



Parks & Landscape Services Section, Municipal Services Department

**Proposed Development of Fernhill Park &  
Gardens, Stepside, Co. Dublin with Works  
within the Curtilage of the Protected  
Structure (Fernhill House)  
PC/PKS/01/17**

**Appendix 7 – Ecology & Horticulture Report**



# The development of Fernhill Park and Gardens as a Regional Public Park

## Ecology and Horticulture



### FINAL REPORT

29<sup>th</sup> June 2017



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## The development of Fernhill Park and Gardens as a Regional Public Park

### Ecology and Horticulture

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## **The development of Fernhill Park and Gardens as a Regional Public Park**

### **Ecology and Horticulture**

#### **1. INTRODUCTION**

##### **1.1 Background**

This report has been prepared by Faith Wilson (an independent ecological consultant and licensed bat specialist) for Dun Laoghaire Rathdown County Council. This report assesses the ecological and horticultural impacts of the development of Fernhill Park and Gardens, Stepside, Co. Dublin as a Regional Public Park.

##### **1.2 Site Information**

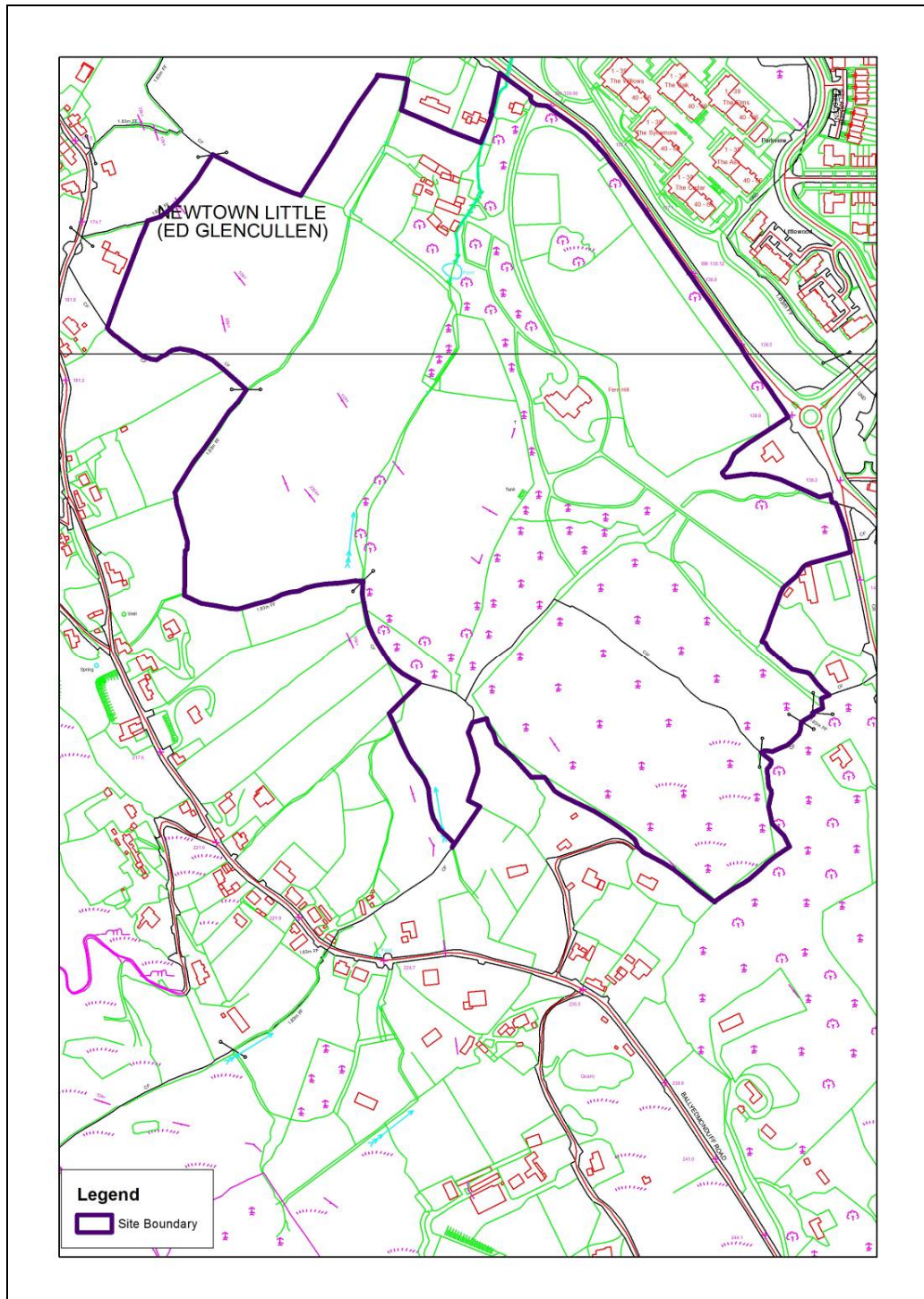
Fernhill Gardens and House is a unique estate situated on the outskirts of Dublin City at the foothills of the Dublin Mountains. The entire property extends to approximately 34 Hectares and includes c. 12.7 Hectares of non-residential agricultural land, while the main house is set within parkland and mature woodland extending to c. 21.1 Hectares. The property also includes staff accommodation set over two yards, a kitchen garden and the remains of a plant nursery and a gate lodge. Two small watercourses flow through the property. These have been diverted to feed a number of ornamental ponds within the gardens. A public right-of-way runs through the property. The southern edge of the property contains a conifer plantation and open hillside with heath and exposed rock.

The gardens at Fernhill were begun by the Darley family in the 1860s and then extensively developed by the Walker family who purchased the property in 1934. The property has a unique and valuable collection of trees and shrubs including an important collection of rhododendrons, camellias and magnolias amongst other specimen trees and shrubs and was developed in the Robinsonian style. The gardens were open to the public until the property was sold in 2007.

The property is zoned F and B – the former to preserve and provide for open space and ancillary recreational activities, the latter to improve rural amenity and provide for the development of agriculture. There's also a Special Objective to the former to preserve trees, woodlands and amenity gardens.

The extensive area of gardens, mixed woodland, conifer plantation, scrub, heathland, grasslands and a watercourse provide suitable habitat for many mammals and birds and other fauna including amphibians and reptiles. The setting of Fernhill at the foothills of the Dublin Mountains also links it to a range of upland habitats.

The extent of Fernhill House and Gardens under the ownership of Dun Laoghaire Rathdown is shown by the purple line boundary on **Figure 1.1.1** below.



**Figure 1.1.1 Fernhill Park and Gardens under the ownership of Dun Laoghaire Rathdown as indicated by the purple line boundary.**

## 1.2 Relevant Ecological Legislation

### 1.2.1 Nature Conservation Designations

Fernhill is not currently designated for any nature conservation purposes under either international or national conservation legislation.

#### *International Conservation Designations*

A number of Natura 2000 designated sites occur within a 15km radius of the property. These include;

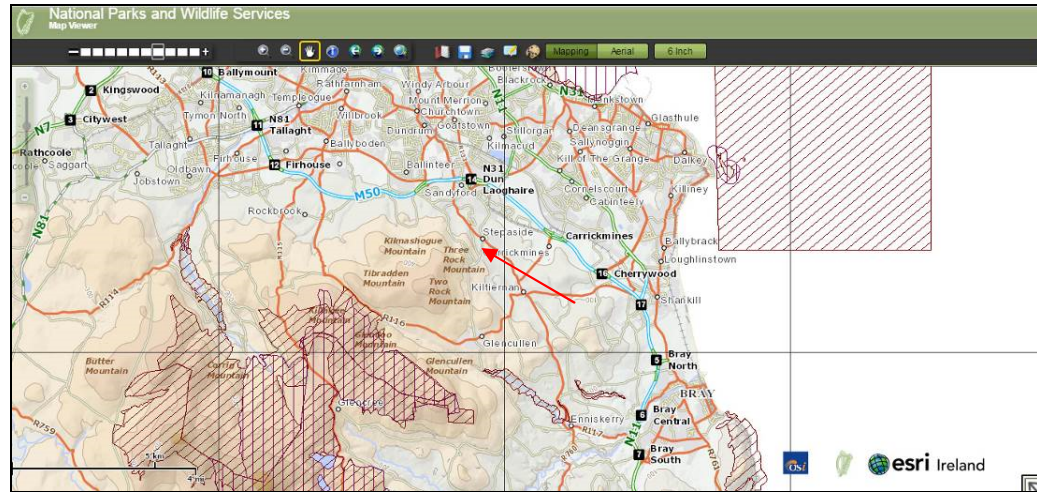
- Ballyman Glen SAC (Site Code: 000713)
- Knocksink Wood SAC (Site Code: 000725)
- Bray Head SAC (Site Code: 000714)
- South Dublin Bay SAC (Site Code: 000210)
- North Dublin Bay SAC (Site Code: 000206)
- Glenasmole Valley SAC (Site Code: 001029)
- Glen Of The Downs SAC (Site Code: 00719)
- Wicklow Mountains SAC (Site Code: 002122)
- Carrigower Bog SAC (Site Code: 000716)
- Rockabill to Dalkey Island SAC (Site Code: 003000)
- Dalkey Islands SPA (Site Code: 004172)
- South Dublin Bay and River Tolka Estuary SPA (Site Code: 004024)
- Wicklow Mountains SPA (Site Code: 004040)
- North Bull Island SPA (Site Code: 004006)

There are ten Special Areas of Conservation (SAC) within a 15km radius of Fernhill as detailed above and shown on **Figure 1.2.1** below. The closest of these is Wicklow Mountains SAC, which is c.3.3km to the south west of Fernhill. There are four Special Protection Areas (for birds) (SPAs), the closest of these is the Wicklow Mountains SPA, which is within 4.1km to the south west.

Special Areas of Conservation (SACs) are habitats of international significance that have been identified by NPWS and submitted for designation to the EU. SAC is a statutory designation, which has a legal basis under the EU Habitats Directive (92/43/EEC) as transposed into Irish law through the European Communities (Natural Habitats) Regulations, 1997, which were amended in 1998, 2005 and 2011. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in the Court of Justice of the European Union (CJEU) judgements.

A Special Protection Area (SPA) is a statutory designation, which has a legal basis under the EU Birds Directive (79/409/EEC). The primary objective of SPAs

is to maintain or enhance the favourable conservation status of the birds for which the SPAs have been designated.



**Figure 1.2.1. Designated areas in the vicinity of Fernhill House and Gardens (Source: National Parks and Wildlife Service). The indicative location of the property is indicated by the red arrow.**

#### *National Conservation Designations*

The boundary of Fitzsimon's Wood pNHA is within 770m to the north of the boundary of Fernhill House and Gardens, while the Dingle Glen pNHA is 3km away to the south east beyond Kiltiernan village.

Proposed NHAs are habitats or sites of interest to wildlife that have been identified by NPWS. These sites become NHAs once they have been formally advertised and land owners have been notified of their designation. NHAs are protected under the Wildlife (Amendment) Act, 2000, from the date they are formally proposed. NHA is a statutory designation according to the Wildlife (Amended) Act, 2000 and requires consultation with NPWS if any development impacts on a pNHA.

Some of the SAC and SPA sites, and a number of other sites in the general area are designated as proposed Natural Heritage Areas (24 in total). These include:

- Ballybetagh Bog pNHA (Site Code: 0001202)
- Ballyman Glen pNHA (Site Code: 000713)
- Booterstown Marsh pNHA (Site Code: 001025)
- Bray Head pNHA (Site Code: 000714)
- Carrigower Bog pNHA (Site Code: 000716)
- Dalkey Coastal Zone And Killiney Hill pNHA (Site Code: 001206)
- Dargle River Valley pNHA (Site Code: 001754)
- Dingle Glen pNHA (Site Code: 001207)
- Dolphins, Dublin Docks pNHA (Site Code: 000201)

- Fitzsimon's Wood pNHA (Site Code: 001703)
- Glen of the Downs pNHA (Site Code: 000719)
- Glenasmole Valley pNHA (Site Code: 001209)
- Glencree Valley pNHA (Site Code: 001755)
- Grand Canal pNHA (Site Code: 002104)
- Great Sugarloaf pNHA (Site Code: 001769)
- Kilmacanogue Marsh pNHA (Site Code: 000724)
- Knocksink Wood pNHA (Site Code: 000725)
- Loughlinstown Woods pNHA (Site Code: 001211)
- Lugmore Glen pNHA (Site Code: 001212)
- North Dublin Bay pNHA (Site Code: 000206)
- Powerscourt Waterfall pNHA (Site Code: 001767)
- Powerscourt Woodland pNHA (Site Code: 001768)
- Royal Canal pNHA (Site Code: 002103)
- South Dublin Bay pNHA (Site Code: 000210)

NHAs are considered to be of national importance, while SACs and SPAs are of international importance for nature conservation.

### 1.2.2 Bats

Eleven species of bats occur in Ireland and all are protected under both national and international law.

#### Wildlife Act 1976

In the Republic, under Schedule 5 of the Wildlife Act 1976, all bats and their roosts are protected by law. It is unlawful to disturb either without the appropriate licence. The Act was amended in 2000.

#### Bern and Bonn Convention

Ireland has also ratified two international conventions, which afford protection to bats amongst other fauna. These are known as the 'Bern' and 'Bonn' Conventions.

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), exists to conserve all species and their habitats, including bats.

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries, which covers certain species of bat.

#### EU Habitats Directive

All bat species are given strict protection under Annex IV of the EU Habitats Directive, whilst the lesser horseshoe bat (*Rhinolophus hipposideros*) and greater horseshoe bat (*Rhinolophus ferrumequinum*) are given further protection under Annex II of the EU Habitats Directive. Both are listed as a species of community

interest that is in need of strict protection and for which E.U. nations must designate Special Areas of Conservation (SACs). The latter is only known from a single site and no breeding populations have been recorded to date. The former are a species of the western seaboard of Ireland and have not yet been recorded on the east coast.

The principal pressures on Irish bat species have been identified as follows:

- urbanized areas (e.g. light pollution);
- bridge/viaduct repairs;
- pesticides usage;
- removal of hedges, scrub, forestry;
- water pollution;
- other pollution and human impacts (e.g. renovation of dwellings with roosts);
- infillings of ditches, dykes, ponds, pools and marshes;
- management of aquatic and bank vegetation for drainage purposes;
- abandonment of pastoral systems;
- speleology and vandalism;
- communication routes: roads; and
- inappropriate forestry management.

### 1.2.3 Badgers

Badgers (*Meles meles*) are common and widespread in Ireland, and are found in all lowland habitats where the soil is dry and not subject to flooding (Hayden and Harrington, 2000). Badgers are social animals that live in complex underground tunnel systems called setts. Badger territories may vary in size from about 60-200 ha (Smal, 1995).

Badgers and their setts legally are protected under the provisions of the Wildlife Act, 1976, and the Wildlife Amendment Act, 2000. It is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. It is standard best practice to ensure that mitigation measures are taken to limit impacts on badgers and badger populations during developments.

The removal of badgers from affected setts and subsequent destruction of these setts must be conducted under licence by experienced badger experts or other suitably qualified personnel. The National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government grant licences to the experts undertaking the badger operations and not to the developer or contractor. An application for a wildlife licence should be submitted to the NPWS with the relevant ecological information from the detailed badger survey. At least three weeks is normally required to process a licence application, but early discussions with NPWS can expedite the procedure. Conditions are usually attached to each wildlife licence granted in respect of



badgers. It is normal practice to impose seasonal constraints e.g. that breeding setts are not interfered with or disturbed during the badger breeding season (December to June inclusive). No active sett should be interfered with or disturbed during the breeding season as any sett category may contain cubs. Closure of setts during the breeding season requires monitoring to demonstrate no sett activity occurs.

