10. BIODIVERSITY

10.1 Introduction

10.1.1 The Nature of the Activity

OPENFIELD Ecological Services was commissioned to carry out this Biodiversity Impact Assessment by Declan Brassil & Co. Ltd. It is proposed to apply for permission to construct a student accommodation development within the existing curtilage of the UCD campus.

10.1.2 The Need for an Ecological Impact Assessment

Under the EIA Directive as well as best practice methodology from the EPA, the analysis of impacts to biodiversity is an essential component of the EIA process, and so is a required chapter in any EIAR.

Under Article 6(3) of the Habitats Directive an 'appropriate assessment' of projects must be carried out to determine if significant effects are likely to arise to the integrity of Natura 2000 sites. An Appropriate Assessment Screening Report has been prepared as a separate standalone report.

10.1.3 Biodiversity, EIA and 'Appropriate Assessment'

Biodiversity is a contraction of the words 'biological diversity' and describes the enormous variability in species, habitats and genes that exist on Earth. It provides food, building materials, fuel and clothing while maintaining clean air, water, soil fertility and the pollination of crops. A study by the Department of Environment, Heritage and Local Government placed the economic value of biodiversity to Ireland at €2.6 billion annually (Bullock et al., 2008) for these 'ecosystem services'.

All life therefore depends on biodiversity and its current global decline is a major challenge facing humanity. In 1992, at the Rio Earth Summit, this challenge was recognised by the international community through the Convention on Biological Diversity which has since been ratified by 193 countries, including Ireland. Its goal to significantly slow down the rate of biodiversity loss on Earth was echoed by the European Union, which set a target date of 2010 for halting this decline. This target has not been met and so a new target of 2020 has been set by EU leaders (DG Environment, 2010).

The main policy instruments for meeting this target have been the Birds Directive of 1979 and the Habitats Directive of 1992. These Directives require member states to designate areas of their territory that contain important bird populations in the case of the former; or a representative sample of important or endangered habitats and species in the case of the latter. These areas are known as Special Protection Areas (SPA) and Special Areas of Conservation (SAC) respectively. Collectively they form a network of sites across the European Union known as Natura 2000. Unlike traditional nature reserves or national parks, Natura 2000 sites are not 'fenced-off' from human activity and are frequently in private ownership. It is the responsibility of the competent national authority to ensure that 'good conservation status' exists for their SPAs and SACs and specifically that Article 6(3) of the Directive is met. Article 6(3) requires that an 'appropriate assessment' be carried out for these sites where projects, plans or proposals are likely to have an effect. In some cases this is obvious from the start, for instance where a road is to pass through a designated site. However, where this is not the case, a preliminary screening must first be carried out to determine whether or not a full assessment is required.

Since coming into being in the United States in 1969, EIA has increasing been developed as a tool for promoting sustainable development and is widely seen as a tool that has the potential to safeguard important ecological resources (Treweek, 1999).

10.2 Study Methodology

This assessment was carried out in accordance with the following methodologies and guidelines:

1. The 'Guidelines for Ecological Impact Assessment in the United Kingdom' by the Chartered Institute of Ecology and Environmental Management (IEEM, 2006).
2. 'Guidelines on the information to be contained in Environmental Impact Statements' by the Environmental Protection Agency (EPA, 2002).
3. Draft Guidelines on Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017)

10.2.1 Survey Methodology

A site visit was carried out on February 5th 2016 and again on August 8th 2017. The site was surveyed in accordance with the Heritage Council's Habitat Survey guidelines (Smith et al., 2010) and the 'Guidelines for Baseline Ecological Assessment' from the Institute of Environmental Assessment (IEA, 1995). Habitats were identified in accordance with Fossitt's 'Guide to Habitats in Ireland' (Fossitt, 2000). A species list for each habitat was compiled and target notes were made. Where relevant, targets notes and location information were taken with a Garmin GPS 60. Data were then uploaded to the ArcView 9.2 GIS software suite.

The species nomenclature for vascular plant conforms with 'The New Flora of the British Isles' (Stace, 2010). For bryophytes 'A Checklist and Census Catalogue of British and Irish Bryophytes' (Hill et al., 2008) is used for scientific names and Mosses and Liverworts of Britain and Ireland (Atherton et al. eds, 2010) for English names.

