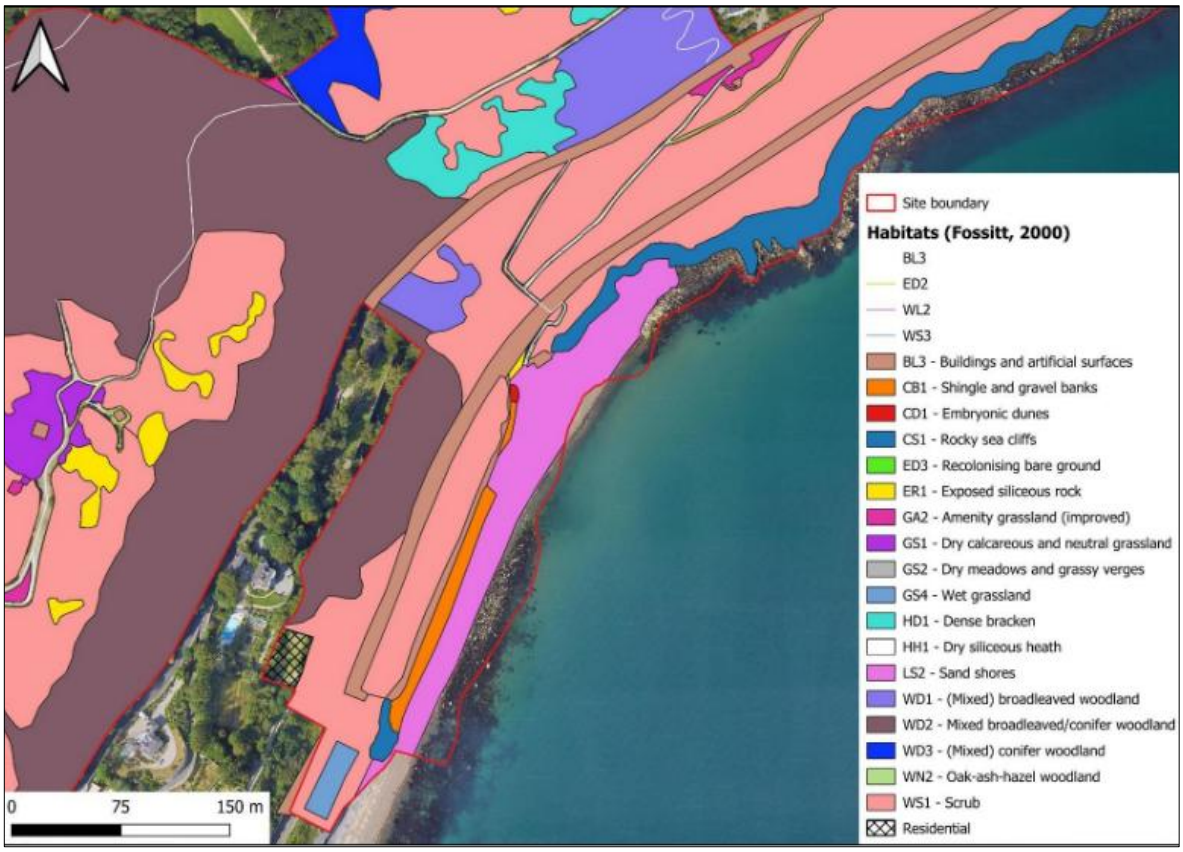

Figure 29. Habitat Map of the south eastern portion of Killiney Hill (Fitzgerald, 2023).

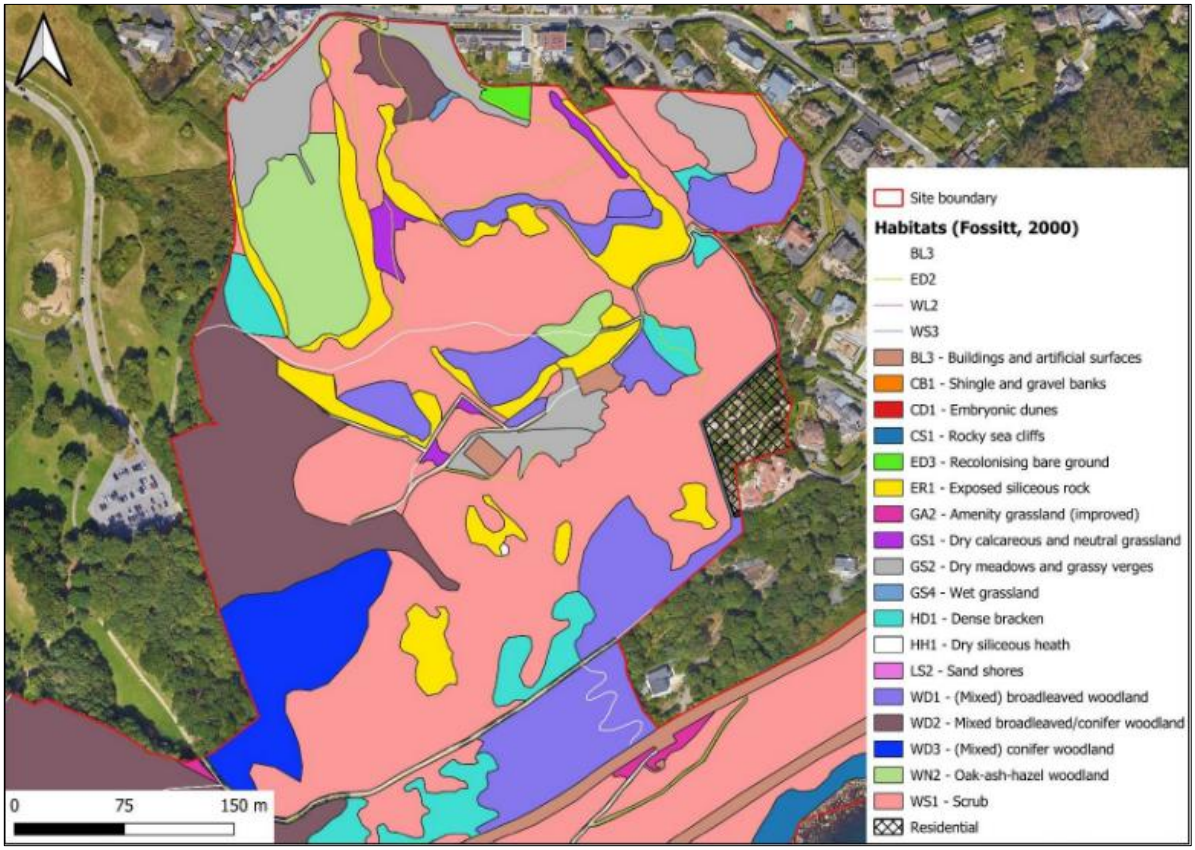

Figure 30. Habitat Map of the northern portion of Killiney Hill (Fitzgerald, 2023).

Fitzgerald rated the site of National ecological value as follows:

> 'Killiney Hill is part of the wider *Dalkey Coastal Zone and Killiney Hill* proposed Natural Heritage Area (pNHA) and is therefore a site of **National importance**. It was primarily designated for its wide range of coastal habitats and also due to the presence of several rare plant species in the site. Killiney Hill is managed by the Dun Laoghaire-Rathdown (DLR) Parks Section in consultation with the Biodiversity Officer and the National Parks and Wildlife Service (NPWS). The protection of the pNHA is also included in the *Dun Laoghaire-Rathdown County Development Plan 2022-2028* and *Dun Laoghaire-Rathdown County Biodiversity Action Plan 2021-2025*'.

2.9 Birds

The birds of Killiney Hill were surveyed as part of the Killiney Hill Breeding Bird Survey completed for Dun Laoghaire Rathdown County Council in 2023. This study recorded 71 species of birds using the site as shown below on **Table 1**. Of those species recorded below in the 2023 surveys those highlighted in **bold** are associated with woodland habitats

Table 1. Bird species recorded as part of the Killiney Hill Breeding Bird Survey (2023).

Common Name	**Scientific Name**
Light-bellied Brent Goose	*Branta bernicla hrota*
Mallard	*Anas platyrhynchos*
Common Swift	*Apus*
Common Cuckoo	*Cuculus canorus*
Feral Pigeon	*Columba livia*
Common Wood Pigeon	***Columba palumbus***
Eurasian Collared Dove	*Streptopelia decaocto*
Eurasian Oystercatcher	*Haematopus ostralegus*
Black-legged Kittiwake	*Rissa tridactyla*
Black-headed Gull	*Chroicocephalus ridibundus*
Mediterranean Gull	*Ichthyaetus melanocephalus*
Common Gull	*Larus canus*
Great Black-backed Gull	*Larus marinus*
European Herring Gull	*Larus argentatus*
Lesser Black-backed Gull	*Larus fuscus*
Sandwich Tern	*Thalasseus sandvicensis*
Common Tern	*Sterna hirundo*
Arctic Tern	*Sterna paradisaea*
Common Guillemot	*Uria aalge*
Black Guillemot	*Cepphus grylle*
Great Northern Diver	*Gavia immer*
Northern Fulmar	*Fulmarus glacialis*
Northern Gannet	*Morus bassanus*
Great Cormorant	*Phalacrocorax carbo*
European Shag	*Phalacrocorax aristotelis*
Grey Heron	*Ardea cinerea*
Eurasian Sparrowhawk	***Accipiter nisus***