#### 1.2.4 Otter

The otter (*Lutra lutra*) is a legally protected species under the EU Habitats Directive (where it is listed under Annex II) and is found throughout Ireland (Hayden and Harrington, 2000). The otter is listed as internationally important in the Irish Red Data book (Whilde, 1993), is classified as 'near threatened' in Ireland (Marnell, et al. 2009), on a European scale (Temple & Terry, 2007) and on a global scale by the IUCN (2009). It is listed as a strictly protected species under Appendix II of the Bern convention (Council of Europe, 1979). Because it is listed in Appendix 1 of CITES (1979), trade in otter specimens is permitted only in exceptional circumstances.

Annexes II and IV of the E.U. Habitats Directive (92/43/EEC) list the otter as a species of community interest that is in need of strict protection and for which E.U. nations must designate Special Areas of Conservation (SACs). The E.U. Habitats Directive was transposed into Irish law in the European Union (Natural Habitats) Regulations, (SI 94/1997) and 40 candidate SACs have been designated for the otter in Ireland (NPWS (2008)). A Species Action Plan and a Threat Response Plan has been prepared for the otter by NPWS (2008 & 2009).

Otters tend to occupy linear territories along watercourses and are rarely found far away from water. A recent national survey of otters in Ireland (Bailey (2006)) surveyed 37 sites within the Eastern River Basin District, of which 22 (59.46%) recorded the presence of otter, the lowest rate in the country.

#### 1.2.4 Invasive Species

Until recently there has been no legal framework for the control or eradication of non-native invasive species in the Republic of Ireland. The Birds and Habitats Regulations (2011) which were signed on 21st September 2011 by the then Minister for Arts, Heritage and the Gaeltacht Jimmy Deenihan, included new legislation on invasive and non-native species in Sections 49 and 50. Sections 49 and 50 have not yet been legally implemented as they have implications for members of the pet and horticultural trades and consultation with these groups is ongoing. It is expected that these new regulations will come into place soon.

***The plant and animal species to which the regulations apply are presented in Schedule Three. Part 1 details the plants species, while Part 3 outlines those animal or plant vector materials and are presented below. Several of these species occur within the gardens at Fernhill.***

### **Third Schedule: Part 1 Plants**

#### **Non-native species subject to restrictions under Regulations 49 and 50.**

<b>First column</b>	<b>Second column</b>	<b>Third column</b>
<b>Common name</b>	<b>Scientific name</b>	<b>Geographical application</b>
American skunk-cabbage	<i>Lysichiton americanus</i>	Throughout the State
A red alga	<i>Grateloupia doryphora</i>	Throughout the State
Brazilian giant-rhubarb	<i>Gunnera manicata</i>	Throughout the State
Broad-leaved rush	<i>Juncus planifolius</i>	Throughout the State
Cape pondweed	<i>Aponogeton distachyos</i>	Throughout the State
Cord-grasses	<i>Spartina</i> (all species and hybrids)	Throughout the State
Curly waterweed	<i>Lagarosiphon major</i>	Throughout the State
Dwarf eel-grass	<i>Zostera japonica</i>	Throughout the State
Fanwort	<i>Cabomba caroliniana</i>	Throughout the State
Floating pennywort	<i>Hydrocotyle ranunculoides</i>	Throughout the State

First column	Second column	Third column
Common name	Scientific name	Geographical application
Fringed water-lily	<i>Nymphoides peltata</i>	Throughout the State
Giant hogweed	<i>Heracleum mantegazzianum</i>	Throughout the State
Giant knotweed	<i>Fallopia sachalinensis</i>	Throughout the State
Giant-rhubarb	<i>Gunnera tinctoria</i>	Throughout the State
Giant salvinia	<i>Salvinia molesta</i>	Throughout the State
Himalayan balsam	<i>Impatiens glandulifera</i>	Throughout the State
Himalayan knotweed	<i>Persicaria wallichii</i>	Throughout the State
Hottentot-fig	<i>Carpobrotus edulis</i>	Throughout the State
Japanese knotweed	<i>Fallopia japonica</i>	Throughout the State
Large-flowered waterweed	<i>Egeria densa</i>	Throughout the State
Mile-a-minute weed	<i>Persicaria perfoliata</i>	Throughout the State

First column	Second column	Third column
Common name	Scientific name	Geographical application
New Zealand pigmyweed	<i>Crassula helmsii</i>	Throughout the State
Parrot's feather	<i>Myriophyllum aquaticum</i>	Throughout the State
Rhododendron	<i>Rhododendron ponticum</i>	Throughout the State
Salmonberry	<i>Rubus spectabilis</i>	Throughout the State
Sea-buckthorn	<i>Hippophae rhamnoides</i>	Throughout the State
Spanish bluebell	<i>Hyacinthoides hispanica</i>	Throughout the State
Three-cornered leek	<i>Allium triquetrum</i>	Throughout the State
Wakame	<i>Undaria pinnatifida</i>	Throughout the State
Water chestnut	<i>Trapa natans</i>	Throughout the State
Water fern	<i>Azolla filiculoides</i>	Throughout the State
Water lettuce	<i>Pistia stratiotes</i>	Throughout the State

First column	Second column	Third column
Common name	Scientific name	Geographical application
Water-primrose	<i>Ludwigia</i> (all species)	Throughout the State
Waterweeds	<i>Elodea</i> (all species)	Throughout the State
Wireweed	<i>Sargassum muticum</i>	Throughout the State

#### *Other Invasive Species*

The main guidance document that has been prepared dealing with invasive species/noxious weeds on sites is the NRA 'Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' which was published in 2010. This document details other non-native species of note.

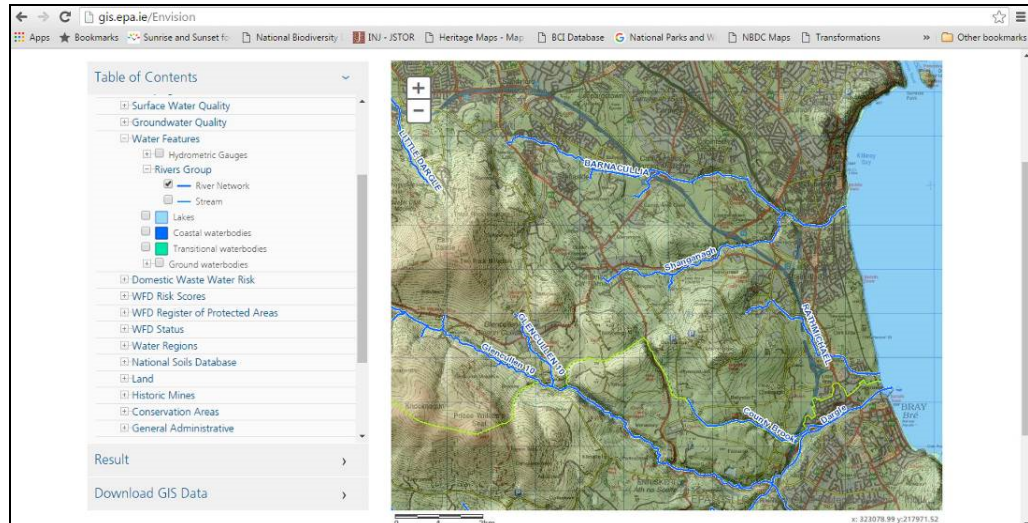
### 1.2.5 Fisheries

Fernhill House and Gardens is located within the Loughlinstown-Coastal river catchment. As shown on the EPA Envision Map Viewer, there are two tributaries of the Barnacullia Stream which rise on Three Rock Mountain and flow through Fernhill then passing under the Dundrum – Enniskerry road. The Barnacullia Stream, then passes through lands at Stepside and converges with the Carrickmines Stream north of the M50 (see **Figure 1.2.5** below). This flows into the Shanganagh River, which ultimately flows into Killiney Bay at Shankill. The water quality of the Barnacullia Streams is currently unknown.

The water quality of the Shanganagh River is classified as 'Good' (i.e. Q4), as recorded at Commons road but upstream near the Wyattville road overpass from Cherry wood the water quality is classified as 'Moderate' (i.e. Q3 - 4,) indicating some localised pollution. The water quality of the Killiney Bay coastal waterbody is 'Unpolluted'. As such, there have been no breaches of the EPA's threshold values for nutrient enrichment, accelerated plant growth, or disturbance of the level of dissolved oxygen normally present under the EPA's "Trophic Status Assessment Scheme" classification (EPA 2015).

Inland Fisheries Ireland report that the Loughlinstown system is exceptional in that it is an urban river system which supports migratory sea trout as well as

resident brown trout and note that salmonid waters constraints apply to any development works within the catchment.



**Figure 1.2.5. EPA Envision Map Viewer showing the watercourses and water quality in the Fernhill area.**

## 2. METHODOLOGY

### 2.1 Project Description

The proposed development comprises of the development of Fernhill as a Regional Public Park as shown in **Appendix 1**. The site is to be developed as a Regional Public Park to include new entrances, roads, car parking, active recreation, play, paths, woodland walks, gardens, ponds and wetlands, meadows, tearooms, public toilets and staff facilities, community garden and all ancillary civil, building and landscaping works.

### 2.2 Desk Study

A desk study was carried out to collate the available information on the ecological environment of Fernhill House and Gardens and wider environs. The National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and Gaeltacht (DAHG) database of designated conservation areas and NPWS records of rare and protected plant species were checked with regard to the location of Fernhill.

Information on protected species of fauna and flora listed for protection under Annex II of the EU Habitats Directive (92/43/EEC), Annex I of the Birds Directive (79/409/EEC) and the Wildlife (Amendment) Act (2000) was also

sought from NPWS and published sources. Recent, high resolution, colour aerial photographs were also used to identify and map potential habitats.

Consultations were made with members of the Walker Family (the previous owners) as well as with various people who are familiar with the property for many years.

## **2.3 Field Surveys**

Fernhill was visited over several occasions by the report authors and at varying times were accompanied/joined by Dun Laoghaire Rathdown parks department staff and family members of the Walker family including Robert and Simon Walker.

### **Habitat & Botanical Survey**

The habitats present were recorded and described to level 3 (Fossitt, 2000) and a check was made for the presence of any invasive species as described above. A detailed botanical survey of the 'Front Lawn' was conducted and built on a previous study completed by Judith Wolff, commissioned by Robert Walker in 2012. Consultation with Peter Cuthbert was also ongoing during the surveys as he was conducting studies of the formal gardens and their development at the time.

### **Mammal Surveys**

#### **Bat Survey**

The bat surveys are currently underway. Works completed to date include a desktop review and consultation with Bat Conservation Ireland, an inspection of trees within the gardens for their potential to support roosting bats prior to any tree surgery works, an inspection of the attics in the main house and a bat detector activity survey of the gardens and grounds in the vicinity of the main house.

The aims of the bat surveys are to:

- a) To determine what species of bats are known from Fernhill and the immediate environs.
- b) To identify roosting sites in buildings within Fernhill.
- c) To determine the use of the mature trees and other habitats in Fernhill as feeding and commuting areas for bats.
- d) To ensure that bats are considered in any tree surgery/remedial works proposed to trees within the grounds.

The bat surveys have been and will be carried out by Faith Wilson, a licensed bat specialist.



Bat activity in buildings is usually detected by the following signs (though direct observations are also occasionally made):

- bat droppings (these will accumulate under an established roost or under access points);
- insect remains (under feeding perches);
- oil (from fur) and urine stains;
- scratch marks; and
- bat corpses.

The nature and type of habitats present are also indicative of the species likely to be present.

Trees for which remedial/safety works were required as recommended in the tree survey conducted by Felim Sheridan (2016) were assessed for their potential use by bats using the following standard criteria, which were created by bat specialists from Bat Conservation Ireland for use in the assessments of tree roosts on large infrastructural projects and are summarised in NRA (2006):

- Presence or absence of bat droppings (these can be hard to find amongst leaf litter or may be washed away following periods of wet weather),
- Bat droppings may also be seen as a black streak beneath holes, cracks, branches, etc.,
- Presence or absence of smooth edges with dark marks at potential entrances to roosts,
- Presence or absence of urine stains at potential entrances to roosts,
- Presence of natural cracks and rot holes in the trunk or boughs of the tree,
- Hollow trees,
- Presence or absence of creepers such as ivy or honeysuckle on trees (ivy clad trees are often used by bat species such as pipistrelles as roosts),
- Presence or absence of loose bark such as that of sycamore, or flaky bark on coniferous species such as cedars, cypress and Scot's pine,
- Presence or absence of bracket fungi which may indicate a rotten or potentially hollow centre to the tree,
- Known bat roosts previously identified,
- Trees with storm or machinery damage or broken boughs,
- Clutter level - where the branches and trunk are easily accessible, this is considered a better tree for bat roosts,
- Adjoining habitat - if there are a variety of feeding opportunities for bats, this increases the potential of a tree as a bat roost,
- Adjoining potential roosts / known roosts. This raises the likelihood of a tree being of benefit as bats may move roosts if the roost becomes too hot or cold during roosting and a nearby alternative roost is highly desirable.

In 2016 the tree survey focused on those adjoining the Enniskerry Road, with those within the estate and gardens assessed in 2017.

In accordance with best practice as described in the 'Guidelines for the Treatment of Bats During the Construction of National Road Schemes' (NRA 2006) and 'Bat Mitigation Guidelines for Ireland' (Kelleher 2006), a bat activity survey of the general environs of the main house and garden was conducted during the active bat season in 2016. This survey assisted in determining if any bat roosts are present in the main house, what bat species occur within the gardens and how bats are using the property for foraging or commuting purposes.

A bat detector survey was carried out at dusk on the 25<sup>th</sup> July 2016 using three types of bat detectors - two Batbox Duet Heterodyne/Frequency Division detectors and a Pettersson D100 Heterodyne detector. The emergence of bats from the main house at dusk was monitored and a walkover survey of the lands was conducted.

Bat activity is predominantly bi-modal, with bats taking advantage of increased insect numbers on the wing during the periods after dusk and before dawn, (there is usually a lull in activity in the middle of the night). While this holds true for 'hawking' species (bats that capture prey in the open air), 'gleaning' species such as brown long-eared (*Plecotus auritus*), Natterer's (*Myotis nattereri*) and Whiskered/Brandt's bats (*Myotis mystacinus/brandtii*) remain active throughout the night, as prey is available on foliage for longer periods.

### **Otter Survey**

An otter survey was conducted along the two watercourses within the estate. These were surveyed on foot for signs indicative of the presence of otters, including:

- otter spraints;
- footprints;
- actual, possible or potential resting sites, (these include underground 'holts' e.g. beneath the roots of bankside trees; or above ground 'couches' e.g. in reedbeds);
- slides or other well-used access points to watercourses (though additional evidence would be required to positively confirm such as indicative of otter presence);
- feeding remains e.g. fish carcasses (though additional evidence would be required to positively confirm such as indicative of otter presence); and/or sightings, including otter Road Traffic Accidents (RTAs).

The surveys were carried out in accordance with best practice as described in the 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA 2009), 'Otter Breeding Sites. Conservation and Management. Conserving Natura 2000 Rivers Conservation Techniques Series No. 5, (Liles, 2003)' and 'Guidelines for the treatment of otters prior to the construction of National Road Schemes' (NRA 2006).

### **Badger Survey**

A badger survey was undertaken across the estate in March and April 2016 by searching for signs of badger activity. These include setts, old bedding material, feeding signs, latrines, badger tracks or paw prints, badger paths and badger hair caught on vegetation or fences. The survey was carried out by an experienced mammal specialist in accordance with best practice as described in the 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA 2009) and 'Guidelines for the treatment of badgers prior to the construction of National Road Schemes' (NRA 2005).

A further badger and mammal survey was completed by Billy Flynn and Eanna Ni Lamhna over several days in June 2017 (Flynn 2017). This survey also utilised a trail camera which recorded nocturnal activity over three nights.

### **Breeding Birds**

The breeding bird season in 2016 was well underway and birds were recorded during the course of the ecological survey visits. The yard buildings were searched for signs of breeding birds such as swallows and owls.