A dedicated bat survey was carried by Brian Keeley of Wildlife Surveys Ireland. This took place in May 2016 and so was within the optimal season for bat activity. While this report is presented in full as Appendix 10.A of this EIAR, the findings are incorporated into this chapter.

10.2.2 Scope of Site Survey

The site survey set out to determine what habitats and species are present on the site and these data are presented in Figure 10.2 as a habitat map.

A dedicated bat survey was carried out by Brian Keeley of Wildlife Surveys Ireland. This was done during the optimal survey period when bats are active.

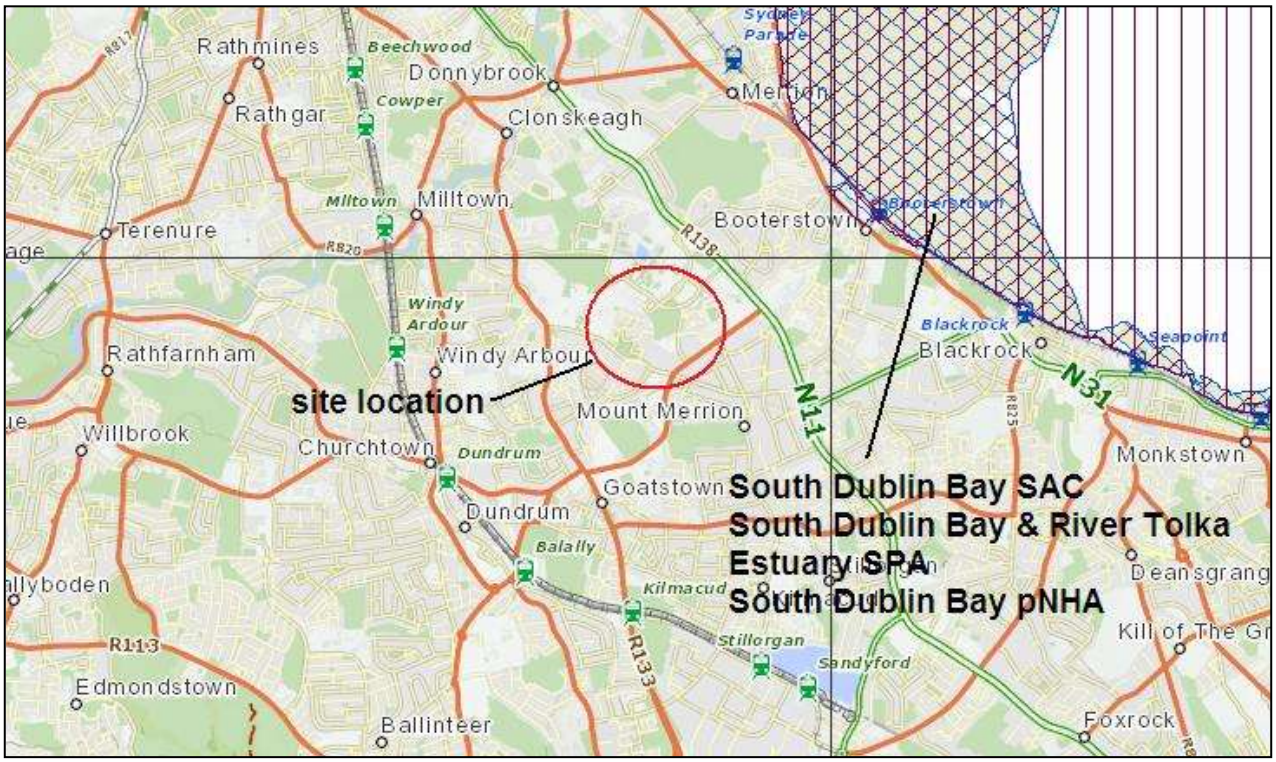
10.3 Existing Environment

10.3.1 Zone of Influence

Accepted methodologies suggest that for non-linear projects a radius of 2 km is an appropriate zone of influence (IEA, 1995). This area is shown in Figure 10.1.

The site is located to within the southern suburban zone of Dublin City, and within the campus of University College Dublin (UCD). It is an area with relatively high population density, with extensive residential developments and transport uses. It lies approximately 1.5km to the west of Booterstown Marsh and, slightly beyond, the shores of Dublin Bay.