Common Name	**Scientific Name**
Common Kestrel	*Falco tinnunculus*
Peregrine Falcon	*Falco peregrinus*
Eurasian Jay	***Garrulus glandarius***
Eurasian Magpie	***Pica pica***
Western Jackdaw	***Coloeus monedula***
Rook	***Corvus frugilegus***
Hooded Crow	***Corvus cornix***
Northern Raven	*Corvus corax*
Coal Tit	***Periparus ater***
Eurasian Blue Tit	***Cyanistes caeruleus***
Great Tit	***Parus major***
Sand Martin	*Riparia riparia*
Barn Swallow	*Hirundo rustica*
Common House Martin	*Delichon urbicum*
Long-tailed Tit	***Aegithalos caudatus***
Willow Warbler	***Phylloscopus trochilus***
Common Chiffchaff	***Phylloscopus collybita***
Common Grasshopper Warbler	*Locustella naevia*
Eurasian Blackcap	***Sylvia atricapilla***
Common Whitethroat	*Curruca communis*
Goldcrest	***Regulus regulus***
Eurasian Wren	***Troglodytes troglodytes***
Eurasian Treecreeper	***Certhia familiaris***
Common Starling	*Sturnus vulgaris*
Song Thrush	***Turdus philomelos***
Mistle Thrush	***Turdus viscivorus***
Common Blackbird	***Turdus merula***
Fieldfare	*Turdus pilaris*
European Robin	***Erithacus rubecula***
European Stonechat	*Saxicola rubicola*
Northern Wheatear	*Oenanthe oenanthe*
House Sparrow	*Passer domesticus*
Dunnock	***Prunella modularis***
Pied Wagtail	*Motacilla alba yarrellii*
Meadow Pipit	*Anthus pratensis*
European Rock Pipit	*Anthus petrosus*
Common Chaffinch	***Fringilla coelebs***
Eurasian Bullfinch	***Pyrrhula pyrrhula***
European Greenfinch	***Chloris chloris***
Common Linnet	*Linaria cannabina*
Lesser Redpoll	*Acanthis cabaret*
Crossbill	***Loxia curvirostra***
European Goldfinch	*Carduelis carduelis*

Common Name	**Scientific Name**
Eurasian Siskin	***Spinus spinus***

Table 1: 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**
Rissa tridactyla	Black-legged Kittiwake	Red	No	0	Non-breeding
Falco tinnunculus	Common Kestrel	Red	No	0	Non-breeding
Apus apus	Common Swift	Red	No	0	Non-breeding
Haematopus ostralegus	Eurasian Oystercatcher	Red	No	0	Non-breeding
Anthus pratensis	Meadow Pipit	Red	No	0	Non-breeding
Fulmarus glacialis	Northern Fulmar	Amber	No	1	Possible
Regulus regulus	**Goldcrest**	**Amber**	**No**	**12**	**Confirmed**
Chloris chloris	**European Greenfinch**	**Amber**	**No**	**4**	**Confirmed**
Larus argentatus	European Herring Gull	Amber	No	1	Probable
Passer domesticus	House Sparrow	Amber	No	2	Probable
Linaria cannabina	Common Linnet	Amber	No	8	Confirmed
Anas platyrhynchos	Mallard	Amber	No	1	Probable
Phalacrocorax aristotelis	European Shag	Amber	No	1	Probable
Phylloscopus trochilus	**Willow Warbler**	**Amber**	**No**	**4**	**Confirmed**
Sylvia atricapilla	**Eurasian Blackcap**	**Green**	**No**	**19**	**Confirmed**
Phylloscopus collybita	**Common Chiffchaff**	**Green**	**No**	**5**	**Probable**
Cuculus canorus	Common Cuckoo	Green	No	1	Possible
Locustella naevia	Common Grasshopper Warbler	Green	No	2	Possible
Garrulus glandarius	**Eurasian Jay**	**Green**	**No**	**1**	**Probable**
Falco peregrinus	Peregrine Falcon	Green	Yes	1	Probable
Anthus petrosus	European Rock Pipit	Green	No	1	Probable
Corvus corax	Northern Raven	Green	No	1	Probable

Species	Common Name	BoCCI status	Bird Directive Annex I	No. of Territories	Breeding Status
Saxicola rubicola	European Stonechat	Green	No	1	Confirmed
Accipiter nisus	**Eurasian Sparrowhawk**	**Green**	**No**	**1**	**Probable**
Spinus spinus	**Eurasian Siskin**	**Green**	**No**	**1**	**Probable**
Certhia familiaris	**Eurasian Treecreeper**	**Green**	**No**	**4**	**Confirmed**
Curruca communis	Common Whitethroat	Green	No	1	Possible

Of those species recorded above in the 2023 surveys those highlighted in **bold** are typical of woodland habitats.

The study noted that:

> ‘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 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*) 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’.

2.10 Bats

The Bat Conservation Ireland database holds a number of records of bats from the 10km square in which Killiney Hill is located (O22). These include records of both roosts and bat activity. Species recorded include:

- Common Pipistrelle (*Pipistrellus pipistrellus*)
- Soprano Pipistrelle (*Pipistrellus pygmaeus*)

- Unidentified Pipistrelle bat (*Pipistrellus* sp.)
- Leisler's Bat (*Nyctalus leisleri*)
- Brown Long-eared Bat (*Plecotus auritus*)
- Daubenton's Bat (*Myotis daubentonii*)
- Unidentified *Myotis* bat species (*Myotis* spp.)
- Whiskered/Brandt's Bat (*Myotis mystacinus/brandtii*)
- Natterer's Bat (*Myotis nattereri*)

During the 2023 surveys six species of bat were detected within the survey area. These were:

- common pipistrelle,
- soprano pipistrelle,
- Leisler's bat,
- Nathusius' pipistrelle,
- brown long-eared bat, and
- Daubenton's bat.

The survey reported:

> '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'.

2.11 Badgers and other Mammals

Protected mammal species such as Badger (*Meles meles*), Pygmy Shrew (*Sorex minutus*) and Red Squirrel (*Sciurus vulgaris*) were all recorded during wildlife surveys of the hill completed in 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.

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.

The report noted:

> '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'.

2.12 Red Squirrel

In the late 2000s it became apparent that the small population of red squirrels on Killiney Hill had reached critically low levels. The DLR Red Squirrel Conservation Project began in 2007 with an assessment of the red squirrel and the removal of grey squirrels that had arrived into 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. In September 2012 fifteen red squirrels were translocated from Wexford to Killiney, and released onto the hill with assistance from NPWS and UCD.

Monitoring in the early years of the project showed signs of recovery and evidence of breeding amongst the population but 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. In 2023 DLRCC began the 'Red Squirrel Restoration Project 2023 – 2030' in response to the results of the monitoring (Carr, 2022).

To date the project has fenced a number of areas which were identified as most sensitive for red squirrels to ensure the protection of such an iconic and important species.

2.13 Deer

There was no evidence of deer within the woods on Killiney Hill however both Sika and Fallow Deer are known from the wider landscape in this part of the county as shown on **Figures 31** and **32** below.

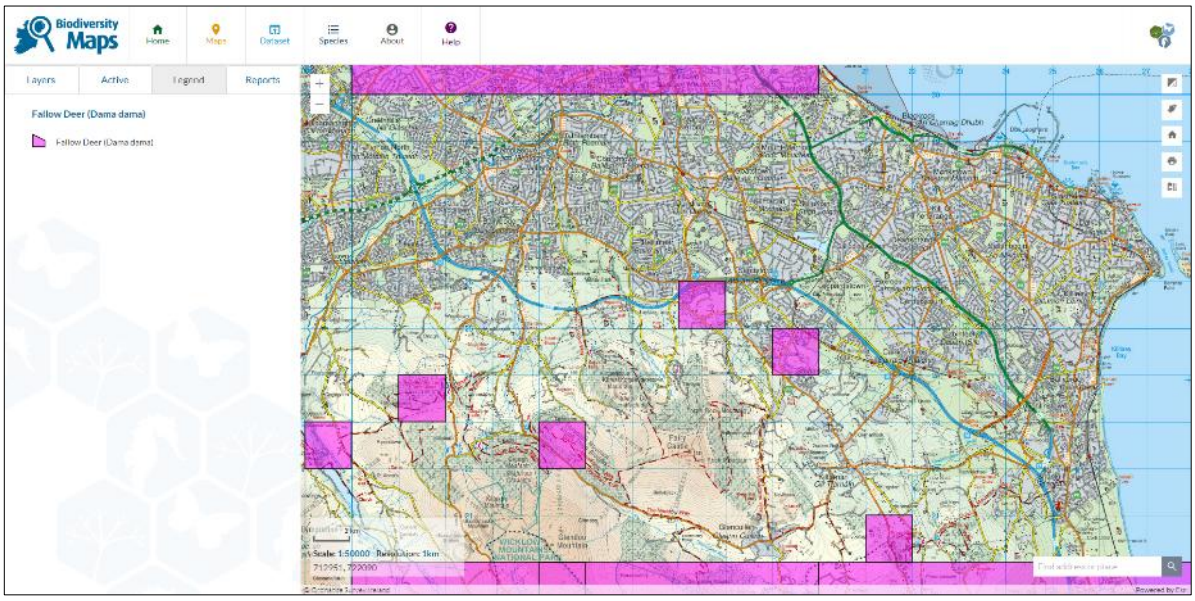

Figure 31. Fallow Deer records (NBDC).

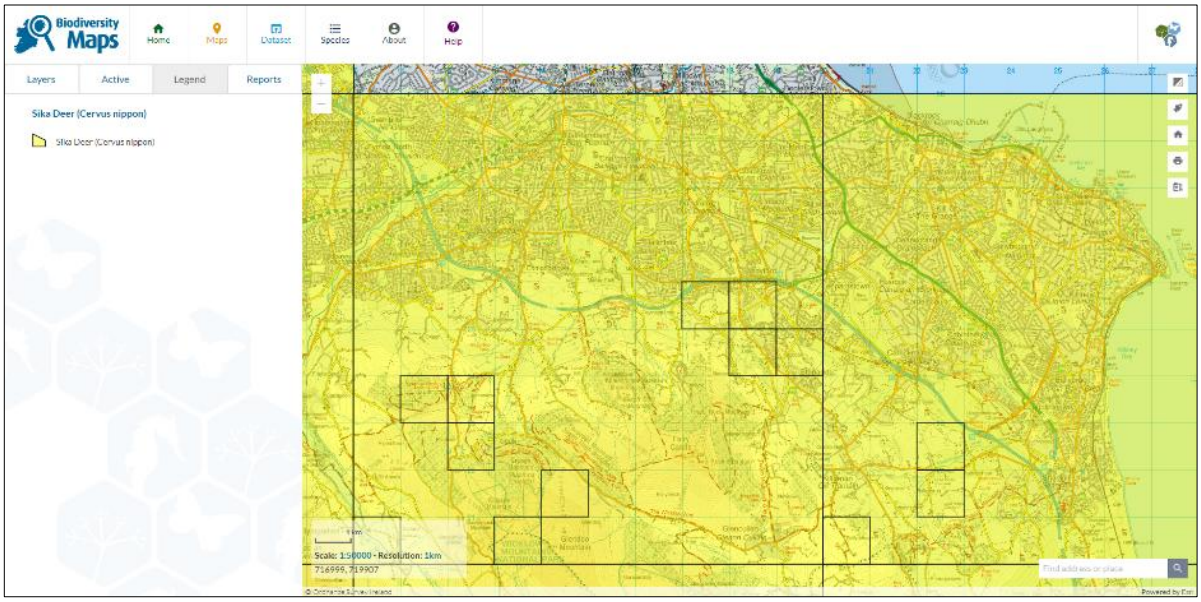

Figure 32. Sika Deer records (NBDC).