## **3. RESULTS**

### **3.1 Receiving Environment**

Fernhill Estate was developed on the slopes of the Dublin Mountains at the base of Three Rock Mountain on well drained, shallow acidic soils with frequent outcropping bedrock of the underlying granite. There is a variety of soil types present within the estate – the majority of the soils are Acid Brown Earths/Brown Podzolics, but there are also some Acidic Gley Soils (Lithosols/Regosols) and some Peaty Podzols on the higher ground.

The underlying granite was quarried locally and it is likely that it was this natural resource that attracted the Darley family (a family of builders, stonecutters, developers and architects) to the property initially in the late 1700s. They developed the estate at Fernhill through a series of planting of what would have been previously unenclosed hillside with woodlands and parkland creating shelterbelts of larch and Scot's Pine which then sheltered the developing garden.

The Darley's developed the garden in the 'Robinsonian' style mixing trees, shrubs, perennials and bulbs side by side in a naturalistic setting. Connections with the National Botanic Gardens ensured a steady stream of calcifuges which could not be grown at Glasnevin and a fine collection of tree rhododendrons to which camellias, azaleas and magnolias were added are one of the main features of Fernhill. There are also a number of fine specimen trees such as giant redwoods, western hemlock, west Himalayan spruce, eucalyptus and others.

### 3.1.1 Rare, Scarce and Threatened Flora

The following rare, scarce or threatened plant species are recorded from the 10km square (O12) in which Fernhill house and gardens is located:

- Red hemp nettle (*Galeopsis angustifolia*), this is a species of calcareous gravels and eskers, there are historic records of this species from Dundrum, Two Rock and Three Rock Mountain, it was last recorded from forestry roads in the area in the late 1960s.
- Great burnet (*Sanguisorba officinalis*), this is a species of dry banks and lakeshores, there are historic records of this species from Templeogue.
- Small white orchid (*Pseudorchis alba*), this a species of acid grassland/heathland, there are historic records of this species from Three Rock Mountain.
- Bog orchid (*Hammarbya paludosa*), this is a species of wet flushes in peatlands, there are historic records of this species from the 10km square but the location is not detailed.
- Lesser snapdragon (*Misopates orontium*), this is a species of arable fields, there are historic records of this species from Bellaley Park.

There are no recent historic records for any of these species from Fernhill.

### 3.1.2 Habitats

The main habitats present within the estate include the house (BL3) and gardens, which are surrounded by mature trees in open parkland (WD5) and mixed broadleaved/conifer woodland (WD2). Two small watercourses which are best described as upland eroding streams (FW1) flow through the property and diverted via a culvert into a series of artificial ponds and pools (FL8) forming a water garden within the rockery and along one of the streams.

The large field between the main house and the Enniskerry Road is known as the 'Front Lawn' and has been managed as permanent pasture grazed by cattle for over a century. This is a good example of species rich neutral grassland (GS1) which has never been artificially fertilised, ploughed or reseeded. This forms an extremely rare grassland habitat within the Dun Laoghaire Rathdown area as the majority of such pastures have been lost through agricultural intensification and improvements with subsequent losses for species diversity as well as through ongoing urbanisation of the county. This field received an application of lime only once in the last fifty odd years (Robert walker, pers. comm.), but was never fertilised. The linear shelterbelts (WD2) and treelines (WL2) which provide shelter for the garden remain and were added to over the years following tree losses, gales and fires.

The three large fields to the south-west of the house have been managed for agricultural purposes. They were managed as grazing/meadow with cattle for

many years and occasionally cut for haylage or silage. These lands all show signs of agricultural improvement and are best described as improved agricultural grassland (GA1)/semi-improved grassland (GS). They are known from east to west as 'Wood Field', 'Swimming Pool Field' and 'Brenda's Field' (Robert walker, pers. comm.). These fields would have been managed as permanent pasture under the ownership of the Walker family but were temporarily put under various arable crops (oats and barley) for three or four years in the 1970s, (Robert walker, pers. comm.).

The upper slopes of the property were planted in the late 1970s with Scot's pine, Coriscan Pine, European Larch, Norway Spruce, Japanese Larch, Logdepole Pine, Beech and Sitka spruce and these small conifer plantations (WD4) are in need of intervention and thinning.

On the margins of these are areas of scrub (WS3) and some old field systems have become wooded with native oak birch holly woodland (WN1) as grazing with livestock in these areas ceased. In the south east of the property an open area of acid grassland (GS3) remains which has become encroached by dense bracken (HD1), scrub (WS3) and the beginnings of native oak birch holly woodland (WN1) in the absence of grazing. A habitat map for Fernhill is presented below in **Figure 3.1.2**.

The gardens are a mixture of planting of ornamental trees and shrubs (WS3) including ginkgo, magnolias, camellia, azaleas, handkerchief tree, tulip tree, Japanese maples, tree peony, hydrangeas, ceanothus, hebes, dogwoods and species of Australasian origin which were brought from the Walker families summer home on Rosdohan Island, Co. Kerry. These include tree ferns, Pittosporums, Eucryphia, Podocarps and Pseudopanax amongst others.

A diverse range of herbaceous and alpine species were also planted in many instances in broad naturalistic drifts in the Robinsonian style below mature trees and shrubs and along the edges of the diverted watercourse and ponds within the rockery at the rear of the main house and along the stream which adjoins the upper yard. A plant nursery (BC2) was established by Robert Walker in the lower yard and remains of this are still present there. Jonathan Burnett (a nephew of Robert's) also ran a successful landscaping company based in Fernhill and remnants of some of his planting material are stored in the old orchard which is located to the north west of the main house. A large volume of old garden waste, cuttings, brash, etc. (ED5) is stored at the northern edge of the kitchen garden.

The kitchen garden (BC4) is surrounded by a high beech treeline (WL2) to the south west, stone walls (BL1) in some locations and a hedgerow (WL1) along the northern edge. The internal box hedging, espalier fruit trees and many elements of the fruit and vegetable beds remain. These were interspersed with planting of herbaceous species and borders including Peonies, Monkshead, Delphiniums and a fine collection of old fashioned tea roses.

Further information on the species present within each habitat is presented below.

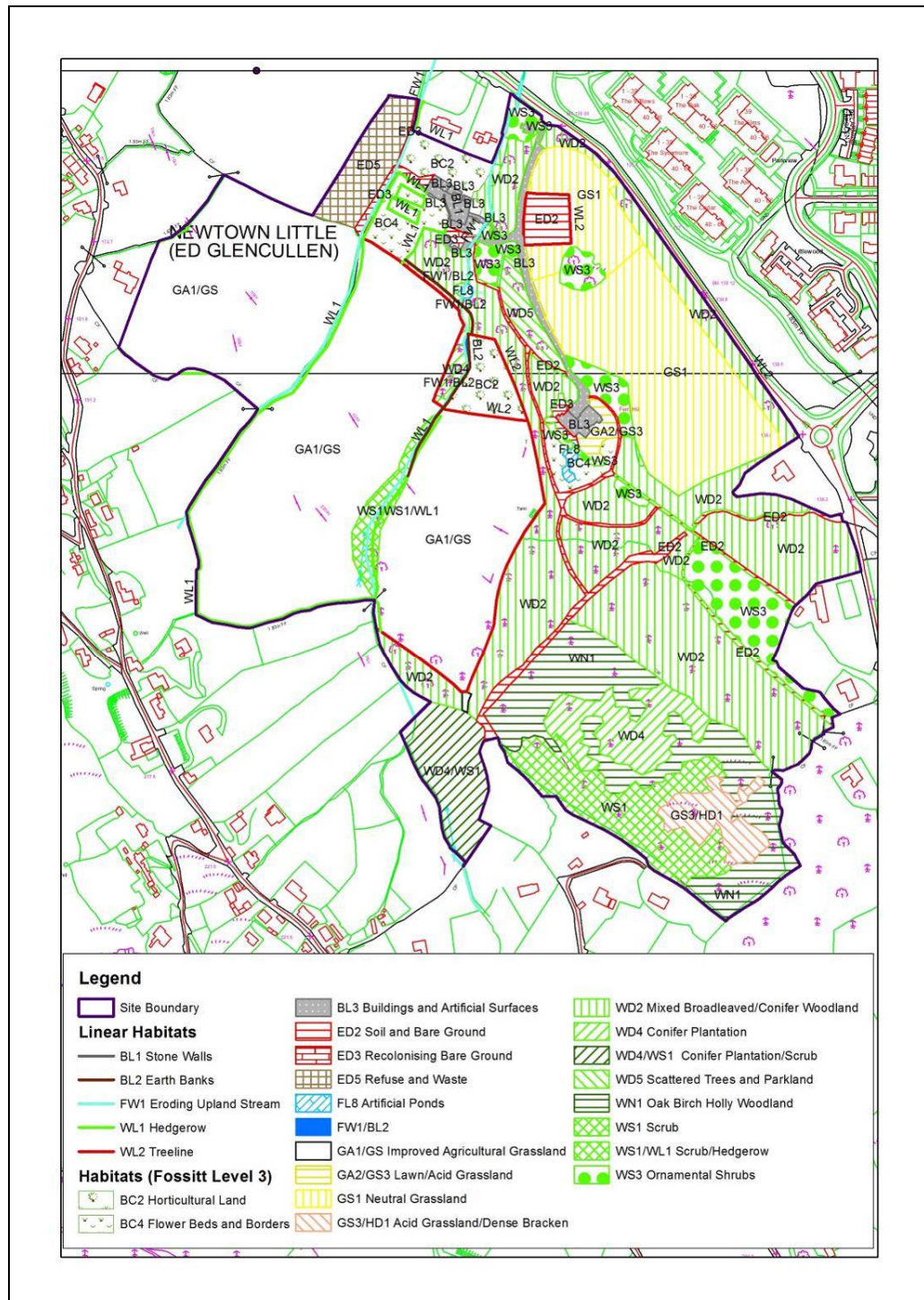


Figure 3.1.2. A habitat map (to Fossitt Level 3) of Fernhill House and Gardens.



### **Neutral to calcareous grassland (GS1)**

The grassland field in front of Fernhill house, known as the 'Front Lawn' has been in permanent pasture for more than 100 years and the diversity of grassland species is indicative of this, and its low intensity management. The main grass species include Sweet vernal grass, Common Bent, Crested dog's tail, Red Fescue and Yorkshire Fog. Early in the summer the grass-like Field Wood Rush was abundant as was Pignut (a small Umbellifer), Yarrow, Barren strawberry and Cowslip. Cowslip is locally abundant along the southern end of the field on sloping ground near the old path/track.

Species indicative of more calcareous grassland were found in localised areas and included: Lady's bedstraw, Quaking grass, Heath grass, Fairy flax, Birds-foot trefoil, Glaucous sedge, Oval sedge, Pill and Common Sedge. Mosses were locally frequent and the most common included *Pseudoscleropodium purum* and *Rhytidiadelphus squarrosus* indicative of unimproved slightly acidic conditions.

Overall this grassland is of high local biodiversity and combines local variation within this grassland including more calcareous areas and damp grassland. There are localised patches that include many of the species associated with the habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (6210); important orchid sites (\*6210) as listed under Annex I of the EU Habitats Directive (92/43/EEC).



**Plate 1. View across the Front Lawn towards the broadwalk.**





**Plate 2. The Front Lawn in April 2016 with abundant Pignut, white flower of Barren strawberry and grass-like hairy leaves of Field wood-rush.**



**Plate 3. Cowslip on sloping bank near old track/road.**





**Plate 4. The Front Lawn July 2016. Calcareous grassland with Quaking grass, Ox Eye daisy, and Knapweed.**

#### **Wet grassland (GS4)**

An area of rush-dominated damp grassland occurs on a gentle slope between the public car park area and the entrance gate. Soft Rush is abundant along with Jointed rush, Yorkshire Fog, Creeping Bent grass and occasionally Hairy sedge, Marsh thistle, Silverweed, Meadowsweet and Wood dock. The wet grassland area is quite localised. The construction of the carpark area may have had an influence on the wet grassland in terms of impeding drainage or runoff seeping down into the wet grassland area.

#### **Dry humid acid grassland (GS3)**

Upslope of the main gardens is a lovely area of semi-natural grassland which reflects the underlying acid soil and granite geology. The main grass is Common Bent. Common sorrel is locally frequent. Associated with the outcropping granite are Sheep's Fescue, Wood sorrel and occasionally Heath bedstraw. Bracken (HD1) is colonising becoming very dense in places. Also noted occasionally were Bilberry (Frochan) and Cow Wheat.





**Plate 5. Acid grassland on upper slopes with outcropping granite. White Wood sorrel flowers among dead bracken stems.**



**Plate 6. Badger sett entrance on grassy bank near edge of native woodland.**



### **Oak/Birch/Holly woodland (WN1)**

Incipient native woodland colonising on the acid thin peaty soil with outcropping granite. Holly is abundant up to 8m tall, interspersed with Downy birch and very occasional Rowan. No oak yet but should colonise over time.



**Plate 7. Native woodland colonising former grassland fields on upper slopes of Fernhill estate near boundary with Three Rock Mountain. Woody species includes Holly, Birch, Gorse and occasional Rowan.**

### **Improved grassland (GA1/GS)**

The three large north-facing fields have been managed for pasture and have been cultivated in the past. The main grass species are: Sweet vernal grass, Foxtail and Crested Dog's tail. Perennial Rye grass is quite rare. Herbaceous species include Creeping thistle and Ribwort plantain. Although these grassland fields are not as species-rich as the front meadow, they nevertheless have reasonable species diversity typical of grassland that has not been too intensively managed.

### **Hedgerows (WL1)**

The fields are bounded by mature hedgerows with a good structure of trees, shrubs and ground flora. One of them is associated with a stream that rises in Three Rock Mountain and flows down through the property. Typically the hedges are comprised of Hawthorn, Holly, Elder, and Blackthorn and there are occasional Ash trees. These hedgerows are original field boundaries, probably dating from when the land was first enclosed and are depicted unchanged from maps dating back as far as 1813.



**Plate 8. View north from Middle Field.**



**Plate 9. Hedgerow between Field and comprised of Gorse (yellow flowers), Blackthorn (in flower), and Hawthorn. Beech trees in distance.**

### 3.1.3 Invasive Species

There are a number of invasive species present within Fernhill some of which would have been deliberately planted within the gardens (as was recommended by William Robinson) and are now recognised as being invasive in nature.

It is from such garden locations that these plants have spread into the wider countryside causing a threat to native habitats. Within the confines of a managed garden where they are controlled they are less of a concern however some species are listed under the Birds and Natural Habitats Regulations 2011 as detailed above. These include Japanese knotweed (*Fallopia japonica*), Three Cornered Leek (*Allium triquetrum*), Giant Rhubarb (*Gunnera tinctora*), Rhododendron (*Rhododendron ponticum*) and American Skunk Cabbage (*Lysichiton americanus*).

Cherry laurel (*Prunus laurocerasus*) is present within the woodlands and in the nineteenth century a formal laurel lawn was created and maintained along the broadwalk – this is also visually covers the right of way which passes below. This is a rare garden feature and is one of only two such extant features in Irish gardens today (Bowe, undated). The laurel lawn was manually cut on an annual basis to retain its form and in recent years this has to some extent been maintained by browsing deer.

Elsewhere in the estate laurel has spread quite significantly through the areas of mature woodland and in some cases could be considered to be negatively impacting these wooded areas and in need of a dedicated eradication/control strategy, but in other areas small clearings and openings have been retained as a result of browsing pressure from deer which have controlled its spread.

Other non-native species which are becoming invasive or have the potential to do so within the gardens include Himalayan honeysuckle/pheasant berry (*Leycesteria formosa*), a species of St. John's-wort (*Hypericum* sp.) and winter heliotrope (*Petasites fragrans*). Agricultural weeds such as ragwort (*Senecio jacobaea*) (which occurs in the back fields) and thistles (*Cirsium* sp.), which are beginning to spread on the front lawn, were previously managed and controlled on an annual basis through hand pulling and topping as part of the ongoing estate management in Fernhill.

### 3.1.4 Birds

A good variety of common bird species were recorded during the bird breeding surveys. These include blackbird (*Turdus merula*), wren (*Troglodytes troglodytes*), robin (*Erithacus rubecula*), dunnoek (*Prunella modularis*), chaffinch (*Fringilla coelebs*), greenfinch (*Carduelis chloris*), bullfinch (*Pyrrhula pyrrhula*), goldfinch (*Carduelis carduelis*), linnet (*Carduelis cannabina*), song thrush (*Turdus philomelos*), and mistle thrush (*Turdus viscivorus*).



Other common species recorded include; great tit (*Parus major*), coal tit (*Parus ater*), blue tit (*Cyanistes caeruleus*), long tailed tit (*Aegithalos caudatus*), goldcrest (*Regulus regulus*), pheasant (*Phasianus colchicus*), rook (*Corvus frugilegus*), jackdaw (*Corvus monedula*), hooded crow (*Corvus cornix*) and magpie (*Pica pica*). Both feral pigeon (*Columba columba* domest.) and woodpigeon (*Columba palumbus*) are regularly encountered and several flocks of starlings (*Sturnus vulgaris*) are known from the general area.

Scarcer species associated with the mature woodland include blackcap (*Sylvia atricapilla*), treecreeper (*Certhia familiaris*) and jay (*Garrulus glandarius*) whilst buzzard (*Buteo buteo*) has made a recent arrival to the area as a nesting species. Other rare nesting species include raven (*Corvus corax*) which has been known from the woodlands since the 1970s. Summer visitors include willow warbler (*Phylloscopus trochilus*) and chiff chaff (*Phylloscopus collybita*).

Species associated with the yards and buildings include swallows (*Hirundo rustica*) which use the many buildings for breeding purposes and pied wagtail (*Motacilla alba yarrellii*). Yellowhammer (*Emberiza citrinella*) which is a declining species was recorded from the areas of scrub and hedgerows in the back fields.

Species associated with the watercourses and ponds include grey wagtail (*Motacilla cinerea*) and moorhen (*Gallinula chloropus*).

Birds of prey include kestrel (*Falco tinnunculus*), sparrowhawk (*Accipiter nisus*) and occasional peregrine falcon (*Falco peregrinus*) in addition to the buzzard mentioned above.

### 3.1.5 Bats

The Bat Conservation Ireland Database of bat records was searched for records of bats from the Stepside/Kiltiernan area. The database contains records of roosts, ad hoc observations and the results of surveys such as the BATLAS 2010 project and the All Ireland Daubenton's Monitoring Project. Bat species recorded within the 10km square in which Fernhill is located (O12) include:

- Common pipistrelle (*Pipistrellus pipistrellus*),
- Soprano pipistrelle (*Pipistrellus pygmaeus*),
- Nathusius's pipistrelle (*Pipistrellus nathusii*)
- Daubenton's bat (*Myotis daubentonii*),
- Leisler's bat (*Nyctalus leisleri*),
- Brown long-eared bat (*Plecotus auritus*),
- Natterer's bat (*Myotis nattereri*),
- Several unidentified *Myotis* species, and
- an unidentified pipistrelle species (*Pipistrellus* sp.).

There are known Common Pipistrelle and Brown Long eared Bat roosts from two nearby properties on the Enniskerry Road and bat activity recorded from the



general vicinity (within 1km) of Fernhill includes foraging records of Leisler's bat, Common Pipistrelle, Soprano Pipistrelle, Nathusius's Pipistrelle, an unidentified *Myotis* sp. and Brown Long-eared Bat.

Bats are known to roost in the main house at Fernhill and a bat was observed within the house in 2016 by Simon Walker who is caretaking the property (Simon Walker pers. comm.). The exact species of that bat is currently unknown.

The attics of Fernhill House were examined and there was no visual evidence of roosting bats within the attics which are limited in nature. A detector survey conducted at dusk recorded several common and soprano pipistrelle, and a brown long-eared bat emerging from the main house. Leisler's bat was also recorded foraging overhead. The main house and adjoining structures are therefore regarded to be a protected structure as a confirmed bat roost under the Wildlife Acts 1976 and 2000 and the Birds and Natural Habitats Regulations 2011. A 'derogation' would be required from the Minister for the Environment, Heritage and Local Government to undertake any works that will remove bats or their roosts. A licence under the Wildlife Acts 1976 and 2000 is required to remove bats and their roosts or to do any conservation or building works to these structures.

The other buildings within the yards in Fernhill and the gate lodge all offer potential to support roosting bats and will be examined in 2017. All bat surveys, unless repeated throughout the year, are snapshots of bat activity in a particular location and are influenced by the time of year, climate and detection efficiency.

Many of the trees within the estate and gardens offer high roosting potential for bats and they are also likely to form an important habitat for foraging and commuting bats in the area.

A series of tree works were proposed for the roadside trees adjoining the Enniskerry Road following a tree survey by Felim Sheridan (Sheridan, 2016).

These trees were examined from the perspective of roosting bats and nesting birds by Faith Wilson with Donal Roe (the tree surgeon, Celtic Tree Solutions) and Eoin O' Brien (Dun Laoghaire Rathdown County Council) on 5<sup>th</sup> April 2016 and it was agreed that where possible potential roosting habitat in certain trees would be retained where possible, while other trees were to be felled in a bat sensitive manner (i.e. section felled). No tree roosts were confirmed but potential roosts were identified in four trees. These trees were subsequently felled in accordance with the guidance and no evidence of roosting bats was found. Dead standing trunks have been retained where possible and additional roosting spaces created in these using a chainsaw to make vertical crevices upwards into the trunk.

A similar approach has been taken in 2017 when the tree works in the wider extent of Fernhill commenced under Twin Oak Tree Care.

### 3.1.6 Badger

The initial surveys conducted in 2016 confirmed the presence of two badger (*Meles meles*) setts within Fernhill, both of which were active at the time of survey. The largest of these, and one which has been known about for many years, is located in the southern end of the estate in the field of acid grassland/dense bracken whilst the other is found in the area of oak birch holly woodland near the right of way. An additional sett was located in the Bosses Rockery near the Spanish chestnut trees in 2017.

A wider survey of the property was completed in 2017 (Flynn, 2017) which confirmed additional use of the property by badgers. This report is presented in **Appendix 2**.

### 3.1.7 Otter

No evidence of otter (*Lutra lutra*) was recorded on any of the watercourses within Fernhill but their presence is not ruled out. The invasive species American mink (*Neovison vison*) may also occur.

### 3.1.8 Other Mammals

The habitats in Fernhill provide good habitat for a range of common and ubiquitous species. Species that are present here include the Irish hare (*Lepus timidus hibernicus*), hedgehog (*Erinaceus europaeus*) and pygmy shrew (*Sorex minutus*). The Irish stoat (*Mustela erminea hibernica*) is also likely to be present on occasion. The woodland habitats are suitable for squirrel species. The grey squirrel (*Sciurus carolinensis*) is known, from previous studies, to occur locally and the red squirrel (*Sciurus vulgaris*) might still occur on occasion (Teangana *et al*, 2004). Also noted were signs of the long-tailed field mouse (*Apodemus sylvaticus*) and brown rat (*Rattus norvegicus*). The house mouse (*Mus musculus domesticus*) is almost certainly present.

Red fox (*Vulpes vulpes*) signs were frequent throughout the study area and were also seen. Rabbits (*Oryctolagus cuniculus*) are locally abundant the area but populations fluctuate depending on the outbreaks of Myxomatosis.

Fernhill also provides good habitat for the pine marten (*Martes martes*). This species has been reported in Co. Wicklow as far north as the Enniskerry region and the species is making a welcome return to the eastern counties of Ireland. It is possible that pine marten occur within Fernhill.

### 3.1.9 Deer

Deer have been present in Fernhill since the 1970s. Red deer have interbred with sika deer in the Wicklow Hills and all deer in the area are believed to be hybrids.

Those seen locally are sika like, referred to by Dr. Hayden as sika-like hybrids (*Cervus elaphus/nippon*).

Funding was successfully procured from the Heritage Council to erect a deer fence within Fernhill to protect the gardens and ornamental planting from their unwelcome incursions and browsing. Unfortunately the deer fence did not fully enclose the gardens and deer can still access the areas of ornamental planting.

As the gardens became less frequently visited over the past number of years deer have become less and less wary of humans and now graze the 'Front Lawn' as well as the kitchen garden, lower yard and former nursery area. To a certain extent their grazing pressure has ensured that much of the woodland areas remain open as in their absence and with no ongoing gardening maintenance they would have become densely choked with both laurel and bramble. At this stage it is clear what species are palatable to deer and these have been heavily browsed whereas those less palatable remain unaffected.

In the absence of a natural predator the deer populations in the area will require culling. Given the recent clear felling of conifer plantations in the Dublin and Wicklow uplands there is an increased movement of deer to the lowlands where they are coming into conflict with landowners, farmers and there is an increasing incidence of road traffic collisions involving deer including a recent deer fatality on the northbound carriageway of the M50 below St. Columba's school (Faith Wilson, pers obs).

#### **3.1.10 Amphibians and Reptiles**

The ponds within Fernhill support populations of common frog (*Rana temporaria*) and are also likely to support smooth newt (*Triturus vulgaris*). There are good populations of both from ponds in the old granite quarries along Blackglen road to the north. Both species are increasingly under pressure in the Irish countryside, through destruction or loss of suitable breeding ponds and pools.

The common lizard (*Lacerta vivipara*) is a common species although difficult to observe; it commonly occurs on heather-dominated moors and can be found basking on exposed rocks. It also occurs within woodlands and in agricultural areas. It is certain to occur in the area although no observations were made.

### **4. ASSESSMENT OF ECOLOGICAL SIGNIFICANCE**

The main interest in Fernhill is in the mosaic of habitats present which include mature trees and woodland, the watercourses and ponds, a variety of grassland habitats, scrub and the buildings, one of which at present contains a confirmed bat roost.

Fernhill is of importance for a variety of fauna including bats, badgers, deer and other mammals.

In an increasingly urbanised environment Fernhill provides an important feature of biodiversity/green infrastructure within the county connecting the uplands to the coast via two watercourses.

As surrounding lands have become developed for housing, schools and other urban uses the lands at Fernhill have been continuously managed for agriculture in a relatively non-intensive way.

The diversity of planting and variety of species is also likely to be of importance for a variety of pollinators which are sure to find a rich nectar source here throughout the year be it from natural habitats or from cultivated garden species.

## **5. DESCRIPTION OF THE PROPOSED DEVELOPMENT**

The existing Fernhill estate is to be developed as a Regional Public Park to include new entrances, both pedestrian and vehicular from the Enniskerry Road and Rosemont School, roads, car parking, active recreation, play, paths with seating/resting areas, woodland walks, gardens, ponds and wetlands, meadows, new boundaries, restoration of existing Coach House as a park tearooms, demolition of 1970s bungalow, new tower building for use as public toilets and staff/community facilities, new sports building, new dwelling unit, community garden and all ancillary civil, building and landscaping works with some works within the curtilage of the Protected Structure (Fernhill House). The nature and extent of the proposed development is outlined below.

### Entrances:

- New vehicular entrance shared with Rosemont School.
- Existing entrance on the Enniskerry Road to be upgraded for pedestrian use and occasional vehicular use.
- New pedestrian entrance off the Enniskerry Road in close proximity to the roundabout at Belarmine.

### Boundaries:

- Deer proof timber post and steel mesh fencing along the southern, eastern and western boundaries.
- New mesh fencing with gates to match either side of the right of way.
- New piers, steel gates and railings to all entrances for visual permeability and prominence.
- Boundaries to be planted with a suitable screening mix where appropriate.

### Shared Surface Avenue:

- Shared surface avenue along the western boundary up to the Road Field incorporating pinch points and ramps.
- Informal car park for approximately 44 cars west of the access road in close proximity to the boundary of Rosemont School.
- Pathway to a pedestrian gate on the boundary with Rosemont School for direct access. Control of this gate will be by Rosemont School in accordance with the parks opening hours.
- Informal coach parking alongside the shared surface avenue.

Road Field:

- Car park for approximately 49 cars along the northern boundary screened from the south with woodland planting. The required quantity of electrical charge points will also be included at appropriate locations.
- Shared surface plaza with sculptural focal point to act as turning circle. Shared surface road linking to the 9 Acre Field.
- Extensive cut and fill of the existing ground to create the formal active recreation area. Low retaining walls south of the car park area with terracing of slopes south of the active recreation area for viewing.
- Steps to provide access with a long children's slide on the slope with stair lift incorporated in design for disabled access.
- Sports building and viewing area with storage for equipment and goals (see further details below).
- Formal grass active recreation space (approx. 11,750 sq. m) with sand capping for intensive use suitable for multiple sports and games.
- Two lane running track around the active recreation area (400m long).
- Circuitous route around the field including a flat viewing space with extensive seating. Bridge linking the Road Field to the 9 Acre Field to the south.
- Woodland screen planting to boundaries.

9 Acre Field:

- Car park for approximately 70 cars including a minimum of 7 no. disabled spaces along the northern boundary screened to the south by mounding and tree planting.
- Area directly south of the car park to be a playful landscape incorporating grass mounds, sculpture, ornamental planting, toddler play area as well as small wind turbines.
- Perimeter path network with open grassland, grass meadow, screen planting and dogs-off-leash areas for large and small dogs.
- Two bridges linking to the Wood Field.

Wood Field:

- Weir constructed to form a linear pond with spill over wetland to attenuate in flash flooding events.
- Wide path at the north of the field to incorporate extensive linear seating.
- Perimeter path network with links to gardens and right of way.
- Grass meadows, tree and woodland screen planting.
- Historic stone lined water channel to be exposed in the field.
- Long linear flying fox following the slope to the south of the field.
- Additional shelterbelt planting alongside existing woodlands.

Woodland:

- Boardwalk path network to be put in place with extensive seating, resting and viewing areas - to also act as outdoor classrooms. Movement of pedestrians off the boardwalk to be restricted in certain locations to protect the forest floor and ecology.
- Old woodland tracks to be retained and restored for pedestrian and maintenance access.
- Native woodland planting to be introduced at appropriate locations.
- Opportunities for a small orienteering course to be explored as well as an area for den building.
- Firebreak to be put in place along the southern boundary under the 220 kV power lines.

Broadwalk & Gardens:

- The gardens including the plant collections, existing Broadwalk and garden trails to be restored in a sustainable manner. New tree and shrub planting to be introduced at appropriate locations to improve overall visitor experience. Ornamental gardens to be managed as semi-natural wild, in line with the Robinsonian Wild style of gardening.
- New boardwalk path network with extensive seating, resting and viewing areas. The boardwalk will improve access around the gardens and address steep falls and existing steep circulation through the gardens. Movement of pedestrians off the boardwalk to be restricted to protect the sensitive parts of the gardens.
- Low timber and steel fencing to be put in place around the gardens with gates at appropriate locations. The fencing will act to ensure the gardens are protected while retaining their existing tranquil feel. Dogs will be not be allowed in the gardens.
- Opportunities for permanent and temporary sculpture to be considered throughout the gardens. A focal point at the end of Broadwalk to be put in place to address its current abrupt ending.
- Meadow:
- New path network to follow the line of the historic roadway parallel to the Enniskerry Road with links to the Avenue and

- house. Extensive linear seating to be put in place to take advantage of the aspect.
- o Additional woodland screen planting to be introduced along the northern boundary.
- o Species rich grasslands to be managed by light natural grazing for 2-3 months of the year with steel fence in place. During the remaining parts of the year, grass tracks will be cut through the meadows and picnic tables placed in appropriate locations.
- o Natural wetland area to the west to be maintained and managed as same.
- o Existing carpark to be removed with planting and grassland extended.