2.14 Current Survey

2.14.1 2023 Woodland Study

The current study of the woodland habitats on Killiney Hill has built on these previous extensive studies, coupled with a number of site visits made by the ecologist and forester and these observations are illustrated in the photographic record presented in **Appendix B**. Key considerations and observations made during the study are summarised below and further discussed in **Section 3**.

There is a need for a Vision/Strategy for the long term development and conservation of the woodlands on Killiney Hill as identified in the Killiney Habitat and Species Management Plan. There has been little in the way of significant woodland planting on the hill since the formative times when the hill was developed as a park. This planting reflects the trends and planting fashions of the time and much of the planting consists of exotic and non-native species. The management of the Woodlands on Killiney Hill need to respond to both the Biodiversity and the Climate Change crisis as recognised in the Killiney Hill Wildfire Strategy.

The dominance of non-native species (principally Beech and Conifers) in the canopy in many parts of the Park has resulted in a lack of ground flora in some areas on account of deep shade. In other areas where more native or deciduous exotics occur (such as Horse chestnut and Sycamore) there is a network of uncontrolled/informal paths and routes through the woodlands leading to a further loss of ground flora where users of the park have left the existing paths and infrastructure provided. Many of these trails are created by dogs off-leash and these trails coupled with dog faeces is altering the woodland ground flora in favour of more coarse species such as nettle along woodland edge. Trampling is also resulting in the introduction of non-woodland flora to the woodland habitats.

On a positive note natural regeneration of many tree species (including native species) is occurring on the hill and areas of native woodland have developed in certain pockets on the hill and in the floor/base of the former granite quarries in Dalkey Quarry. Of particular note in this area are the populations of Irish Whitebeam (*Sorbus hibernica*), which is an Irish endemic whitebeam. This species occurs on the shear tops of the old quarry faces at Killiney Hill.

Large areas of scrub are dominated by gorse but this species is also acting as a nurse area for native trees – providing shelter from wind, historic protection from grazing animals (such as the goats which used to occur on the hill) the development of a humic layer on the shallow peat soils over the bedrock. Species which are bird sown such as Oak, Mountain Ash, Whitebeam, Elder and Holly as well as Ash and Sycamore were recorded in these areas and under natural processes scrub habitats transition to emerging woodland and ultimately canopy forming woodland. Examples of this can be seen in some parts of the hill.

Recent planting of both native and non-native species has been undertaken at several locations on the hill by DLRCC Parks Department. Some of these areas need tending such as the removal of tree guards, the need for thinning in some locations and crown release work in others.

There are limited areas on the hill where woodland cover could be expanded through deliberate establishment/planting of trees but two areas which are currently dominated by dense bracken offer potential for woodland expansion.

The main threats to the woodland habitats on the hill arise from:

- Visitor pressures (humans and dogs),
- Ash die back disease,
- Grey squirrel damage,

- Invasive species, and
- Fire

The woodland management plan is also mindful of the conservation of fauna and rare flora on the hill as well as the landscape/aesthetic/visitor experience including the preservation of long distance views.

2.14.2 Invasive species

Three species listed under the Third Schedule of the Birds and Natural Habitats Regulations 2011 were recorded within the woodlands. These are Three cornered leek (*Allium triquetrum*), Spanish/Hybrid bluebell (*Hyacinthoides hispanica*), and Grey Squirrel (*Sciurus carolinensis*).

Other species recorded within the woods which are threatening (or have the potential to if left unchecked) the biodiversity of the woodland habitats include Sycamore (*Acer pseudoplatanus*), Cherry laurel (*Prunus laurocerasus*), Snowberry bush (*Symphoricarpos alba*), Winter heliotrope (*Petasites fragrans*), Buddleia (*Buddleia davidii*), Cotoneaster (*Cotoneaster horizontalis*), Alexanders (*Smyrnium olusatrum*), Montbretia (*Crocosmia* x *crocosmiflora*), Large bindweed (*Calystegia sylvatica*), Old man's-beard (*Clematis vitalba*), NZ Cabbage palm (*Cordyline australis*), Eucalyptus (*Eucalyptus* sp.), Wilson's honeysuckle (*Lonicera nitida*), Snowberry (*Symphoricarpos albus*), Maidenahir vine (*Muehlenbeckia complexa*) and Pheasant berry (*Leycesteria formosa*).

Invasive Species Management commenced in 2024 to determine the appropriate treatments of the invasive plant species across the site. Grey Squirrel are managed annually by DLRCC.

2.14.3 Previous Management Recommendations for the Woodlands

Fitzgerald (2023) recommended the following management for the woodland and scrub habitats on Killiney Hill which have been incorporated into actions of the Killiney Habitat and Species Management Plan:

> '**Woodland**
> Most of the woodland within the site is dominated by non-native canopy species, especially *Acer pseudoplatanus*. Although woodland dominated by non-native canopy species is still valuable as a habitat, native woodland canopy is nonetheless generally of higher ecological value and therefore the promotion of native species cover should be encouraged. To increase the cover of native species, cuttings of trees such as *Fraxinus excelsior* could be taken from oak-ash-hazel (WN2) woodland (a habitat type with native species canopy cover, which is currently restricted locally) on site and planted in areas of (mixed) broadleaved woodland (WD1) and mixed broadleaved/conifer woodland (WD2).
>
> Native understorey species planting could be attached to existing old walls to funnel visitors and domestic dogs away from areas of woodland restoration.
>
> Woodland restoration for the promotion of red squirrel populations would work hand in hand with the restoration of woodland ground flora for improvements in botanical diversity locally.
>
> Moreover, the use of native ground cover such as *Ilex aquifolium* and *Rubus fruticosus* agg. should be employed to achieve this. Such restoration measures should be considered in light of the negative impact that trampling is having on the native ground flora vegetation in some areas.

Overall a woodland specialist should be commissioned to examine the potential for woodland restoration in all of the areas of woodland on site, with a particular focus on areas of (mixed) broadleaved woodland (WD1) and mixed broadleaved/conifer woodland (WD2) near to the main access paths and routes which are most affected by trampling/fertilisation.

Scrub and Dry Heath

Whilst scrub (WS1) is an important and extensive area of semi-natural habitat at Killiney Hill, it can encroach onto other important habitats within the site, including dry heath (HH1) and areas of grassland. Scrub should be cut back from the small areas of nascent dry heath (HH1) and wet grassland (GS4) within the site in order to promote the growth of these scarce habitat types on site. Different management methods should be trialled for scrub on site more broadly. This may include the intermittent cutting of scrub on an e.g. biennial basis. Furthermore, goat grazing could be considered along the southern slopes of the site, which are less accessible by visitors'.

3. Woodland Management Recommendations

3.1 Vision for the Woodlands on Killiney Hill and their Management

The overarching Vision for the woodlands on Killiney Hill is that the existing woodland habitat is protected on the hill, diversified both in terms of species composition and age, and where possible that native woodland habitat expands within the park. This could be through natural regeneration and natural succession from scrub to woodland or through new woodland establishment. The woodland habitat consists of not only the canopy trees but also the understorey and shrub layers and associated ground flora which is protected from trampling and allowed to recover. The woodlands of Killiney Hill continue to support a suite of fauna associated with the habitat such as Red Squirrel, Badger, a variety of bats and woodland birds such as Jay, Treecreeper, Long eared Owl and Sparrowhawk.

The future management of Killiney Hill and its woodlands is essentially driven by human/man-made impacts as opposed to natural influences and processes (principally trampling and the risk of fire) as the site is located in a highly pressurised, urban landscape within Dun Laoghaire Rathdown County .

The future management of the woods should ensure that any actions or measures undertaken achieve the following objectives:

- Contribute to the restoration of native woodland habitat in Ireland as part of Ireland's commitments under the EU Nature Restoration Law.
- Protect and conserve the habitats for which the site is listed as a proposed Natural Heritage Area.
- Contribute to the conservation of native woodland habitat within the Dublin Bay Biosphere Reserve.
- Achieve the relevant actions of the Killiney Hill Habitat and Species Management Plan.
- Contribute to the aesthetic and landscape values of Killiney Hill.
- Demonstrate achievement towards moving to or reaching more favourable conservation status for the woodland habitats with an increase in native species within the woods and the protection and restoration of the ground flora and shrub layers within the woods.
- Elimination and ongoing control of non-native invasive species within the woodland.
- Build resilience in the woodland with the addition of some native species which are currently absent/ in low numbers within the woodland (hazel and wild cherry) in light of Ash die-back disease and the loss of same from within the woodland.
- Conserve the populations of Irish Whitebeam (*Sorbus hibernica),* an Irish endemic whitebeam which occurs on the shear tops of the old quarry faces at Killiney Hill. This species is listed as Vulnerable (Wyse Jackson *et al.,* 2016) as less than 1000 mature individuals are estimated to exist in Ireland and hence are of high ecological value.
- Restore areas for non-volant woodland mammals and implement measures to reduce disturbance impacts from humans and dogs.

3.2 Dun Laoghaire Rathdown County Council Policies and Objectives

Killiney Hill woods is part of the DLR Ecological Network and forms one of the important wildlife corridors of the Killiney and Dalkey costal corridor. The proposals for the management of the Killiney Hill Woodlands are in line with the relevant Actions from the **Dún Laoghaire-Rathdown County Biodiversity Action Plan - Nature Recovery, Restoration & Reconnection (2021 – 2025)**.