Ornamental Gardens - West of Avenue:

- o The ornamental gardens including the plant collections and garden trails to be restored in a sustainable manner. New tree and shrub planting to be introduced at appropriate locations to improve overall visitor experience. Ornamental gardens to be managed as semi-natural wild, in line with the Robinsonian Wild style of gardening.

Kitchen Garden:

- o Kitchen Gardens to be managed as community gardens where local people learn to grow fruit and vegetables while also maintaining some of the more ornamental aspects of the gardens.
- o Access to certain parts of the Kitchen Gardens will be restricted to the public except for pre-determined times.
- o Existing glass houses and buildings to be restored for horticultural use.

Right of Way:

- o The Right of Way will be upgraded in line with the upgrade of the paths in the Three Rock Mountains using locally sourced and naturally occurring materials.
- o Some orientation points and information to be put in place along its route.
- o There will be no access to Fernhill from dusk to dawn. The Right of Way will remain open at all times.

Drainage:

The drainage has been designed in accordance with the GDSDS with attenuation in soft areas where possible. Surface water design has been undertaken using best practice and integrated Sustainable Urban Drainage Systems in order to replicate the natural characteristics of rainfall run-off from the proposed development. As well as attenuating the water on site, the quality of the surface water will be improved while also providing an amenity through good quality integrated design.

- The Surface water drainage design primarily relates to the new shared surface avenue, the Road Field and the 9 Acre Field. From sample boreholes in this area, the ground percolation appears to be good. Hard standing areas have been designed to be permeable where possible and allow natural infiltration into the ground. For non-permeable paving, surface water run-off has been designed to be directed towards the soft landscape areas, swales and filter drains where it will naturally infiltrate into the ground. Some storage attenuation zones are also proposed in order to reduce the run-off from the site.
- The remaining parts of the site will naturally infiltrate into the ground as they do so at present.
- Rain water harvesting will take place around all buildings for watering trees and shrubs.

Play:

- Main natural adventure play space to be developed in the old orchard area of the park. Its setting in an existing clearance in the woods with the stream alongside and with its proximity to main park facilities makes it the ideal location. The play space will include some adventurous and challenging play units while always encouraging free and natural play using existing resources on site.
- Small fenced off toddler play area to be developed in close proximity.
- Further natural play will be encouraged throughout by strategically placing suitable items which will encourage free play and exploration of nature and the environment.

Outdoor Exercise Equipment:

- Outdoor exercise equipment to be strategically placed in the most appropriate location(s) to encourage physical activity which will be suitable for all age groups. This will have an energy generating component which will tie into the overall Sustainability Strategy.

Existing Buildings:

- The existing Gate-Lodge just off the Enniskerry Road is currently in use as a residence for a member of staff. It is envisaged that this use as a residence will be maintained.
- The existing Coach House building in the middle of the site is being developed as a tearooms/café. The building is to be upgraded, conserved and restored with a modest extension to the west. The ground floor will incorporate a servery and a seating area with a double height space. Staff preparation and other facilities will be situated on the 1st floor mezzanine above the servery area.



- The existing Bungalow building opposite the Coach House is to be demolished and a new building put in place on or close to its existing footprint.
- The existing building to the east of the bungalow will be upgraded and renovated for use as a shop or community facility.
- The existing shed/store buildings will be retained for storage and locating plant as required.
- The development of Fernhill House is outside of the scope of this Part 8. It is envisaged that this will be developed for a wide community use – subject to extensive studies and a further Part 8.

Proposed Buildings:

- New Tower building on or close to the footprint of the existing bungalow. This building will be a contemporary design responding to its setting and location. It will incorporate public toilets, staff facilities, community facilities and external seating/viewing areas.
- New sports building at the upper level of the active recreation space. This building will be a contemporary design incorporating timber cladding and a green roof. This building consists of changing rooms, bag store, toilets (accessible externally) with a storage cage alongside for goals, etc.
- New modest eco-type residential unit located below an existing barn structure to the north of the Coach House.
- All new buildings will be designed to meet with the requirements of the Near Zero Energy Building standards and will tie in with the overall Sustainability Strategy.

Services:

- Existing low voltage overhead power lines as well as other overhead lines throughout the estate to be undergrounded.
- New watermain, sewage, and ducting for electricity, fibre and utilities to be laid on the existing avenue and new shared surface avenue.
- New low voltage LED lighting columns will be put in place along the new shared surface avenue and in the car park in the 9 Acre Field. Additional bollard lights will be put in place from the car park to Fernhill House along the accessible path.
- Should a small sub-station be required, this will be located along the new avenue and screened from view where possible.

Area Under Lifetime Tenancy:

- This area will be developed as a staff depot yard upon completion of the lifetime tenancy agreement.

Other:

- Extensive bicycle parking (included some covered parking) to be put in place at the entrances and car parks and in close proximity to the proposed tearooms.
- Ducting for fibre will be put in place in order to develop the park as a Smart Park.
- Sensory spaces to be developed in appropriate locations along with age friendly initiatives.
- Opportunities for permanent or temporary sculpture to be reviewed at detail design stage.

## 6. POTENTIAL IMPACTS OF THE DEVELOPMENT OF FERNHILL AS A PUBLIC PARK

The acquisition of Fernhill, a listed heritage garden and its surrounding natural habitats and estate landscape, by Dun Laoghaire Rathdown County Council provides incredible opportunities for the county, its residents and visitors.

The garden and environs of Fernhill offer a refuge for both man and nature in an increasingly urbanised world, a place of inspiration and tranquillity, beauty for the eye, natural attractions for all ages and a place with an enormous opportunity for learning about biodiversity and horticulture.

A garden is:

- A place of beauty
- A place of pleasure
- A place of escape
- A creative expression
- Performance art with plants

Fernhill, in keeping with other Robinsonian style gardens such as Mount Usher, offers a sublime example of the melding of both garden and nature – an expression on the ground of the following ethos:

**‘To create a garden is to search for a better world – the very art of planting is to hope for a glorious future’**

People should leave a garden and a park in a better humour than when they entered it.

The importance of a connection with the natural world, with living things and with the wild is increasingly being demonstrated globally in terms of our mental health outcomes, well being and physical health. As people become more and more urbanised and our cities expand natural areas and wild places become increasingly important.

**The development of Fernhill as a flagship park with a new ethos towards park management for delivering these benefits is to be welcomed.**

Biodiversity values in the vicinity of Fernhill and environs have been in decline due to development and the ongoing urbanisation of what was still essentially a rural landscape twenty years ago. The construction of the M50 motorway, the ongoing development and expansion of Sandyford, and residential developments in the Carrigmines and Stepside area have all contributed to the loss of a rural farmed landscape to essentially an urban/suburban one encroaching at the foothills of the Dublin Mountains.

The zoning of lands for development in the vicinity of Carrigmines, Kiltarnan and Cherrywood further adds pressure to wildlife and natural habitats in this area of Dun Laoghaire Rathdown. Residential, commercial and other intensive development expected with such zoning confirms the value of Fernhill as a significant area of green infrastructure in the area and care must be taken to ensure that its' development as a regional park and public amenity does not significantly reduce its biodiversity value.

Given that this significant tranche of land and gardens is now under the welcome ownership and management of Dun Laoghaire Rathdown County Council there is an opportunity to deliver long term biodiversity gains for the area as well as for people.

Fernhill is a fragile place in many ways – its appeal and ecological interest lie in its old world charm, its narrow mossy rocky paths, its naturalistic plantings, its collection of specimen trees and shrubs, its bird song and wild flora coupled with a light hand in terms of its maintenance and lack of manicure.

Potential long-term negative impacts on flora, fauna and the gardens in Fernhill if unmitigated include:

- Increased disturbance to fauna from both visitors and dogs within the property, which until now has been in private hands with low visitor numbers
- Increased disturbance to badgers due to proposed improved public access to the southern portion of the estate
- Increased risk of pollution to local streams as a result of surface water run-off from increased car parking, access roads, etc.
- Increased disturbance to fauna from lighting of public car parking areas, pathways, etc.
- Trampling of sensitive habitats such as the grasslands in the Front Lawn
- Trampling/damage to moss, lichen and fern communities on boulders, path surfaces and the round timber edging to existing paths
- Picking/collection of flowering plants from within the garden

- Theft of specimen plants/shrubs from the collection as has happened at other heritage gardens open to the public
- Potential for the introduction of invasive species from the horticultural trade, on machinery and plant or through the movement of soils on site
- Renovations/reuse of buildings with subsequent losses for roosting bats, nesting swallows, etc.
- Pressure from the public/public perception to sanitise/tidy the park and gardens thereby losing its wild character and Robinsonian planting ethos
- The potential use of herbicides etc. (with subsequent impacts on invertebrates and fauna) in the management of the gardens, which have always been actively gardened manually as opposed to 'maintained'
- Fire and anti-social behaviour
- Excessive pressure in terms of health and safety which results in the loss of veteran trees and naturalistic features such as uneven paths, fallen trees, boulders, etc.
- Ongoing pressure for car parking, playing pitches, etc. which all lead to further losses of character and habitats
- Pressure to widen paths for standard vehicular access and maintenance vehicles
- Sheer visitor numbers and pressure arising from the property 'being loved to death'

Potential long term positive impacts include:

- Ongoing protection of the lands as an open green space and area of green infrastructure within the county
- Management of natural habitats for biodiversity
- Control and eradication of invasive species
- Control and eradication of deer from the gardens and woodlands
- Creation of new areas of native woodland habitat
- The gradual transformation of the conifer plantation to a native woodland using close to nature, 'continuous cover forestry' techniques
- Replanting/creation of new shelterbelts, which form an important function in creating and maintaining a micro-climate for the gardens
- New ornamental planting within the gardens to maintain/enhance the collection
- Provision of SUDS measures to reduce the results of flash flooding in the property
- Creation of new water features within the property
- An opportunity to educate people about biodiversity, the natural world, where their food comes from, sustainable development, etc.
- Creation of pollinator friendly planting

- Training potential for gardeners and horticulturalists
- A training ground for ecologists and habitat managers
- Gains from human interactions with biodiversity in terms of mental health

## **7. MITIGATION MEASURES**

### **7.1 Mitigation by Avoidance**

The principal mitigation that should be considered in any development is avoidance of impact. Detailed consideration has therefore been given to avoiding any direct or indirect impacts from the development of the park on existing habitats such as mature trees, hedgerows and treelines, scrub, grassland and wetland habitats, amphibian breeding areas and badger setts within Fernhill. This has ameliorated the majority of the potential impacts for both flora and fauna.

A new vehicular and pedestrian access has been created adjoining Rosemont School as to use the existing access to Fernhill would have required significant losses of the mature trees in the shelterbelts adjoining Enniskerry Road to achieve the required sight lines from a traffic management perspective.

### **7.2 Tree Protection**

Protective fencing will be erected in advance of any construction works commencing. This will be erected outside the drip-line of the canopy of retained trees in order to prevent damage by machinery, compaction of soil, etc. in accordance with BS 5837:2012 during developments such as the construction of the new access road and car parking areas. This will be signed off on by a qualified arborist or ecologist to ensure it has been erected properly before any machinery is allowed to commence work. No ground clearance, earth moving, stock-piling or machinery movement will occur within these protected areas.

### **7.3 Timing of Works**

Felling of trees or clearance of vegetation will not take place during the bird nesting season between 1<sup>st</sup> March and 1<sup>st</sup> September. This is a statutory obligation under the Wildlife Amendment Act 2000.

### **7.4 Lighting Design**

Four species of bats have been documented using Fernhill to date and both they and other mammals are sensitive to lighting and in general will avoid areas which are illuminated.

Design recommendations from the BCT (2010) for wildlife-friendly lighting include:

1. Do not "over" light. This is a major cause of obtrusive light and is a waste of energy. Use only the minimum amount of light needed for safety. There are published standards for most

lighting tasks, adherence to which will help minimise upward reflected light.

2. Eliminate any bare bulbs and any light pointing upwards. The spread of light should be kept near to or below the horizontal.
3. Use narrow spectrum bulbs to lower the range of species affected by lighting.
4. Use light sources that emit minimal ultra-violet light. Insects are attracted to light sources that emit ultra-violet radiation.
5. Reduce light-spill so that light reaches only areas needing illumination. Shielding or cutting light can be achieved through the design of the luminaire or with accessories, such as hoods, cowls, louvers and shields to direct the light.
6. Reduce the height of lighting columns. Light at a low level reduces ecological impact. However, higher mounting heights allow lower main beam angles, which can assist in reducing glare.
7. For pedestrian lighting, use low level lighting that is directional as possible and below 3 lux at ground level.
8. Limit the times that lights are on to provide some dark periods for wildlife.
9. Use lighting design computer programs and professional lighting designers to predict where light spill will occur.

At present there is no significant outdoor lighting within Fernhill beyond an occasional over-door light at residential properties. This has ensured that a dark landscape for foraging and commuting bats and movement for other wildlife has been maintained.

Where lighting is required it will be designed and installed with controlled targeting as a priority. Bollard lighting could be employed along the footpath and in the area of the car parks where lighting will be required.

An example of a sensitively designed standard is presented below in **Plate 10**. The bollard should be no taller than 1.5 metres and preferably in the range of 1.2 – 1.3 metres. The source of light should be Light Emitting Diodes (LEDs) as this is a narrow beam highly directional highly energy efficient light source. The lighting should allow for a light level of 3 lux at ground level. This low lighting is thus easier to control both the direction but also the actual light level because it is so close to the target area.

It is generally recommended however that lighting is kept to a minimum within the park. If lighting standards for illuminating the access road are required the following specification (see **Figure 6.2.1** below) provides some good design guidance and detail. This specification has been used in other areas in County Dublin where bat activity is recorded such as between the 3rd Lock at Inchicore and the 12th lock at Newcastle Road on the Grand Canal and is available online at: [http://eleceng.dit.ie/sdar/IrishLighter/il\\_2011/AlexNaper.pdf](http://eleceng.dit.ie/sdar/IrishLighter/il_2011/AlexNaper.pdf). This

specified an illuminance level on the Grand Canal of no greater than 0.25 lux and on the path/cycle track of a minimum of 1.5 lux and an average of 7.5 lux. A special louvered lamp design limited the forward and backward light spill of these lighting columns.

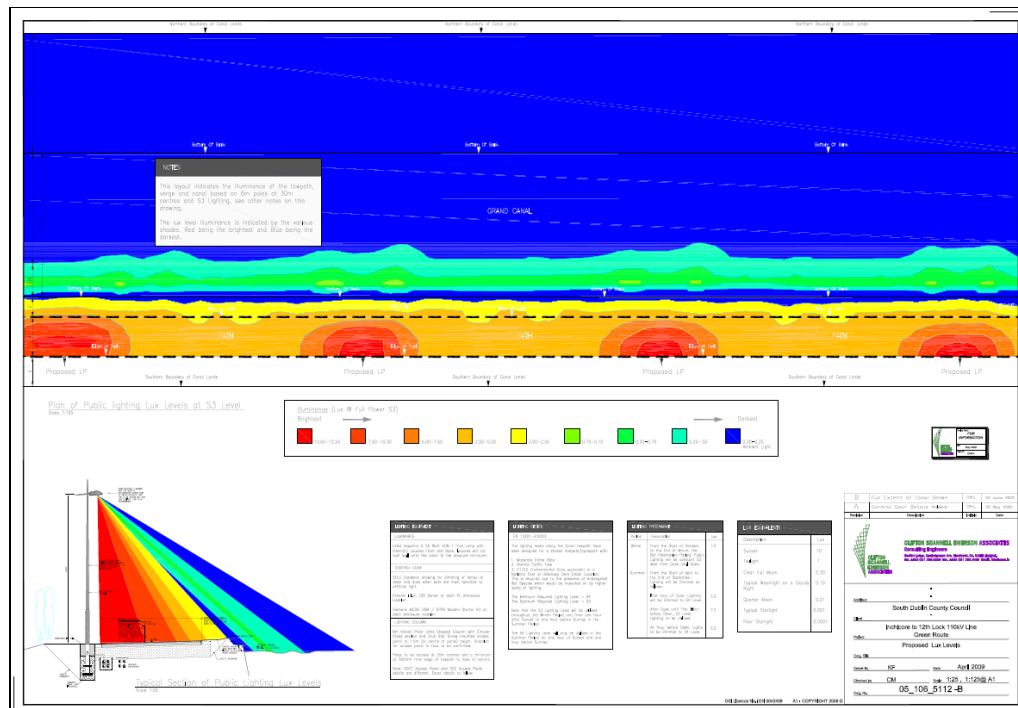
The design specification for this lighting scheme was as follows:

- Column mounting height: 6 meters
- Path width: 3 – 4 metres
- Buffer width: 1 metre
- Illuminance level on canal: No greater than 0.25 lux
- Illuminance level on path: Min 1.5 lux, average 7.5 lux
- Canal level: 1 metre below path level.