These include:

Action 1.4
Develop DLR Habitat and Species Action Plans

Action 1.6
Update our County Ecological Network Map to protect and enhance DLR's Green Infrastructure

Action 1.7
Identify important biodiversity areas most vulnerable to climate change, including terrestrial, watercourses, coastal and marine areas, and establish measures and projects that assist protection of vulnerable areas

Action 2.5
Develop biodiversity management plans for open spaces within DLR ownership and update existing plans

Action 3.1
Identify and map habitats, species and supporting features that provide ecosystem services

Action 3.6
To protect, restore and expand our County Ecological Network and DLR'S Green Infrastructure. Deliver Nature Recovery and Restoration as part of our Ecological Network and promote the use of Nature-based Solutions where these solutions allow the delivery and expansion of our Ecological Network

Action 3.7
Carry out ecological surveys and assessment of our habitats, including hedgerows, rivers and streams, to provide information regarding areas that require restoration in order to deliver Nature Recovery and Restoration and expansion of our Ecological Network

Action 4.5
Establish and promote positive examples of cooperative local community biodiversity projects or demonstration models

They are also in line with the **Objectives for Natural Heritage, Designated Sites, Ecological Networks, Rivers and Hedgerows as set out in the Dún Laoghaire-Rathdown County Development Plan (2022 - 2028)**, as follows:

8.7.1.1 Policy Objective 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 Conservations (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.

8.7.1.4 Policy Objective 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.

8.7.1.6 Policy Objective GIB23: CountyWide 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.

8.7.1.8 Policy Objective GIB25: Hedgerows
It is a Policy Objective to retain and protect hedgerows in the County from development, which would impact adversely upon them. In addition, the Council will promote the protection of existing site boundary hedgerows and where feasible require the retention of these when considering a grant of planning permission for all developments. The Council will promote the County's hedgerows by increasing coverage, where possible, using locally native species and to develop an appropriate code of practice for road hedgerow maintenance. The Council will promote the protection of existing hedgerows when considering a grant of planning permission for all developments.

The Killiney Hill Habitat and Species Management Plan also outlines relevant actions including:
1.1 Identify and map areas suitable for increasing cover of native species
1.2 Commission woodland specialist to examine the potential for woodland restoration (WD1 & WD2) and to develop a method statement for woodland restoration
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.
1.4 Implement the planting of native species
1.5 Monitoring programme for woodland area to be developed by woodland specialist
7.1 Restore areas and reduce access to sensitive locations to allow them to recover
10.1 Liaise with our Parks staff to address the provision of a designated dog off leash area
14.1 Develop an overall programme to monitor the effectiveness of the actions set out in the HSMP

3.3 Implications of Nature Conservation Listing

Killiney Hill is a proposed Natural Heritage Area and therefore any proposed woodland management operations should be discussed and agreed with National Parks & Wildlife Service (NPWS). In general woodland habitats across Ireland are in poor condition due to:

- the presence of non-native invasive species;
- an inappropriate grazing regime;
- poor woodland structure;
- a lack of natural regeneration; and
- their small size and fragmented nature.

The management prescriptions set out in this plan aim to address these challenges, as appropriate, for the woodland habitats on Killiney Hill.

3.4 Proposed Deadwood Policy

There is a general lack of both fallen and standing deadwood within the woodlands on Killiney Hill. Where trees have fallen or been removed they seem to have been chipped and the chippings spread such as in Compartment 22. This adds a huge injection of nutrients to the woodland system and results ultimately in the development of a weedy flora. In contrast the slow gradual decay of standing or fallen deadwood is part of the natural processes of woodland ecology and slowly release nutrients to the system which allow the development of the humic layer in the soil and support woodland fungi.

Standing deadwood is an essential multifunctional and structural component of the forest ecosystem and is an important habitat for many species (mammals, birds, amphibians, insects, fungi, moss and lichen communities). Deadwood increases the structural and biological diversity of the woodland ecosystem since many organisms are adapted to utilise its resource.

Fallen deadwood is also another important micro-habitat that is in short supply in the woods and it is recommended that a policy be implemented to maintain as much fallen deadwood as possible *in-situ*.

Note that these objectives can be achieved without compromising safety concerns on the hill as there is no issue with making safe standing or fallen trees adjoining the formal pathways through the woodlands. See also **Section 3.9**.

3.5 Ash Dieback Disease

Ash dieback is a serious disease of ash trees caused by the invasive fungal pathogen *Hymenoscyphus fraxineus* (previously known as *Chalara fraxinea*), which originated in Asia and was brought to Europe in the 1990's. The pathogen has now spread across most of the natural range of Ash in Europe causing high mortality rates of Ash trees. Ash dieback was first detected in 2012 in Ireland on plants imported from continental Europe. The disease is now prevalent across Ireland and will likely cause the death of over 90% of Ash tree's here in the next decade. The disease can affect Ash trees of any age and in any setting. The disease can be fatal, particularly among younger trees. Many of the Ash trees on Killiney Hill are showing signs of ash die back. Where safe to do so some of these Ash trees could be allowed to transition naturally to standing deadwood.

It is recommended that a bi-annual summer survey of healthy Ash trees not displaying Ash dieback symptoms be carried out and that these are recorded, mapped and protected in any woodland management operations.

3.6 Invasive Species

The woodland habitats on Killiney Hill are threatened by many invasive and non-native species which threaten the biodiversity and ecological function within the woodlands. They are considered to be negatively impacting these wooded areas (as well as other habitats such as the areas of Scrub which are transitioning to native woodland through natural regeneration) and are in need of a multi-annual dedicated eradication/control strategy.

Dun Laoghaire Rathdown County Council has been implementing control of the Grey squirrel populations - see **Section 3.10**.

3.7 Felling Licencing & General Thinning Policy

Some of the more recently planted areas such as within Compartment 5 should undergo some selective thinning to favour the development of native and to maintain and improve structure and diversity. This will require a ten year felling licence from the Forest Service in the Department of Agriculture, Food and Marine. There is an application process for this

which involves setting out thinning and felling areas, years and intensities. This can be made based on the maps and prescriptions prepared in this plan.

A second 10-year felling licence will be required for the period 2034-2043.

However, many of the proposed measures can be commenced without a felling licence (e.g. invasive species management) and even some of the thinning can commence as it will be of low intensity and therefore sub-threshold (<15m³ of timber per annum) in terms of the requirement for a felling licence.

All felling and thinning works should be conducted between 1st September to 28th February to avoid the bird breeding season.

3.7.1 Professional Marking

It is recommended that professional marking is carried out by a suitably **qualified and experienced forester** and **bat specialist** ahead of operations to:

1. Select the appropriate trees for felling in favour of others or to create opportunities for diverse regeneration or enrichment planting.
2. Potential bat roosts in trees are retained or surveyed in advance of felling work.
3. Ensure the appropriate intensity of thinning is achieved.
4. Select trees for ring-barking where appropriate.
5. Facilitate contractors in pricing work.

This is an important step in ensuring the long term stability and species composition of the woods. It is recommended that the ProSilva Ireland Marking Protocol be followed when carrying out this work. This is presented below on **Figure 33**. The ProSilva 2-day Tree marking training course could provide a helpful training piece for DLR Parks staff. Please find link here: https://prosilvaireland.com/category/tree-marking/

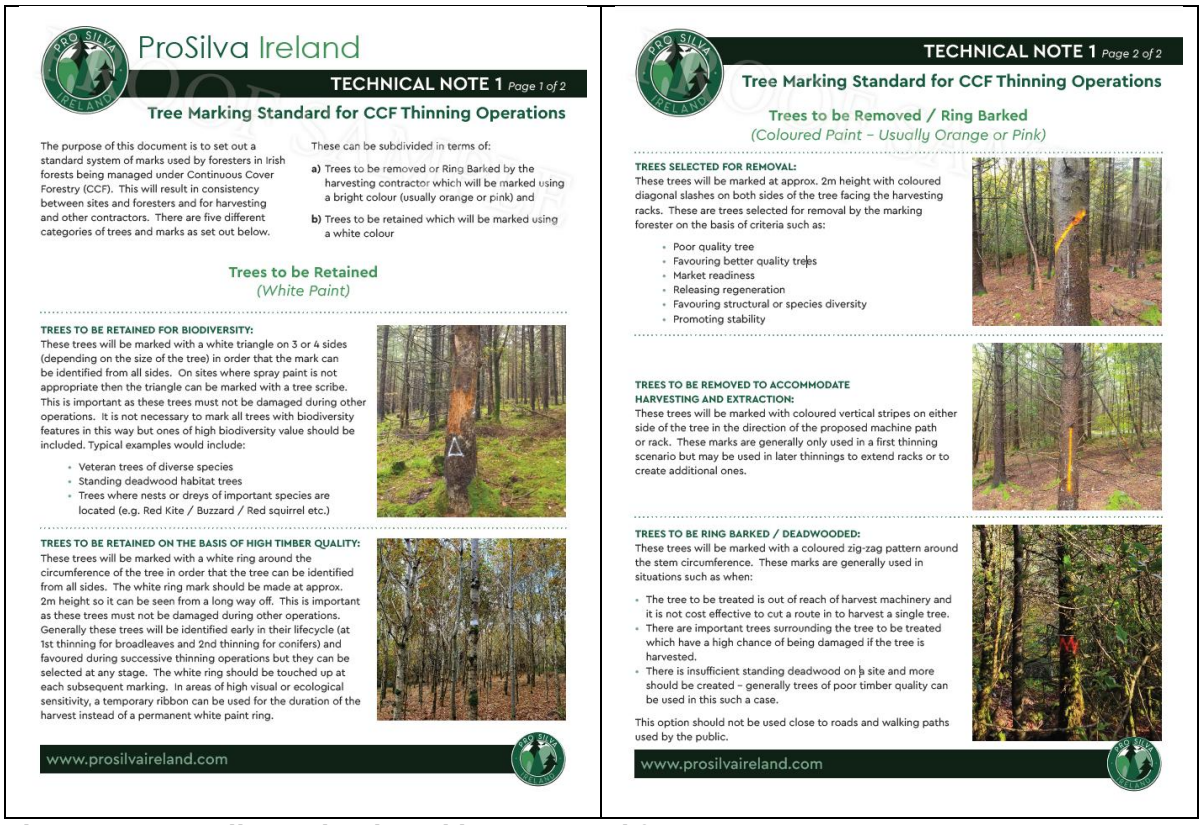

Figure 33. ProSilva Ireland Marking Protocol for CCF Management.

3.7.2 Halo thinning & Group thinning

The general silvicultural principals that apply for thinning the wood are listed as follows:

- Long term native broadleaves such as Oak must be favoured for retention throughout.
- Halo thinning – This is the identification of a tree which has been selected for long term retention and crown development based on its species or particular biodiversity features. The thinning policy for this is to remove competitor(s) from around this tree gradually over time to ensure its survival and release of its crown from competition. This will both improve it's stability and longevity.
- Group thinning – This is the removal of a number of trees within one specific area or coupe. The removal of a group of trees could be for a variety of reasons such as Ash dieback disease which is mentioned above, or to remove dominant trees (e.g. Sycamore) to create opportunities for more diverse regeneration or enrichment planting of a more desirable species within the woodland composition.
- Marking and thinning operations will seek to retain stable, native and biodiverse trees.
- Thinnings will aim to improve woodland structure, particularly in the context of the rise to dominance of Sycamore and Beech and the onset of Ash dieback disease by transferring vitality and growth on to desired species for long term retention. This will continue on a regular cycle to be determined for each compartment during the professional marking process.

3.7.3 Woodland Felling Operations

All felling should be carried out "motor-manually" using skilled chainsaw operators. There is no need to use traditional large scale forestry machinery such as a harvester and forwarder. In general it is neither necessary nor practical to extract the timber during the operations. As the operations proposed are driven by ecological objectives and it is proposed to increase the levels of standing and fallen deadwood in the woodland the timber does not need to extracted. This will also ensure the protection of the woodland soils which enables natural regeneration and revegetation to take place. The existing pathways within the woods should be adequate to allow the works to take place.

3.8 Enrichment Planting

This is a technique which is used to regenerate a desired species within a woodland or to add it to the species complement within the wood if it is currently lacking. This is generally done following woodland management interventions, such as group selection or single tree selection. Enrichment planting beneath existing canopy cover typically increases the probability of successful establishment of a desired species. These desired species may not exist in the forest currently or have suitable conditions to regenerate naturally. Sites where invasive species dominate as outlined in the invasive species section above can have a significant impact on the woodlands ability to naturally regenerate due to competition for light and nutrients. Enrichment planting can ensure that some desired species suitable to the conditions available have a chance to out-compete surrounding vegetation and allow adequate establishment.

Note that the DAFM Forest Service has restrictions about the tree planting stock that can be used within its schemes. The seed collectors need to be registered and various paperwork needs to be completed to certify the provenance of any material used. This is especially important for the Killiney Hill Woodlands given their ecological importance within DLRCC and the pNHA status of the hill.

3.9 Humans, Dogs & Impacts on Woodland Habitats and Ground Flora

The issue of disturbance of wildlife from people and dogs and the trampling impacts of both within the woodlands on Killiney Hill is extremely high and discussions with dog owners identified a perception that this is 'the only park in DLRCC where dogs are allowed off lead'.

Other studies completed on the hill have recorded disturbance to badgers and other protected fauna.

There is an issue with permeability on the hill with informal tracks in many areas including emerging woodland habitat in areas of scrub. The potential for a rolling system of fencing using Chestnut paling or similar that is used to enclose woodland areas for 2-3 years may be sufficient to allow brambles and other woodland flora to develop as well as allowing visitors to feel that they are not being too controlled/excluded from parts of the hill before it is moved on to protect other areas.

3.10 Control of Grey Squirrel

The grey squirrel is commonly seen in many parts of Dún Laoghaire Rathdown and is a species listed under EU Regulation 1143/2014 on Invasive Alien Species. Grey squirrel are particularly damaging to semi-mature broadleaves – particularly Sycamore, Beech and Oak and continuing the ongoing control of the grey squirrel population in Killiney Hill is recommended. It is possible Pine Marten may reach Killiney Hill under natural means as part of their ongoing range expansion in Ireland. They have been recorded from Deansgrange, further south near Enniskerry in County Wicklow and near Lambs Cross as can be seen on **Figure 34** below. Two pine marten den boxes should be provided in the woods to assist in this natural recovery.

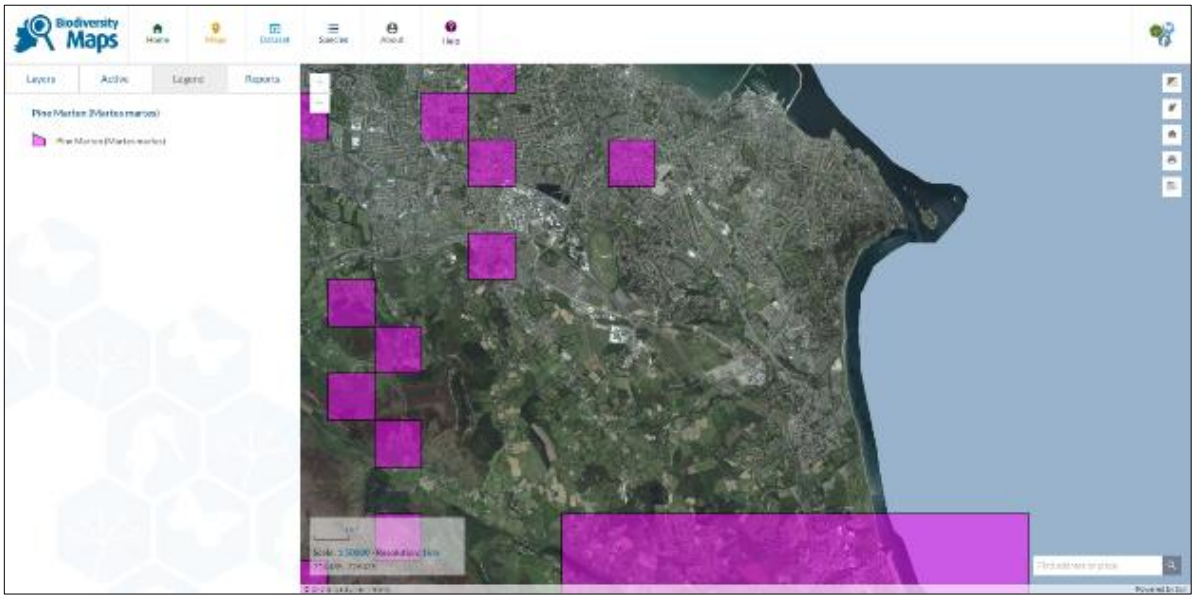

Figure 34. Pine Marten records from the environs of Killiney Hill.

3.11 Forest Service Schemes

There are 2 Schemes operated by the Forest Service in the Department of Agriculture, Food & Marine which could be utilised by Dún Laoghaire Rathdown County Council to assist funding the management of the woodlands on Killiney Hill. These are as follows:

3.11.1 Continuous Cover Forestry Scheme

This element two of the Woodland Improvement Scheme (WIS) will provide funding for conversion of existing forests to Continuous Cover Forestry (CCF) over a 12-year transitional period. Successful applicants are eligible for three WIS payments (€750 / ha.) for three separate interventions. A “Transformation Management Plan” must accompany the application to the Forest Service in the Department of Agriculture, Food and Marine. This plan could be used as a basis for such an application.

3.11.2 Afforestation on Public Lands Scheme - Native Woodland Categories

Two areas on Killiney Hill were identified where the area under native woodland could be expanded with tree planting. These are compartments 8 and 21. Planting in these areas would allow the creation of 0.87ha of new native woodland. Such planting would be eligible for grant aid support under the Forest Service's FT3 – Forest Creation on Public Lands scheme.

FT3 provides funding for Native Forest areas which are capable of delivering the following ecosystem services:

- The recreation of lost native woodland habitats, rich in biodiversity and cultural significance.
- The formation of 'bio-corridors' with and between other semi-natural habitats within the surrounding landscape.
- Carbon sequestration arising from woodlands that will exist in perpetuity.
- The protection and enhancement of water quality and associated aquatic ecosystems.
- The improvement of air quality in urban and peri-urban areas.
- Soil protection and the reclamation of former landfill and brownfield sites.

The scheme comprises three separate funding elements. Planting Element FT3 relates to Native Forest planting, and Recreation Elements 1 and 2 (both optional) relate to recreational facilities.

Planting Element FT3 provides up to €6,440/Ha towards planting and maintaining new woodlands. There is also an additional grant available in support of recreational facilities within the newly planted woodlands.

Those facilities eligible under Element 3 include new walking trails, seating and signage, such as information boards, interpretive aids and way-markers.

3.12 Potential Outlets and Markets for any Timber Produced

Thinning will be at a scale where extraction of timber is not considered necessary given:

1. The overriding ecological objectives for the property;
2. The small volume of timber to be harvested;
3. The need to develop greater levels of standing and fallen deadwood in some compartments;
4. The additional "non-selective" nature of harvesting for access development that would be required if extracting timber;
5. The protection of soil from compaction for regenerative purposes is important.

Current access within the Park will be adequate to facilitate the management of the property and the small volumes of wood which will require felling through silvicultural interventions. Therefore the question of outlets and markets for timber harvested does not arise, unless for very small scale wood turning or craft uses that do not require access for timber lorries and heavy harvesting machinery.

3.13 Specific Biodiversity Prescriptions

The measures proposed in this plan that will benefit woodland birds, bats, mammals and Invertebrates include:

Birds

- management of the existing woodlands to improve the structure of the woods and recreate an understorey, promote native species and natural regeneration;
- restructuring of the woodland to create open glades and increase woodland edge – achieved through professional marking and selective felling;

- management of dead wood (both standing and fallen within the woods) to improve woodland invertebrate diversity and hence foraging for birds.

Bats

- management of the existing woodlands to improve the structure of the woods and recreate an understorey, promote native species and natural regeneration;
- restructuring of the areas of young woodland to create open glades and increase woodland edge to improve foraging areas for bats - achieved through professional marking and selective felling;
- management of dead wood (both standing and fallen within the woods) to improve woodland invertebrate diversity and hence foraging for bats.