In addition, the lights can be dimmed by remote control to lower levels on the path (down to 0.5 lux) during times of low usage.



**Plate 10. Bollard lighting amidst car parking at OPW Brú Na Boinne visitor centre, Newgrange, Co. Meath.**



**Figure 7.4.1. Modelled light levels along the Grand Canal.**

## 7.5 Boundary Treatments/Fences

Any new walls or entrances to Fernhill should be built as either dry stone or “dry stone affect” granite walls and covered in a thin layer of soil and reseeded with native grasses to maintain the naturalistic sense of place. Such construction is also in keeping with the built heritage of Fernhill. If feasible existing collapsed walls, such as those adjacent to the right of way or between the Wood and Middle Fields should be rebuilt using the existing stones.

The boundary fence either side of the right of way and the deer fence proposed for the property should be subject to pre-construction wildlife survey and designed with other fauna in mind at Detailed Design Stage.

## 7.6 Planting of Native Species/Landscaping

The landscaping proposals for Fernhill (including the planting of boundary trees and shrubs in the back fields) will include the use of native and local plant species such as hawthorn, blackthorn, holly, hazel, mountain ash, alder, willows, oak, ash, elder and gorse. The species used will be native and of local origin, certified stock is available from nurseries who supply stock for the Native Woodland Scheme.

Other specimen trees which are non-native but already in place within the shelterbelts will also be used in new plantings in order to maintain and enhance the existing shelterbelts.



### 7.7 Pollinator Friendly Planting

Climbers such as honeysuckle (*Lonicera periclymenum*) are beneficial to moths and other nocturnal insects while shrubs such as Hebe and Buddleja are beneficial to daytime and some night insects. New planting proposals should consider providing nectar rich flowers for insects across the season. Many of these species are already in place in Fernhill and could be propagated and brought on as opposed to new stock being purchased.

Suitable spring flowers include: bluebell (*Hyacinthoides non-scriptus*), bugle (*Ajuga* sp.), crab apple (*Malus* sp.), daffodils (*Narcissus* sp.) heritage varieties only, flowering cherry (*Prunus* sp.), flowering currant (*Ribes sanguineum*), forget-me-not (*Myosotis* sp.), hellebore (*Helleborus corsicus*, *H. foetidus*), Lungwort (*Pulmonaria* sp.), rhododendrons (species type), rosemary (*Rosmarinus* sp.), Viburnum (*Viburnum* sp.), thrift (*Armeria maritima*), etc.

Early-summer flowers include; columbine (*Aquilegia* sp.), false goat's beard (*Astilbe* sp.), bellflowers (*Campanula* sp.), comfrey (*Symphytum* sp.), everlasting sweet pea (*Lathyrus latifolius*), fennel (*Foeniculum vulgare*), foxglove (*Digitalis purpurea*), geranium (*Geranium* sp.), cinquefoil (*Potentilla* sp.), snapdragon (*Antirrhinum* sp.), betony, lamb's ear (*Stachys* sp.), teasel (*Dipsacus* sp.), thyme (*Thymus* sp.), Viper's bugloss (*Echium vulgare*), mullein (*Verbascum* sp.), etc.

Late-summer flowers include; angelica (*Angelica* sp.), aster (*Aster* sp.), cardoon (*Cynara cardunculus*), cornflower (*Centaurea* sp.), dahlia (single-flowered), Delphinium (*Delphinium* sp.), Eryngium (*Eryngium* sp.), Fuchsia (*Fuchsia* sp.), globe thistle (*Echinops* sp.), heather (*Calluna* sp., *Erica* sp.), ivy (*Hedra helix*), lavender (*Lavandula* sp.), penstemon (*Penstemon* sp.), scabious (*Knautia* sp.), stonecrop (*Sedum* sp.), verbena (*Verben bonariensis*), etc.

Excellent advice and guidance on further suitable species is available in the Irish Pollinator Plan material.

### 7.8 Heritage Garden/Plant Collection

It is understood that Dun Laoghaire Rathdown County Council will appoint a head gardener and undergardener to Fernhill but it must be stressed that this is a property that has always been 'gardened' as opposed to 'maintained'. A light touch is what is required with a sensitivity towards the native species of the adjoining habitats be they grasslands or woodlands.

In the initial years a large amount of sheer recovery of the collection from encroachment by briars and other aggressive species such as winter heliotrope and ground elder will be required.

The plant collection at Fernhill is currently being documented but encompasses an impressive collection of trees, shrubs, bulbs, perennials and herbaceous species. The inventory of trees and shrubs is building on the work published by

Mary Forrest in 1985 catalogued the collection in Fernhill (95 species, 296 named varieties). Of particular note is the collection of Rhododendrons with some 114 varieties recorded at Fernhill in that study.

It is recommended that a regeneration of the Rhododendron collection is begun with an emphasis on the species Rhododendrons as opposed to the many hybrids and cultivars now available. This collection could make a contribution to the conservation of species which are threatened in their native habitats in the Himalayas and South East Asia.

Other groups such as *Cornus* sp., *Camelia* sp., *Magnolia* sp. and other specimen shrubs and trees should also be sought for the collection.

It is important that not only are funds made available for the restoration of the gardens and collections at Fernhill but that a sinking fund for the ongoing development and maintenance of the collection is adequately resourced.

As noted above plant material with single flowers, which favour pollinators, should be favoured in new plantings in the kitchen garden.

A detailed inventory and garden management plan is in preparation to further inform the management and development of the gardens.

Access around the estate is restricted in some areas by narrow rocky paths which are the historic quarry paths associated with the granite quarries of the hillside which were developed by the Darley family. It is features such as these that give Fernhill its charm, character and interest. Such paths should be maintained in situ without alteration which will require legwork or the use of a specialist small vehicle where access is required by staff or visitor. The late Ralph Walker used an electric golf buggy to access much of the estate following his stroke and the use of a similar vehicle (or quad and trailer) would allow access to many areas when needed or to bring those less able to enjoy features of the garden such as the broadwalk and tennis court.

The use of granite grit (procured from the local stream) has always been used for maintaining path surfaces within Fernhill and is both aesthetically and ecologically in keeping with the location.

A strict biosecurity protocol should be implemented at Fernhill in order to protect the collections and ensure that any new plant material brought into the gardens is disease free and non-invasive in nature.

It is recommended that an advisory committee/board of specialists with expertise in horticulture, heritage gardens and ecology is established to oversee the restoration of the garden and collection at Fernhill as well as its ongoing development and expansion.

There is a concern regarding lack of adequate resources or staffing to protect the garden collection, which is vulnerable to theft and to educate the public. The permanent staff could be assisted by a 'Friends of Fernhill' made up of local volunteers and gardening enthusiasts who if provided with a branded fleece/raingear could be able to assist in educating and informing the public. The role of a park constable should also be considered.

#### **7.9 Control of Invasive Species**

A number of species listed under the Birds and Natural Habitats Regulations 2011 are recorded in Fernhill. These include Japanese knotweed (*Fallopia japonica*), Three Cornered Leek (*Allium triquetrum*), Giant Rhubarb (*Gunnera tinctora*), Rhododendron (*Rhododendron ponticum*) and American Skunk Cabbage (*Lysichiton americanus*). A detailed management plan for either their control or eradication needs to be drawn up for the gardens. There is an opportunity to educate the public on same.

Should earth or other material be brought to Fernhill this material should be screened to confirm that no invasive species such as Japanese knotweed or other species as described on <http://www.invasivespeciesireland.com/> are present. All machinery and plant entering Fernhill should be cleaned to ensure that no fragments of Japanese knotweed or seeds of other invasive species are brought on to the site in line with the Birds and Natural Habitats Regulations 2011. See also the comments below relating to the procurement of planting material for landscaping purposes in the wetlands.

#### **7.10 Control of Noxious Weeds**

Populations of ragwort in both the Front Lawn and back fields will need to be controlled. In the past this has been done in the Front Lawn by hand pulling and given that this area will be grazed by livestock it is important that a plan is drawn up for the control of this species which is poisonous to animals if ingested. The thistle populations will require ongoing management and topping.

#### **7.11 Pond/Wetland Creation**

There is the opportunity to create a new wetland in the Front Lawn below the old car parking area and in the Middle Field as part of SUDS measures in the park.

Suitable native plant species for planting in such a wetland/attenuation area include:

- Marginals - Yellow flag iris (*Iris pseudacorus*), Marsh marigold (*Caltha palustris*), Water plantain (*Alisma plantago-aquatica*), Water forget-me-not (*Myosotis scorpioides*), Brooklime (*Veronica beccabunga*), Bogbean (*Menyanthes trifoliata*), Ragged robin (*Lychnis flos-cuculi*).
- Emergents - Greater spearwort (*Ranunculus lingua*), Branched bur-reed (*Sparganium erectum*), Purple loosestrife (*Lythrum salicaria*), Water mint (*Mentha aquatica*).

Care should be taken when purchasing aquatic plants from nurseries as many species have the potential to become invasive. Attention is drawn to the invasive species listed under the Birds and Natural Habitats Regulations 2011.

#### **7.12 Woodland Management/Fire Protection**

The conifer plantation on the upper slopes of Fernhill will be transformed over time to a more diverse woodland using continuous cover/close to nature forest management techniques.

A critical part of this plan is the establishment and maintenance of a fire break below the 220kV powerline as there have been ongoing issues with anti-social behaviour and fires in this portion of the property and the risk of fire is a serious one.

#### **7.13 Trampling/Overuse**

Trampling and the compaction of soil have lead to the degradation of habitats in many public areas and natural habitats in the wider countryside. The scar on the ascent to Djouce Mountain can now be seen from many miles and has exacerbated significantly in the last ten to fifteen years with increasing visitors and amenity use. Heavy foot traffic also poses a risk to the root zone of specimen trees and shrubs.

The species rich grassland of the front lawn, the garden area and the woodlands are all vulnerable to overuse and are sensitive to many visitors.

Visitors can be encouraged to remain on formal paths in Fernhill by the use of fallen logs or stones as path edges, by fencing areas such as the proposed boardwalk through the woodlands or by the provision of an obvious mown path through meadows and grasslands.

Thorny planting can also dissuade people from entering areas and reduce the risk of 'dead zones' in parks with associated anti-social behaviour.

For that reason it is recommended that the proposed boardwalk/new access route to the upper slopes of Fernhill is fenced to deter the public from entering this area.

#### **7.14 Carrying Capacity/Visitor Study**

The number of car parking spaces provided within the park should be developed on a phased basis and the impacts of visitors and the carrying capacity of Fernhill to accommodate same should be subject of a detailed survey from both a horticultural and ecological perspective to ensure that the development of Fernhill and the management of people is sustainable. This can assist in developing a management plan for visitors to the park and preventing it from 'being loved to death'.

Consideration should be given to the provision of a link bus serving the parks of Fernhill, Marlay, St. Enda's and Cabinteely from the LUAS and public transport services to ensure that public access is truly sustainable.

#### **7.15 Sediment Control**

Sediment control practices are used on building sites to prevent sand, soil, cement and other building materials from reaching waterways and water dependent habitats such as the adjoining drainage ditches, reedbeds and saltmarshes. Even a small amount of pollution from a site can cause significant environmental damage by killing aquatic life, silting up streams and blocking storm water pipes. Storm water can contain many pollutants which can enter our local drainage ditches, streams, rivers and marine systems, causing harm to native animals, plants, fish breeding habitats and recreational areas.

Soil erosion, sediment and litter from building sites can be major sources of storm water pollution, and can cause:

- significant harm to the environment e.g. loss of valuable foraging areas in adjoining mudflats for wintering birds
- weed infestation of waterways caused by sediment settling on the creek beds and transporting nutrients
- loss of valuable topsoil
- significant public safety problems when washed onto roads and intersections
- blocked drains creating flooding and increased maintenance costs
- damage to recreational and commercial fishing.

Sediment control usually requires little effort and results in:

- Cleaner waterways and healthier aquatic life.
- Improved site conditions.
- Improved wet weather working conditions.
- Reduced wet weather construction delays.
- Reduced losses from material stockpiles.

- Fewer mud and dust problems.

Good site management in relation to sediment control during the construction phase should prevent this from occurring and possible mitigation measures for consideration are outlined below.

Other measures to be implemented on site include briefing of all site contractors regarding the sensitivity of the watercourses and water features on site and the need for strict site management in relation to potential run off.

**Minimising site disturbance:**

Prevention is better than cure. Careful design and an efficient construction sequence will minimise disturbance to the site. This will save money and reduce environmental impact.

Design to avoid excessive cut and fill, unnecessary clearing of vegetation and to preserve existing site drainage patterns. Clear only those areas necessary for building work to occur. Preserve grassed areas and vegetation where possible. This helps filter sediment from storm water run off before it reaches the drainage system and stops rain turning exposed soil into mud. Delay removing vegetation or commencing earthworks until just before building activities start. Avoid building activities that involve soil disturbance during periods of expected heavy or lengthy rainfall.

**Implement sediment control:**

Install sediment control measures before commencing any excavation or earth moving. Regularly maintain them until construction is complete and the site is stabilised.

*Firstly divert uncontaminated storm water away from the work area.*

Avoid contamination of storm water and the adjoining road drains and potentially the Barncaullia Streams with sediment. Use diversion devices to reduce the volume of storm water reaching the disturbed area. Consideration may need to be given to the creation of a diversion channel to divert uncontaminated storm water around the disturbed area. Construct the channel uphill of the disturbed area with a bank on the lower side. Regularly remove sediment from the channel. Line the channel with erosion control mats or turf to prevent soil erosion or use check dams constructed from sand or gravel filled bags.

*Minimise the potential for erosion*

Construct a single vehicle entry/exit pad to minimise tracking of sediment onto roadways. Use a 150mm (minimum) layer of 40mm recycled aggregate or crushed rock. A raised hump across the entry/exit pad can be used to direct storm water run-off into a sediment trap to the side of the pad. Protect materials that may erode, particularly sand and soil stockpiles, with waterproof coverings. Contain waste in covered bins or traps made from geotextile fabric. Locate stockpiles of building materials away from drainage paths and uphill of

sediment barriers. Divert run-off around stockpiles unavoidably located in drainage paths using a perimeter bank uphill. Use biodegradable erosion control mats to protect exposed earth.

*Prevent sediment-contaminated water leaving the site*

Use barriers to trap coarse sediment at all points where storm water leaves the site, before it can wash into drains or into the local streams. Relocate sediment on site or dispose of it suitably. Remove accidental spills of soil or other material immediately. Maintain vegetation elsewhere on the site in a healthy state as it can function as an additional filter for sediment. Cut brick, tile or masonry on a pervious surface such as grass or loosened soil within the property boundary. The same applies when cleaning equipment. Waste concrete, paint and other solutions used on site should be properly disposed of so they do not contaminate storm water.

#### **7.16 Faunal Disturbance**

Dogs and people pose a real threat to the fauna of Fernhill which rely on undisturbed refuges for lying up, breeding, foraging and hunting. Disturbance by dogs has resulted in the extinction of the Irish hare from the Bull Island for example and similar impacts could occur in Fernhill.

A dedicated off leash area for dogs will be provided in the 9 acre field. Otherwise it is proposed that dogs must be on a lead at all times within Fernhill and no dogs will be allowed within the gardens.

Given that visitors with dogs are likely to wish to visit both the gardens and the parkland areas some form of dog crèche will be required to ensure that dogs can be safely left in the shade with water while their owners visit the other attractions in the park such as the house and tea rooms.

#### **7.17 Provision of Roosting and Nesting Opportunities**

Nesting and roosting opportunities should be provided for both bats and birds on trees within the park. These can include the erection of artificial nest boxes and bat boxes, which should be specified by an ecologist and erected under their supervision.

#### **7.18 Fisheries**

Inland Fisheries Ireland detail the following:

‘It is IFI policy to maintain watercourses in their open natural state preventing habitat loss and preserving biological diversity. Natural fish migration should be maintained by minimizing changes to the natural stream morphology and hydraulic conditions. In developments where permanent and temporary structures are constructed over watercourses the structures should not impact negatively on predevelopment conditions. All culverts should be as short as possible to minimise habitat loss. All culverts should be adequately sized to accommodate the required flood discharge and remain backwatered to a depth

of 500mm. Design details should be discussed and agreed with IFI. Installation of culverts should be completed 'in the dry' in accordance with an agreed 'Method Statement'.

Permanent diversions are not encouraged and are only permitted in limited circumstances. Where stream realignments are permitted the new channel must display hydraulic and morphological characteristics necessary for good fisheries habitat.

As with any development all measures necessary should be taken to ensure comprehensive protection of local watercourses, best practice must be implemented at all times in relation to any activities that may impact on surface water and riparian habitats.

Appropriate erosion and sediment control measures should be put in place to minimise the impact from sediment/silt on associated watercourses. This should incorporate an inspection and maintenance programme of all treatment facilities by the contractor. At the operational stage all storm runoff should be treated via petrol/oil interception.

Removal and disturbance of riparian and bankside vegetation should be minimised.

Because all channels are Salmonid, instream works should be completed during the period May – September'.

The guidelines presented in the Eastern Regional Fisheries Board 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' should be followed. This and other guidance is available from:

<http://www.fisheriesireland.ie/fisheries-management-1/86-planning-for-watercourses-in-the-urban-environment-1/file>

<http://www.fisheriesireland.ie/fisheries-management-1/90-requirements-for-the-protection-of-fisheries-habitat-during-construction-and-development-works-at-ri-1/file>

## **7.19 Protection of Bats**

Measures to ensure bats are not impacted during the tree felling works are ongoing. Further studies will confirm the presence/absence of scarce woodland species such as Whiskered bat, Natterer's Bat and Daubenton's bat using the site and to inform any lighting proposals for the park.

All buildings will be surveyed for bats prior to any design proposals for same to ensure that no roosts are lost. Roosting spaces will be included in the design of new buildings such as the tower building, which will be created in the upper yard to replace the gardener's cottage.



#### **7.20 Protection of Badgers and other Fauna**

A viewing area is proposed in the south-east of the site, which is in close vicinity to the location of the only main badger sett in Fernhill. It is recommended that this location be reconsidered.

For example, an extensive area of gorse to the south of this contains no protected mammal refugia and would also be suitable, allowing as it does commanding views. However, the proposed route to this area should also be reconsidered.

The indicative route given on the Draft Masterplan drawing (DRP 2315--02) may be altered to minimise disturbance to badgers. It is recommended that a site visit is carried out with local authority Parks Department staff and an ecologist to preliminarily set out a suitable location for the viewing area and the routes to same.

The opening of the park to the public will have potential impacts on badger activity and habitat. It is recommended that exclusions be placed on the access of walkers to certain areas and the exclusion of dogs from any of the areas where badger setts or activity have been located.

The proposed boardwalk and access route from the 21 steps to the southern portion of the property should be fenced to deter the public from entering this area.

#### **7.21 Grassland Management Plan**

A grassland management plan will be developed for the management of the Front Lawn and the grasslands in the back fields.

#### **7.22 Educational Material/Signage/Display Boards**

A number of colourful informative display boards and signs will be developed for Fernhill providing both ecological and horticultural information. Plant lists for specific parts of the garden will be developed on completion of the garden inventory.

Consideration should be given to the engagement of a guide for the general public and for specialist groups visiting the gardens and park.

### **8. PREDICTED IMPACT OF THE DEVELOPMENT OF FERNHILL AS A PUBLIC PARK**

Given the implementation of the detailed mitigation measures outlined above it is expected that the floral, faunal and horticultural riches of Fernhill will be safeguarded and protected for future generations.

## **9. MONITORING & ADDITIONAL SURVEYS**

It is recommended that a number of further ecological and monitoring studies are conducted within Fernhill to further inform its sustainable development as a public regional park and garden. These include:

- A detailed bat survey including monitoring of woodland bats
- A breeding bird survey
- A breeding amphibian survey
- A reptile survey
- An ongoing inventory of native botanical species
- A butterfly survey
- A damselfly and dragonfly survey of the ponds and water gardens
- A bryological (moss and liverwort) and lichen survey
- A mycology/fungal survey
- A detailed invasive species survey and management plan detailing the precise locations and extent of populations with guidance for their control or eradication
- A woodland management plan for the conifer plantations to include thinning as required and any additional interventions required
- A deer management plan to assess the impacts of deer control conducted to date

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## APPENDIX 1. HABITAT SURVEY – FIELD NOTES

**Fern Hill Habitat Notes - Habitat Survey April/May 2016 – see Figure 1 below for locations**

Note No.	Habitat	Fossitt code	Description
N1	Neutral grassland / Parkland trees	GS1/ WD5	Permanent pasture in front of Fern Hill house. Species-rich grassland with frequent Pignut, Field Wood Rush, and Cowslip. Scattered Parkland trees.
N2	Spring	FP	Old Well with granite surround
N3	Mixed broadleaved/ conifer woodland	WD2	20m wide band of mixed woodland along road boundary; Mature trees: Beech, Pinus spp. Horse chestnut, Fir. Understory sparse, mainly Holly.
N4	Mixed broadleaved/ conifer woodland	WD2	Arboretum on both sides of avenue lined with Wellingtonia, specimen Rhododendron, Magnolias, Tree Ferns and fine mature trees of Beech, Pines, Larch, Eucalyptus, Smithsonian Spruce. Understory of Cherry Laurel locally frequent and grazed by deer
N5	Mixed broadleaved/ conifer woodland	WD2	Arboretum extending upslope on rocky ground with outcropping granite. Fine mature Scots Pine, Beech, Larch, Rhododendron and other exotics. Ground flora: Wood Rush, Wood sorrel and moss. Birch becoming frequent upslope.
N6	Oak-birch-holly woodland	WN1	Semi-natural woodland on steep slope with exposed granite boulders. Frequent mature Holly up to 8m high, occasional Mountain Ash and Downy Birch locally frequent and Gorse. Dry peaty soil. Ground flora includes Common Bent grass, Wood Sage Honeysuckle and Mosses. Evidence of deer tracks frequent. Outlier badger sett
N7	Acid grassland/ Dense Bracken	GS3/ HD1	Open rough grassland on undulating slope with some outcropping granite. Vegetation mainly Common bent grass and a cover of dead Bracken. Localised Wood sorrel and Cow wheat near rocky area. Includes a few depressions/borrow pits? Large badger sett on western side
N8	Conifer Plantation	WD4	Semi-mature plantation of Sitka spruce interspersed with some Birch and Scots Pine.
N9	Scrub	WS1	Wide band of Gorse along property boundary
N10	Conifer Plantation	WD4	Semi-mature plantation of Scots Pine interspersed with some Sitka spruce and Birch
N11	Mixed Broadleaved woodland	WD1	Small area of mixed woodland at south-west boundary adjacent to a stream. Mature beech trees and Scots Pine. Granite boulders
N12	Improved agricultural grassland	GA1	Large north-facing fields on moderate slope. Vegetation mainly Sweet vernal grass, Ribwort plantain, Meadow foxtail, Field Wood rush (O). Nettle, Field buttercup, Ragwort, Creeping thistle, Sorrel, Hogweed rare.

Note No.	Habitat	Fossitt code	Description
N13	Upland eroding stream	FW1	Meandering watercourse which rises in Three Rock Mountain, it flows between Field 2 and Field 3. It is 0.5-1.5m wide over a sandy gravelly substrate with occasional granite boulders. Good swift flow continues down through the garden. This is a tributary of the Carrickmines River
N14	Conifers	WD4	Band of mature conifers mainly Norway Spruce along field boundary grading into scrub
N15	Mixed broadleaved/ conifer woodland	WD2	Mature trees mainly conifers Pines and Cypress along edge of fields
N16	Mixed broadleaved/ conifer woodland	WD2	Extensive area of mature mixed woodland mainly of Beech, Sycamore and fine Scots Pine with an understory of Holly and Hawthorn
N17	Hedgerow	WL1	Mature hedgerows > 5m wide in places along field boundaries of Holly, Blackthorn, Hawthorn, Elm, Gorse, Bramble and ivy. Great cover for birds and wildlife
N18	Upland eroding stream	FW1	Small watercourse between Field 1 and Field 2, 0.5m wide (smaller than N13) with gravelly substrate, trickle flow. Also a tributary of the Carrickmines River
N19	Horticultural land	BC2	Former Kitchen garden divided by a network of paths. Includes fruit trees. Not currently managed
N20	Scattered Trees and Parkland	WD5	Along driveway from Gate to House includes some fine mature trees – notable Oak and Sycamore near gate and other broadleaves and conifers among amenity grassland area approaching house
N21	Buildings and artificial surfaces	BL3	Includes, driveways, surfaced paths, car park etc.

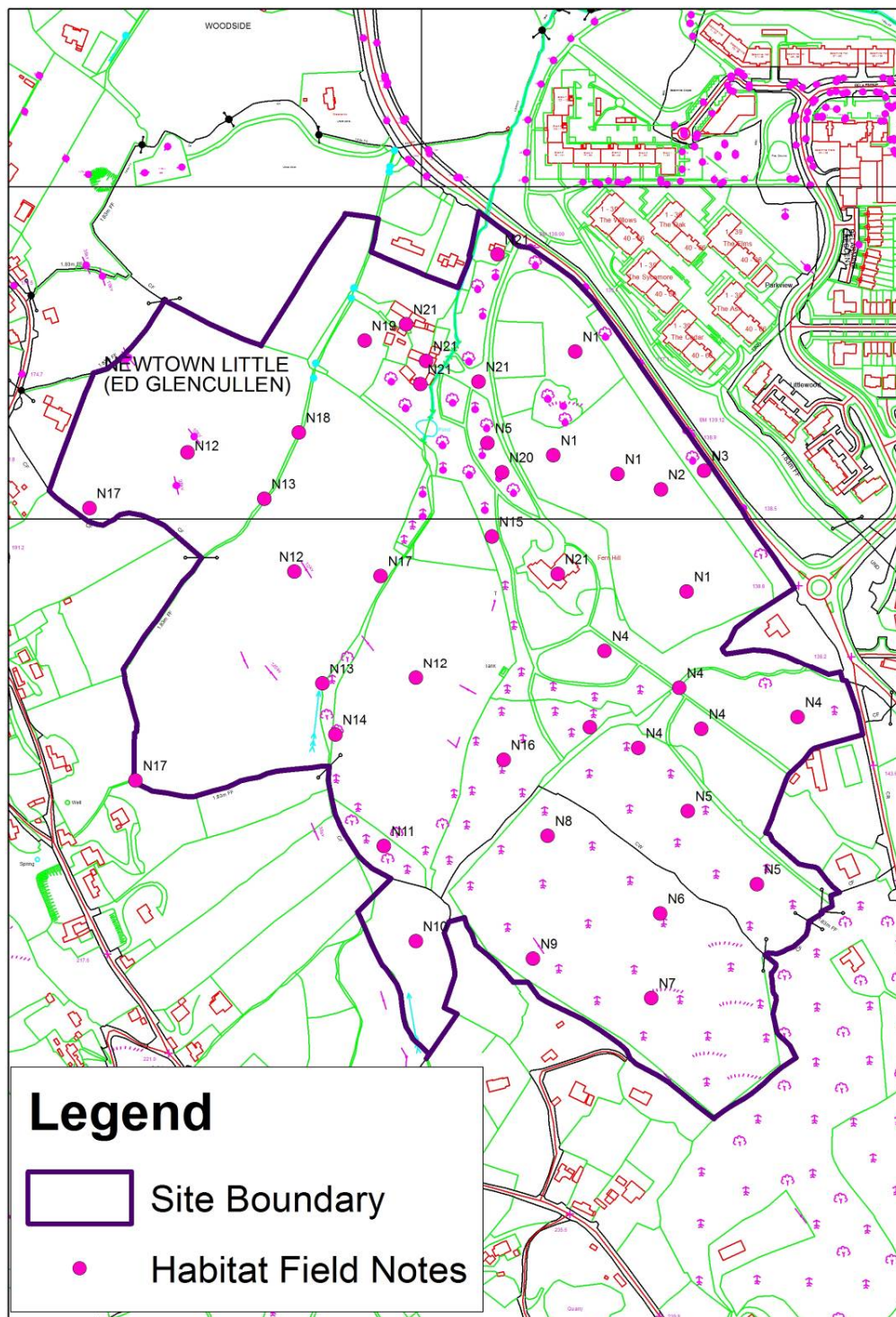


Figure 1. Habitat Survey 2016 – Field Note Locations.



## **APPENDIX 2. MAMMAL SURVEY**



# Fernhill Estate

## Mammal Survey Report

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**Report for:** Anne Murray  
Dun Laoghaire Rathdown County Council

**By:** Billy Flynn & Eanna Ni Lamhna  
Flynn Furney Environmental Consultants

**Date:** 23 June 2017



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## **1. INTRODUCTION**

### **1.1 This Survey Report**

The following report details the findings of a mammal survey carried out at Fernhill Estate by Flynn, Furney Environmental Consultants on behalf of Dun Laoghaire Rathdown County Council. The survey was carried out as part of a series of studies undertaken by the County Council. These will be used to inform a submission of a 'Part 8' Planning Application for the use of the site as a parkland for public amenity use. This present report focuses on the park as habitat for protected mammal species and their refugia. The report also examines the potential of the parkland area of the estate as such habitat. The report also addresses potential impacts that the use of the site as public amenity parkland might have on protected species. It should be noted that this survey examines terrestrial non-volant mammals and that bat species are the subject of other studies carried out here. The objectives of the survey are given below

The primary objectives of this study were to assess:

- i. Existing mammal habitats
- ii. Signs of current mammal activity
- iii. Location of any mammal refugia
- iv. Potential impacts of proposed management works on mammal populations

An overriding objective of this study was to assess the activity of local populations of mammal species protected by law. However, the authors also surveyed and recorded all other mammal activity signs within the area to establish presence/absence of species and activity levels within the study area. A further and key objective is to assess the estate for any habitats of ecological concern with regard to mammals and to maximise the protection of these habitat areas prior to any works and the subsequent opening of the park to visitors from the public.

### **1.2 Area under Survey**

The entire property of the Fernhill Estate was surveyed. This is some 80 hectares in total surface area. In addition to this, some survey work was carried out on private lands to the north, east and west of the estate. This was in a private housing estate, roadside areas and the boundaries of a golf course. The survey area is shown in Appendix A.

### **1.3 Protected / Designated Areas**

The area is not subject to any designation for the conservation of nature. The nearest designated sites are Wicklow Mountains SAC (Site Code 002122) and SPA (Site Code 004040) which lie approximately 4.5km to the southwest.