Specific measures proposed in this plan for bats include:

- the erection of bat boxes - 'Schwegler' woodcrete bat boxes (of varying designs as detailed below) are recommended. These are available for purchase online from www.nhbs.com or www.jacobijayne.com ;
- the following numbers of bat boxes are recommended:
    - Schwegler 1FF bat box design x 8 No. units;
    - Schwegler 2FN bat box design recommended x 8 No. units;
    - Schwegler 1FD with front panel bat box design recommended x 6 No. units.

Mammals

- Provision of two pine marten den boxes within the woodlands to provide breeding habitat for this species, which is recovering its natural range in Ireland following years of persecution.

Invertebrates

- management of the existing woodlands to improve the structure of the woods and recreate an understorey, promote native species and natural regeneration;
- restructuring of the woodland to create open glades and increase woodland edge;
- management of dead wood (both standing and fallen within the woods) to improve woodland invertebrate diversity.

3.14 Climate Change Resilience

Climate change is likely to impact on woodlands through a variety of ways, such as:

- Changes in the seasonality of rainfall
- Increased intensity of rainfall events
- Increasing periods of drought (not only in summer)
- Increased storms, severe winds and wind throw events
- Increased threat of tree pests and diseases
- A longer growing season
- Potential increases in temperature

The Woodlands on Killiney Hill need to be resilient, resistant and adaptable if future generations are to derive the goods and services that we currently enjoy from them today.

Best practice for improving resilience of our woodlands to climate change recommends:

- the adoption of continuous cover woodland management,
- the promotion of species able to tolerate future predicted climate conditions,
- the planting of the right tree in the right place,
- the restoration of suitable conditions for certain species in certain locations in relation to hydrology/species diversity

- encouragement of natural regeneration to improve genetic diversity and tree quality,
- the use of tree mixtures that mutually benefit one another and are compatible with growth rate and shade tolerance, and
- the use of appropriate provenance of any new tree material with the implementation of high biosecurity standards

The removal of invasive species and natural regeneration should all assist in helping the Woodlands on Killiney Hill become more resilient to climate change impacts.

3.15 Fire Risk

Man made fires are an increasing management issue on Killiney Hill. A fire strategy has been developed for the hill and this coupled with other measures such as the restoration of the heathland and grassy edge habitats in the areas of Gorse dominated scrub on the summit of the hill for reptiles and rare plants will reduce fire loading risk in the immediate environs of where the public congregate. Fire is predominantly an issue for conifer plantations whereas native woodland with a well-developed ground flora does not generally burn.

3.16 Natural Succession

As discussed above in **Section 3.15** fire is an increasing threat to the park and whilst the transition from heathland to scrub dominated by European Gorse and ultimately native woodland is a natural one there are challenges in managing this process. The development of tall mature heath dominated by European gorse has resulted in a decline in quality of the coastal heathland and grassland habitats on the hill with subsequent impacts on various species groups including reptiles and rare plants. Notwithstanding that the pockets of native woodland that have developed in the hill and individual naturally regenerated trees are of high ecological value and it would be important to protect these in any targeted grazing plans for the restoration of heathland habitat using species like goats. Excellent expertise on the use of goats to manage gorse and work towards the restoration of heathland habitat on Howth has been developed by the biodiversity team in Fingal County Council.

3.17 Community Engagement

It is recommended that this woodland plan is disseminated to local staff, councillors and residents and others in the community to ensure buy in for same.

Local groups could be engaged to deal with some of the invasive species that can be dug out, cut back or pulled but those requiring the use of herbicides are best treated by professional contractors.

3.18 Woodland Biodiversity Surveys

It is recommended that a lichen, moss and fungal survey of the woodlands are completed.

3.19 Monitoring

It is recommended that there is ongoing monitoring of the effectiveness of the implementation of the woodland management measures

3.20 Staff Training

It is recommended that the DLRCC park staff are given training in the various woodland management techniques including where to plant trees, what species to plant and how to tackle invasive and non-native species.

Appendix A: Woodland Inventory and Plan

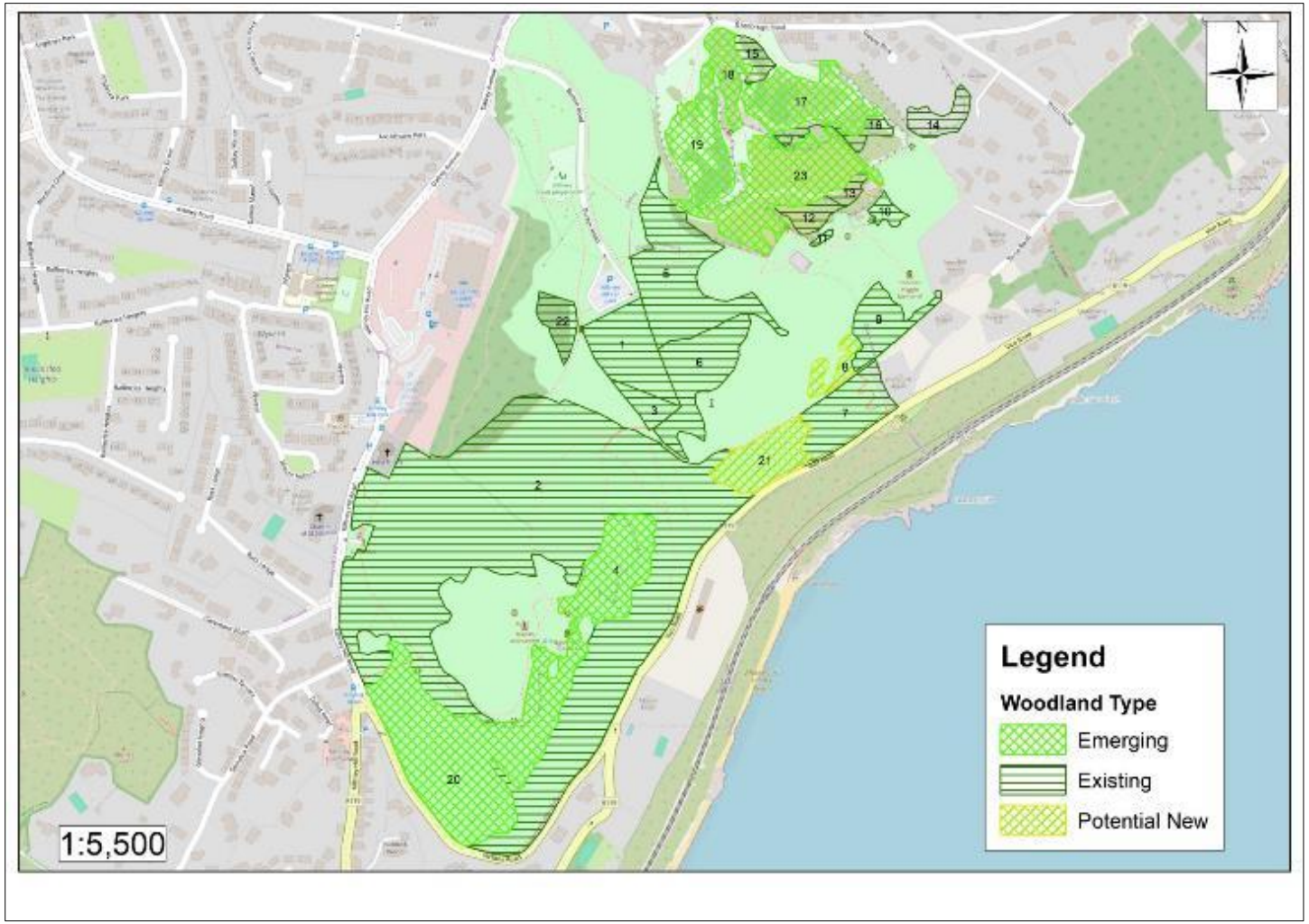

Figure 35. Compartment Map 1:5,500.

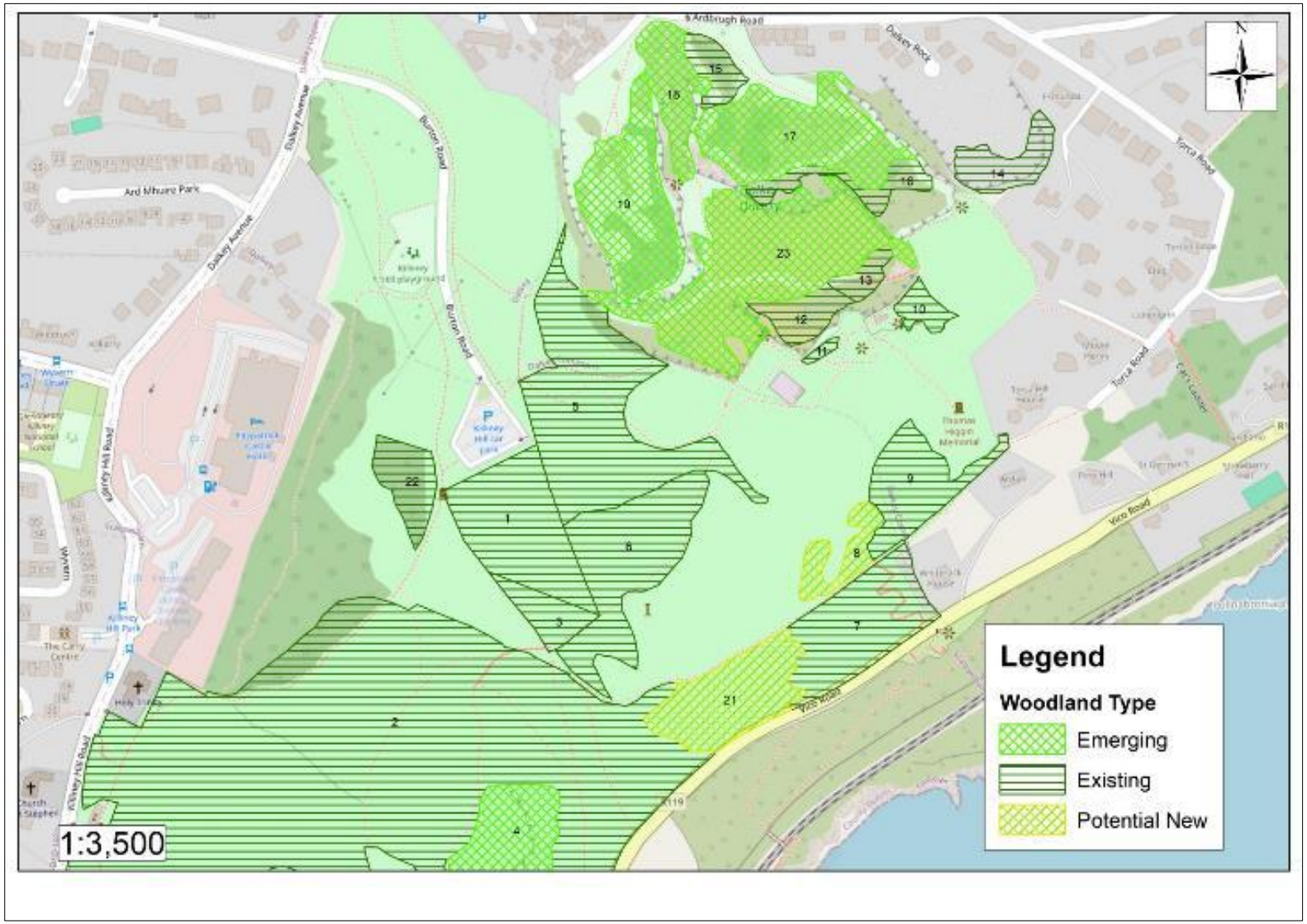

Figure 36. Woodland Map – South 1:3.500.

Figure 37. Woodland Map – North 1:3.500.

Table 1. Woodland Compartments and Management Prescriptions.

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
1	0.83	Existing	(Mixed) broadleaved woodland (WD1)	Mature woodland dominated by Beech with Ash, Sycamore and occasional Larch No understorey/shrub layer – occasional Elder Very restricted ground flora – mostly non-woodland species, grasses, etc. Trampling Dog faeces Invasives - Three Cornered Leek Ash Die-Back	Reduce Trampling and Dog faeces in the woodland through fencing Implement dogs on leash policy Invasives – control Three Cornered Leek in spring when evident Monitor Ash trees for resilience to Ash die-back and protect, if dead allow to decay naturally where safe to do so Enrichment Planting below areas of ash die back with oak as light gaps develop Maintenance of Enrichment Planting
2	11.33	Existing	Mixed broadleaved/conifer woodland (WD2)	Mature woodland dominated by Beech and Sycamore with Ash and Oak. Scots pine, Wych elm, Yew, Hazel and Elder is also present as is Gorse at margins. Mature Hawthorn. Veteran specimen Oak, Beech and Horse chestnut. Good ivy cover on trees. Good woodland flora in parts with ferns and bramble cover Sycamore regeneration threatens native components of the woodland.	Reduce Trampling and Dog faeces in the woodland through fencing Implement dogs on leash policy Tackle Invasives Manage Sycamore regeneration through tending Enrichment planting with natives – Hazel, Oak in light gaps Marking by a forester and thinning of younger planted material on left hand side of the path leading down to the tea rooms from the Obelisk to allow crown development here

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
				Recent planting of Hazel, Scots pine, Mountain Ash, Larch and Oaks. Trampling – various unofficial paths through the compartment Dog faeces Invasives - Winter Heliotrope, NZ Cabbage Palm, Cherry Laurel, Hybrid Bluebell, Three cornered leek, Red valerian, Alexanders, Sycamore, Cotoneaster spp., Butterfly Bush Recent fire damage evident in areas of adjoining gorse scrub Red squirrel restoration area is located within this woodland – ground flora shown signs of recovery within the fence Sycamore show signs of Grey squirrel damage Several seating areas are present Mostly bounded by the remains of the old deer park wall	Reduce trampling along path edges with fencing Retain ivy on trees for biodiversity value
3	0.20	Existing	Conifer woodland (WD4)	Monterey Pine plantation with some Holly and Elder at margins Heavily shaded No understorey/shrub layer beyond occasional Elder	Reduce Disturbance, Trampling and Dog faeces in the woodland through fencing Implement dogs on leash policy Some enrichment planting of native species in light gaps

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
				Trampling - Introduction of Non Woodland Flora Dog faeces Disturbance to Red Squirrel	
4	0.97	Emerging	Natural regeneration of native tree species within areas of gorse scrub (WS1)/degraded dry heath (HH1)/Acid grassland (GS3) and exposed rock (ER1)	Natural regeneration of Oak, Mountain Ash, Elder, Ash, Scots pine and Whitebeam noted here Bramble, Ling heather, Bell heather, Wood sage, Herb Robert and Common polypody fern present Good examples of naturally regenerated woodland adjoins this compartment to the north Invasive species – Three cornered leek	Allow woodland processes (natural regeneration) to continue on the lower slopes where not in conflict with heath/grassland restoration measures Tackle invasives – Three cornered leek
5	1.58	Existing	Mixed broadleaved/conifer woodland (WD2)	Veteran Beech, Sycamore, Ash Sitka Spruce and Douglas Fir stand in need of thinning Ash with Ash die-back Old tree guards on planted Oaks near quarry Sycamore regeneration in need of control Exposed granite bedrock in places Trampling – pathways through this stand	Professional Marking of Thinnings – including some group thinning Thinning of selected Sitka Spruce and Douglas Fir to stabilise stand Reduce Trampling and Dog faeces in the woodland through fencing Implement dogs on leash policy Manage invasives Remove old tree guards

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
				Invasives - Montbretia, Butterfly Bush and Cotoneaster, Three cornered leek	
6	0.94	Existing	(Mixed) conifer woodland (WD3)	Monterey Pine at eastern margin with some younger Larch, Sitka Spruce and Douglas Fir Trampling	Professional Marking of Thinnings – including some group thinning Thinning of selected Larch, Sitka Spruce and Douglas Fir to stabilise stand Light gaps in canopy below Monterey Pine have grass regeneration below - establish two trial exclosures – one to measure trampling impact and natural regeneration, one to be planted with shade tolerant species – Elder, Holly, Hazel
7	0.77	Existing	(Mixed) broadleaved woodland (WD1)	Ash, Sycamore, Beech Some Ash show signs of Ash die-back Regeneration is mostly non-natives Invasives - Three Cornered Leek	Control regeneration of Sycamore Enrichment planting with natives Ash could be allowed to decay naturally on much of these slopes
8	0.21	Potential New	Dense Bracken (HD1)/Dry meadow and grassy verges (GS2)	Gorse, Bracken	Establish New Native Woodland Protect from trampling and access Implement dogs on leash policy
9	0.50	Existing	(Mixed) broadleaved woodland (WD1)	Ash, Sycamore, Elder, Hazel, Scots pine, Beech, Gorse Invasives – Sycamore, Eucalyptus	Implement dogs on leash policy
10	0.11	Existing	(Mixed) broadleaved woodland (WD1) Dense bracken (HD1)/Dry meadow	Ash, Sycamore, Hazel, Wych elm, Mountain Ash, Elder, Hawthorn Powerlines overhead Ash with ash die-back	Establish New Native Woodland in open area bracken/ coarse grassland but would need tending Protect from trampling and access Implement dogs on leash policy

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
			and grassy verges (GS2)		
11	0.02	Existing	(Mixed) broadleaved woodland (WD1)	Ash, Sycamore, Whitebeam Invasives – Pheasant berry, Red valerian	Tackle Invasives Implement dogs on leash policy
12	0.20	Existing	(Mixed) broadleaved woodland (WD1)	Ash, Sycamore, Whitebeam Yew on the upper quarry edges Invasives - Butterfly bush, Red valerian, Alexanders, Sycamore	Tackle Invasives Implement dogs on leash policy
13	0.11	Existing	Oak-ash-hazel woodland (WN2)	Ash, Sycamore, Whitebeam. Elder, Hawthorn, Gorse Ash have Ash die-back Invasives - Cotoneaster, Montbretia, Sycamore and Flowering Currant	Tackle Invasives Implement dogs on leash policy Control sycamore regeneration
14	0.26	Existing	(Mixed) broadleaved woodland (WD1)	Ash, Sycamore, Whitebeam, Elder	Implement dogs on leash policy
15	0.17	Existing	Mixed broadleaved/conifer woodland (WD2)	Ash, Sycamore, Whitebeam, Elder Invasives - Muehlenbeckia	Tackle Invasives Implement dogs on leash policy
16	0.21	Existing	(Mixed) broadleaved woodland (WD1)	Ash, Sycamore, Whitebeam, Hawthorn, Elder Invasives - Cotoneaster	Allow Natural Processes to Continue Implement dogs on leash policy Tackle Invasives
17	0.92	Emerging	Natural regeneration of native tree species within areas of gorse scrub (WS1)/acid	Invasives - Pheasantberry, Montbretia, Muehlenbeckia	Allow Natural Processes to Continue Tackle Invasives Implement dogs on leash policy

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
			grassland (GS3) and exposed rock (ER1)		
18	0.35	Emerging	Natural regeneration of native tree species within areas of gorse scrub (WS1)/acid grassland (GS3) and exposed rock (ER1)	Natural regeneration of Oak, Mountain Ash, Elder, Ash, Scots pine and Whitebeam noted here Invasive species – Butterfly Bush	Allow woodland processes (natural regeneration) to continue where not in conflict with other heath/grassland restoration measures Tackle invasives
19	0.83	Emerging	WN2/WS1	Invasives - NZ Cabbage Palm	Allow woodland processes (natural regeneration) to continue where not in conflict with other heath/grassland restoration measures Implement dogs on leash policy Tackle invasives
20	3.20	Emerging	Natural regeneration of native tree species within areas of gorse scrub (WS1)	Natural regeneration of Oak, Mountain Ash, Elder and Whitebeam noted here Invasives - Butterfly bush, Red valerian, Alexanders, Sycamore	Allow woodland processes (natural regeneration) to continue where not in conflict with other heath/grassland restoration measures Tackle Invasives Implement dogs on leash policy
21	0.66	Potential New	Dense Bracken (HD1)/Dry meadow and grassy verges (GS2)/Scrub (WS1)	Need to preserve some of the open vistas from the pathway here	Establish New Native Woodland Implement dogs on leash policy
22	0.27	Existing	Mixed broadleaved/conifer woodland (WD2)	Semi-mature planting of Beech and Monterey Pine No shrub layer or ground flora	Reduce Trampling and Dog faeces in the woodland through fencing Implement deadwood policy as opposed to chipping in future

Compt. No.	Area (Ha)	Woodland Status	Habitat (Fossitt)	Observations/Threats	Management Prescription (2024-2033)
				Trampling – heavy pressure from car park Tree chippings	Enrichment planting with natives in light gaps protected by fencing
23	1.54	Emerging	Natural regeneration of native tree species within areas of gorse scrub (WS1) and on the upper parts of the quarry rock faces	Ash, Whitebeam, Yew, Hawthorn, Gorse, Hazel, Bracken Invasives - Butterfly Bush, Cotoneaster, Red valerian,	Allow Natural Processes to Continue Tackle Invasives Implement dogs on leash policy

Appendix B: Photographic Record

Plate 1. Trampling pressures, dog faeces and deep shade in Compartment 1 adjoining the car park (WD1). Many of the Ash here are suffering from Ash die-back.