## 2. METHODS

Survey was carried out (during daylight hours) on the 2<sup>nd</sup>, 7<sup>th</sup>, 9<sup>th</sup>, 12<sup>th</sup> and 17<sup>th</sup> and 26<sup>th</sup> June. The survey involved direct observation of signs of mammalian activity which included prints, tracks, droppings, resting places, water access points and evidence of feeding. Badger (*Meles meles*) setts and squirrel (*Sciurus* spp) dreys were especially targeted by the survey. These being the refugia of protected species and sensitive to any changes in habitat, landuse or other development.

The survey was carried out by 2 no. ecologists walking over the entire site of works. All tangible signs of mammal activity were recorded and mapped. It should be noted that conditions were perfect for survey, there being much soft ground from recent rain (yielding good opportunities for finding prints) and bright sunlight and clear visibility for much of the survey period. However, a small area of the proposed works site had been cleared of vegetation and scrub prior to survey. Some mammal signs or habitat may thus have been removed. The placement of earth and spoil in an adjacent area may possibly have concealed other mammal signs.

In addition to the daylight surveys, a Swann trail camera with infra-red lenses (for night-time photography) was placed in 2 no. over a total of 2 no. days and 3 no. nights

### 3. RESULTS

#### 3.1 Badger Activity

It was noted that there was ample suitable habitat for badger activity. There is an abundance of suitable feeding and foraging habitat here. The signs that were found are detailed below.

It should be noted at the outset of this section of the reporting that the extent of deer activity here (see below) may conceal some other mammal signs by obliterating prints in softer ground. This said, it would be expected that prints would be found in obscure places (e.g. under vegetation over which deer would jump) as well as other signs such as scrapes. Badgers create shallow but distinctively-shaped scrapes. These are often obvious and easily found in grassland areas (close to field margins) and in deciduous woodland. Both of these habitat types are abundant at Fernhill Estate. Badgers also scrape on old wood such as fallen trees and on stones and stone walls. Again, these are found in many locations at Fernhill. Definitive signs of recent badger feeding were found at 1 no. location. These were to the northeast of the site (within the gardens) where the distinctive scrapes were recorded.

Badger hair is frequently found on barbed wire, especially at regular boundary crossing points. At Fernhill badger hair was found at 3 no. locations but none of these appeared to be recent (the hairs being weathered).

#### 3.2 Badger Setts

Badgers live in complex social groups. Each group will hold a territory. Within this territory there is typically a Main Sett. This will be the largest sett in the territory and have numerous entrances (sometimes up to 30 no. but usually 6-10 no.) with conspicuous spoil heaps made up of excavated materials. The main sett is always occupied as long as the group is active and intact. The main sett is used for breeding every year. Near and often physically connected to the main sett are usually one or more Annex Setts. These are typically in continuous use and may be used as maternity setts. Within the territory there are also Outlier Setts. These are usually smaller, single-entrance outliers being the most common and not physically connected to any other sett. They may be on the periphery of a territory but may also be found anywhere within it.

A number of badger setts were recorded. The following were found: 1 no main sett (5-entrance), an annex (2-entrance) to this main sett and 4 no. single-entrance outliers. All of these were disused. It is estimated that none of these had been in use by badgers within the last 2-3 years. The greater majority of these setts are located within lands dominated by bracken (*Pteridium aquilinum*) to the south-east of the site and in woodland areas close to this (to the north of the bracken-dominated area).

In addition to these, one of the single-entrance outliers was found toward the centre of the centre, close to a stream, south of the house.

### 3.3 Squirrel Activity

Grey Squirrel (*Sciurus carolinensis*) occurs at Fernhill. Activity of this species was recorded in numerous areas but mostly within the mixed broadleaved woodland area within a radius of around 0.5km of the house. Most activity was noted to the south and east of this area and always within woodland. Grey Squirrels were seen on all survey days. Signs of bark gnawing were noted on some younger trees. Gnawed pine cones were found in several locations.

Fewer signs of squirrel activity were noted toward the eastern and western site boundaries where less favourable habitat exists. Evidence of feeding activity (e.g. gnawed pine cones) were found in numerous locations.

No Red Squirrel (*Sciurus vulgaris*) were seen during survey. No evidence of Red Squirrel feeding (e.g. caches of nut shells or kernels) were found. It may be assumed that this species does not occur within the Fernhill Estate.

### 3.4 Dreys

No confirmed dreys were identified. However, timing of survey was suboptimal for drey location. Autumn/Winter allows easier survey of potential dreys. However there are numerous locations where old corvid nests may be being utilised as Grey Squirrel dreys. Further survey work in the correct season would be required to confirm drey location if so required.

### 3.5 Deer Activity

Deer activity was found throughout the site. Indeed, there were few areas where Deer prints and droppings were not found. Deer, usually fawns, were seen on almost all of the survey days. The Deer here are believed to be Sika (*Cervus nippon*) or Sika-Red Deer hybrids (*Cervus nippon x elaphus*). Although deer-fencing surrounds much of the site, this is of uneven build quality and maintenance. There are numerous gaps in this fencing, allowing ready access for Deer. Most of these are to the south and east of the site.

Deer hair was found on fencing and at paths throughout the site. Extensive signs of Deer browsing may be seen throughout the site. There are also many well-used deer paths within all areas of the site. There are also several areas where antler-rubbing has caused damage to tree-bark.

### 3.6 Stoats

No definitive signs of Stoats (*Mustela erminea Hibernica*) were found but several burrows and crevices suitable for stoats were found. Excellent habitat for the Stoat exists within the estate (i.e. semi-natural grassland, treelines, banks and stone walls. It is therefore likely that this animal occurs within the Fernhill Estate.

### 3.7 Hedgehogs

Much suitable habitat for Hedgehogs (*Erinaceus europaeus*) occurs within the site. This includes broadleaved woodland, It is likely therefore that there are numerous hedgehogs within the site and that they are breeding here. Scrapes on a fallen log indicating hedgehog activity were found to the west of the site within an area of Beech woodland.



### 3.8 Irish Hare

No signs of activity of the Irish Hare (*Lepus timidus Hibernicus*) were recorded within the site. However, further survey work would be required to adequately assess whether this species occurs within the site. Survey over autumn/winter would be beneficial.

### 3.9 Non-Protected Mammals

Rabbit (*Oryctolagus cuniculus*) activity was found in numerous locations. This included several active warrens. However, these tended to be small in extent (usually with 2-4 entrances). Rabbit droppings were found close to these.

Fox (*Vulpes vulpes*) activity was noted throughout the site in the form of paths, prints, odour, snagged hairs and droppings. 2 no. recently used dens (also known as earths) were also found. A single fox was recorded on the trail camera.

Evidence of feeding, droppings and burrows of the Brown Rat (*Rattus norvegicus*) were found in several locations.

Domestic/Feral Cats (*Felis catus*) and prints thereof were seen in several locations, particularly to the north-west of the site.

No definitive signs of other terrestrial mammals were found within the area under survey. However, it is likely that Wood Mouse (*Apodemus sylvaticus*) and Pygmy Shrew (*Sorex minutus*) occur widely within the site.

## 4. DISCUSSION

### 4.1 Badger Habitat, Setts and Activity

Badger activity occurs within the site and evidence suggests long-term use of the site by this species as well as individuals ranging widely within the site.

The setts within the site are not currently active. However, it was reported to the authors that the setts at Fernhill were active as recently as last year (*Pers Comm*<sup>1</sup>). The signs of badger activity suggest that active setts occur close to Fernhill. A resident of a neighbouring property reported an active (breeding) badger sett within these private grounds (*Pers Comm*<sup>2</sup>). However, a subsequent survey did not find any evidence of setts here nor likely habitat for same. The adjacent Golf Course, however, is almost certainly utilised by badgers and a definitive trail accessing this was found. The fact that the setts at Fernhill are within better habitat areas mean that these setts may become active at any time. Best practice guidelines require inactive setts to be protected as they are vital units within a badger territory.

### 4.2 Squirrel Activity and Dreys

While Grey Squirrel activity was locally high in certain areas of the estate (i.e. within c. 0.5km of the house), the range of this species appears to be quite limited within Fernhill. The grassland areas to the south and west of the site and the residential developments to the north have likely constrained the spread of this species. The apparently low numbers of Grey Squirrels in Fernhill may make a trapping and eradication initiative here feasible.

No signs of activity of Red Squirrels were found. While it may be assumed that this species does not occur at Fernhill, there is an abundance of suitable habitat within the estate and indeed in the wider area, especially to the south and southwest. This species has extended its range in recent years and it is likely that this site may become of significance for this species in the medium to long-term. A Red Squirrel reintroduction project may well be feasible here.

While no dreys of either species was found, further survey work at optimal time would be required to locate these.

### 4.3 Deer Activity

Deer occur widely in Fernhill Estate. The numbers and density here would have impacts on the vegetation here, in particular the regeneration of broadleaved woodland areas. Some non-native species may be significantly impacted upon by deer browsing also. The deer fencing on the site boundary is ineffective and there are several areas where deer have found weak points - gaps, low mesh or clearance of mesh over ground level. A limited cull of deer has been carried out at the estate over the last year (*Pers Comm*) but this has been suspended in recent months. Control and exclusion of deer would have long-term beneficial impacts on woodland regeneration.

### 4.4 Stoats

While no evidence of stoat activity was found, it is likely that this occurs widely within the site. However, further survey work would be required to confirm this.

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<sup>1</sup> Personal Communication (1) which is believed to be reliable as this was with a former resident of the estate.

<sup>2</sup> Personal Communication (2) with a resident of the adjacent estate.

#### 4.5 Other Species

Similarly to the Red Squirrel, the Pine Marten (*Martes martes*) range has expanded significantly in recent years and while no evidence of activity of this species was found at Fernhill, this site would offer much suitable habitat for same.

While it is likely that Hedgehogs occur widely within the site further survey work would be required to confirm this. Similarly, activity of the smaller and more cryptic mammals (Mice, Shrews etc.) would require some dedicated survey work to confirm their presence and activity levels here.

## 5. RECOMMENDATIONS

Dun Laoghaire Rathdown County Council proposes to carry out works to enhance visitor facilities at the Fernhill Estate. This is to include allowing vehicular access to part of the site, further paths and upgraded trails. A viewing area is also proposed to the south-east of the site.

The latter is proposed for an area where the only Badger main sett is located. It is recommended that this location be reconsidered. For example, an extensive area of gorse to the south of this contains no protected mammal refugia and would also be suitable, allowing as it does commanding views. However, the proposed route to this area should also be reconsidered. The indicative route given on the Draft Masterplan drawing (DRP 2315-02) may be altered to minimise disturbance to badgers. It is recommended that a site visit is carried out with local authority Parks Department staff and an Ecologist to preliminarily set out suitable location for the viewing area and the routes to same.

The opening of the park to the public will have potential impacts on badger activity and habitat. It is recommended that exclusions be placed on the access of walkers to certain areas and the exclusion of dogs from any of the areas where badger setts or activity have been located.

No evidence of any Red Squirrel activity or refugia was found. Therefore, none of the proposed enhancement works will impact on this species. However, much suitable habitat for this species exists within the site. This species has extended its range in recent years and it is likely that this site may become of significance for this species in the medium to long-term. It is recommended that the local authority consider a reintroduction. Again, exclusion of dogs from suitable habitat areas would be recommended in order to avoid disturbance to this species.

The eradication of Grey Squirrel from the site would have long-term beneficial impacts on the regeneration of woody vegetation. It would also make the success of any Red Squirrel reintroduction far more likely, given the lack of feeding competition from the Grey and lowered disease transmission risk. It is recommended that a more detailed survey of Grey populations are carried out in order to draw up plans for their trapping and eradication.

There is ample habitat for other smaller mammal species, including Stoat, Wood Mouse and Hedgehog. However, these species are more cryptic and some dedicated survey work (e.g. live-trapping, print-capture) is recommended to assess these populations. Habitat areas such as treelines, grasslands and woodland all offer ideal refuge and

Enhanced public access is part of the proposed Masterplan. The management of visitor access to areas of higher value must be considered as part of overall site management. There are extensive areas of semi-natural grassland in Fernhill Estate that may be quite unique to this county that are of high value to almost all of the species under survey. It is important to consider how visitor access and its attendant activities (e.g. dog walking, picnicking ) may impact upon such habitat areas.

Dog-walking in particular must be controlled on any site where native mammal species are known to occur. Control of dogs is recommended to the extent where dogs must be excluded from more sensitive areas and kept on leads in others. Safety considerations would include unleashed dogs being excluded from areas where deer may occur. Deer pursued by unleashed dogs may injure themselves on fencing or emerge onto adjoining roads, raising risks of road traffic collisions. The delineation of a fenced area where dogs may be exercised is recommended.

It is recommended that areas highlighted as important for protected mammal species are maintained within the Masterplan as not to be developed without consultation with ecologists. The purpose of this is to maintain areas for mammals that will not be subject to significant change.

It is recommended that any lighting system proposed at Fernhill Estate is devised in consultation with the local authority Biodiversity Officer and project ecologists. Lighting has potential to impact negatively on mammal activity on a range of species. Wildlife-friendly lighting (e.g. low-spill, smart lighting) would be recommended for much of the site, including treelines (mammal commuting routes), woodland edge and grassland areas (feeding and foraging areas).

Outside of the areas where protected mammals have been recorded, the maintenance of semi-natural habitats (e.g. species-rich grasslands, mature hedgerow) is important for the establishment or expansion of feeding/foraging areas for these species. Future management plans should prioritise this maintenance of existing habitats when considering potential site usage.

## **6. CONCLUSION**

There is evidence of mammal activity throughout the site. This includes badger activity such as feeding and foraging. A number of badger setts occur within the site which will require protection. The exclusion of damaging activities and disturbance is an overriding factor. There is grey squirrel activity within the site and likely to be several dreys here. No Red Squirrels are thought to occur. A long-term project to reintroduce the native red species should be considered. Deer activity occurs widely throughout the site and existing deer control measures are inadequate. Deer should be excluded from the estate in the medium to long-term.

Further work is recommended on establishing presence and populations of other mammal species including the native Irish Stoat which probably occurs here.

There is excellent habitat at Fernhill for a range of native mammal species. The maintenance of these suitable habitat types must be a priority for managers of the estate with future management plans reflecting this. Correct management regimes, including control of visitor access to sensitive areas and restriction on activity types such as dog-walking will be required. These will benefit not only the existing and potential mammal populations here but also the overall biodiversity of the site into the future.

**Appendix A.** Drawings of Findings

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## **Appendix B. Some Photographs of Site**

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## Appendix B. Some Photographs of Site

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Fig 1. Entrance to main sett to southeast of site.



Fig 2. Entrance to main sett showing some of spoil heap at front of photograph.



Fig 3. Disused main sett entrance partially blocked.



Fig 4. Entrance to annex sett, now overgrown.



Fig 5. Second entrance to annex sett, also overgrown.



Fig 6. The area in which main sett and annex are located is dominated by bracken, making locating of setts difficult.



Fig 7. Deer fencing to the east of site near the 'Broad Walk'



Fig 8. Badger hair on barbed wire to east of site.



Fig 9. Disused outlier sett (single-entrance) close to south-eastern boundary of site.





Fig 10. Gnawed pine cones within mixed woodland toward centre of site.



Fig 11. Mammal 'run' - rabbits and foxes - in semi-natural grassland toward front of site.



Fig 12. Mammal run, used by both deer and foxes toward north of site.



Fig 13. Deer run in woodland close to Fernhill House.



Fig 14. Disused fox den (or earth) toward south-eastern boundary of site.



Fig 15. Rabbit warren (active) close to Fernhill House.



Fig 16. There is an abundance of fallen and felled wood at Fernhill, providing abundant habitat for mammals such as hedgehogs and mice.



Fig 17. Fox den close to south-eastern boundary of site.



Fig 18. Deer run close to south-western boundary of site.



Fig 19. Damage to mature tree from deer antler rubbing.



Fig 20. Active rabbit warren toward south-western boundary of site.



Fig 21. Flattened wire of fencing on south-western boundary where deer are accessing site. This fencing is not suitable for deer exclusion.