Plate 2. Three cornered leek in Compartment 1 – an invasive species listed under the Third Schedule of the EU Birds and Natural Habitats Regulations 2011.

Plate 3. Ash with Ash die back in Compartment 1. Trampling, enrichment from Dog faeces and Invasives are also an issue here.

Plate 4. Some Ash may show resilience to the Ash die-back disease and should be monitored as opposed to large scale removal of Ash on Killiney Hill. Those that are located away from paths should be allowed to die and decay naturally as part of natural woodland processes.

	
Plate 5. Stand of *Pinus nigra* in Compartment 3 (**WD4**). Trampling and enrichment from Dog faeces are an issue here.	Plate 6. Trampling pressures between Compartments 3 and 6.
	
Plate 7. Trampling evident in the more naturalised woodland in Compartment 2 on the eastern slope of Killiney Hill (mixed broadleaved/conifer woodland - **WD2**)**.**	Plate 8. Trampling evident in the more naturalised woodland in Compartment 2 on the eastern slope of Killiney Hill (mixed broadleaved/conifer woodland - **WD2**)**.**
	
Plate 9. Woodland ground flora in Compartment 2 with evidence of trampling.	Plate 10. Woodland ground flora in Compartment 2. Species such as *Cordyline australis* should be removed.

	
Plate 11. Squirrel feeding station/trap in Compartment 2.	Plate 12. Looking north east over the woodland in Compartment 2.
	
Plate 13. Wood sorrel and ivy.	Plate 14. Navelwort on rocks within the woodland.
	
Plate 15. Possible Spanish bluebell in Compartment 2.	Plate 16. Winter heliotrope in Compartment 2 beside the path from the tea rooms to the obelisk.

Plate 17. Greater plantain – a non woodland species introduced below the trees in Compartment 3 on footwear/by dogs.

Plate 18. Heavily disturbed area in Compartment 3 with no ground flora or understory.

Plate 19. The boundary between Compartments 2 and 4.

Plate 20. Naturally established birch woodland at the boundary between Compartments 2 and 4.

Plate 21. Regenerating Oak in gorse scrub in Compartment 4.

Plate 22. Mountain Ash regenerating in the gorse scrub in Compartment 4.

Plate 23. Scots Pine in Compartment 4.

Plate 24. Mountain Ash in Compartment 4.

Plate 25. Pockets of native woodland established naturally in Compartment 4.

Plate 26. Oak with Three cornered leek at the base near the path in Compartment 4.

Plate 27. High biodiversity features on Oak.

Plate 28. Dense tangles of Bramble within the woodland protect emerging trees and provide refuges for fauna and bird nesting habitat.

Plate 29. Scots pine on the crest of the hill in Compartment 2.

Plate 30. Oak on the crest of the hill in Compartment 2.

Plate 31. Young sapling Sycamores should be removed through tending in areas suitable for regeneration of native trees – i.e. with an adjoining native seed source and suitable light conditions.

Plate 32. Whitebeam (*Sorbus intermedia*).

Plate 33. Heavy trampling activity in the root zone of Birch in Compartment 2.

Plate 34 .Evidence of coppicing on the hill in the past. Note Three cornered leek at the base.

Plate 35. Scots pine are a native conifer.

Plate 36. Red squirrel protection area.

Plate 37. Grey squirrel feeding damage on Sycamore – note dead top.

Plate 38. Native woodland elements on the hill – Oak, Ash, Scots pine, Wych elm, Gorse and the non-native Sycamore.

Plate 39. Wych elm on the hill.

Plate 40. Potential bat roosting locations in trees.

Plate 41. Planted Hazel doing well near the summit.

Plate 42. Planted Scots Pine doing well near the summit.

Plate 43. Planted Larch near the summit.

Plate 44. Naturally regenerated Mountain ash near the summit – protected by bramble and gorse.

Plate 45. Mature Hawthorn with very high biodiversity value.

Plate 46. Further planting of non-native species such as Sycamore should be avoided.

Plate 47. Areas of young planting beside the path in Compartment 2 should be thinned to allow crown development.

Plate 48. Edge trees near the path/woodland edge to be retained for stand stability.

Plate 49. Dense shade, trampling and invasive species (Alexanders) reduce the native ground flora.

Plate 50. Ivy on trees has high ecological value and should not be removed.

Plate 51. Mature Beech (non-native).

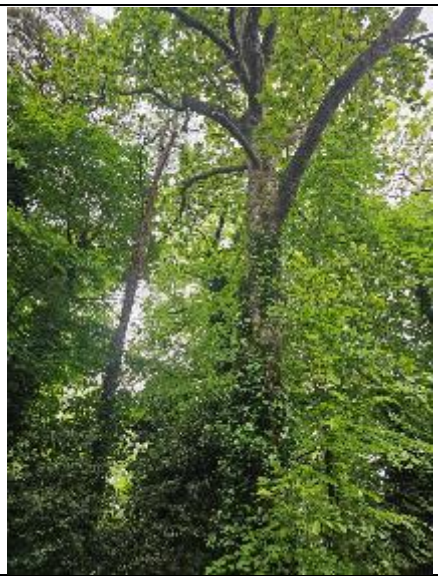

Plate 52. Mature Oak (native).

Plate 53. Cherry Laurel in Compartment 2.

Plate 54. Cherry Laurel in Compartment 2.

Plate 55. Trampling in Compartment 2.

Plate 56. Yew tree in Compartment 2.

Plate 57. Wood chip spread in Compartment 22.

Plate 58. Mix of native and non-native species in the canopy of Compartment 2.

Plate 59. Heavy trampling and deep shade in Compartment 5.

Plate 60. Tree guards from former planting need to be removed in Compartment 5.

Plate 61. Tending of Sycamore regeneration and enrichment planting with natives is recommended.

Plate 62. Cotoneaster to be removed from Compartment 5. Thinning of Douglas Fir and Sitka Spruce to favour natives is recommended.

Plate 63. Sycamore regeneration is outcompeting native oak regeneration.

Plate 64. Thinning and tending of Scots pine and Larch is recommended in Compartment 6.

Plate 65.Trampling in Compartment 5.

Plate 66.

Plate 67. Interface between Gorse Scrub and woodland habitats.

Plate 68. Interface between Gorse Scrub and woodland habitats.

Plate 69. Common whitebeam (*Sorbus aria*).

Plate 70. Areas of Oak – Ash Hazel Woodland (WN2) in Dalkey Quarry. Yew is also present. Invasives here include Cotoneaster, Pheasant berry, Eucalyptus, Butterfly Bush, and the non-native Sycamore.

Plate 71. Areas of Oak – Ash Hazel Woodland (WN2) in Dalkey Quarry. Yew is also present.

Plate 72. Areas of Oak – Ash Hazel Woodland (WN2) in Dalkey Quarry. Yew is also present.

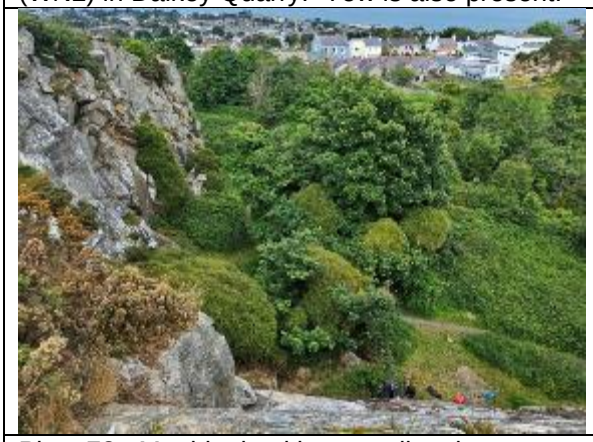

Plate 73. Muehlenbeckia strangling the trees (and other vegetation) in the lower quarry.

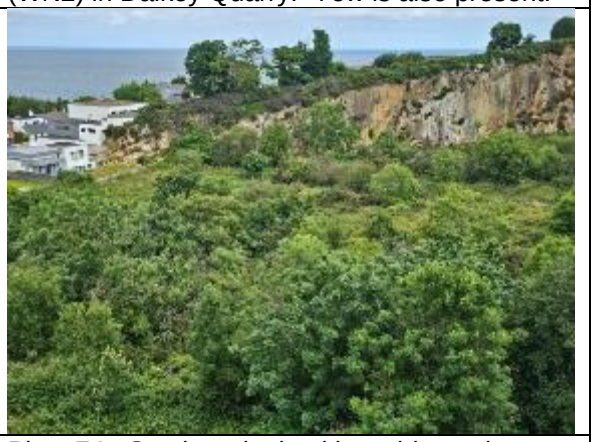

Plate 74. Scrub and mixed broad-leaved woodland (WD1) in the lower quarry.

Plate 75. Invasives threatening natural woodland development in Dalkey Quarry include Cotoneaster and Butterfly bush.

Plate 76. Butterfly bush.

Plate 77. Young planted oaks out-shaded by non-native Sycamore and Beech.

Plate 78. Planted oaks protected from trampling by brambles.

Plate 79. Woodland ground flora beginning to recover inside the red squirrel conservation area fence.

Plate 80. Woodland flora beginning to recover on unofficial pathways following erection of fencing.

Appendix C: References

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