Figure 10.1 **Approximate 2km radius of the UCD site showing the location of the proposed development.** Boundaries of protected areas include pNHA (blue), SAC (red diagonal), and SPA (red vertical) (from www.npws.ie



10.3.2 Stakeholder and Consultees

The Development Applications Unit (DAU) of the Department of the Arts, Heritage and the Gaeltacht was contacted for nature conservation observations. A response to this was received on April 14th 2016 (reference GPre00071/2016). In it they state:

> *"Badgers are known to have occurred in the recent past on this section of the Belfield campus where the proposed student accommodation is to be located, and bats have frequently been observed in this area. A survey for badger setts and other evidence of badgers' presence in the vicinity of the proposed development, as well as comprehensive bat surveys, should therefore be carried out and the results of these surveys included in the EIS. Measures to mitigate the impact of the impact of the proposed*

development on badgers and bat species should also be included in the EIS. The possible impact of the proposed development on breeding birds should also be assessed."

The correspondence from the DAU is presented in full as Appendix 10.B of this chapter.

10.3.3 Existing Legislation, Plans and Proposals

10.3.3.1 Convention on Biological Diversity (CBD)

The protection of biodiversity is enshrined in the CBD to which Ireland is a signatory. As part of its commitment to this international treaty Ireland, as part of a wider European Union initiative, is committed to the halt in loss of biodiversity by the year 2010. The National Biodiversity Plan (Dúchas, 2002), published in 2002, states that "each local authority [is] to prepare a local biodiversity action plan".

10.3.3.2 ''Treasuring our Wildlife' – a Biodiversity Action Plan for Dún Laoghaire Rathdown County Council 2009 - 2013

This plan was adopted in 2009 and aims "to create a vibrant and progressive environment in which to live and work, where the county's natural and built environment is valued, promoted and protected, both for people and wildlife. Its objectives include Gathering Information; Managing the Biodiversity Resource; Education and Awareness; and Cooperation with stakeholders.

While there are no actions that are directly relevant to this proposal it does stress the importance of maintaining biodiversity areas outside of those sites designated at a national or European level.

10.3.3.3 Dún Laoghaire Rathdown County Development Plan 2010 – 2016 (DLRCC, 2010)

Chapter 9 of the plan focuses on Landscape, Heritage and Biodiversity. Section 9.3.1 states that:

'It is Council policy to protect and conserve the environment including, in particular, the architectural, archaeological and natural heritage of the County and in particular to conserve, manage and protect nationally important and EU designated sites including Special Protection Areas, proposed Natural Heritage Areas.'

It continues that implementing this policy will involve (inter alia) maintaining trees, hedgerows and woodlands. Meanwhile Policy LHB9 states:

"It is Council policy to protect and promote the conservation of Biodiversity in areas of natural heritage importance outside designated areas and to ensure that features of biodiversity importance including species protected under the Wildlife Acts 1976 and 2000, the Birds Directive 1979, and the Habitats Directive 1992 are adequately protected. Ecological assessments will be carried out for all developments in areas that support, or have potential to support, features of biodiversity importance or protected species and appropriate mitigation/avoidance measures will be implemented."

In this way the plan stresses that the impact to biodiversity from development should be minimised and that 'important' wildlife habitat areas and corridors be maintained.

While Policy LHB11 states: "It is Council policy that trees, groups of trees or woodlands particularly where they form a significant feature in the landscape or, are important in setting the character of ecology of an area shall be preserved wherever possible."

10.3.4 Existing Designations within the Zone of Influence

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Special Protection Areas (SPA – Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. Proposed NHAs (pNHA) are areas that have yet to gain full legislative protection. They are generally protected through the relevant County Development Plan. There is no system in Ireland for the designation of sites at a local, or county level. No such sites have been listed in the Dun Laoghaire Rathdown County Development Plan.

Within 2km of the subject site there is one area which falls under a number of designations for biodiversity conservation: Dublin Bay. This area falls within the South Dublin Bay SAC (site code: 0210) and pNHA (site code: 0210) and the South Dublin Bay & River Tolka Estuary SPA (site code: 4024). Dublin Bay is designated as a wetland of international importance under the Ramsar Convention (site number 832) and was recently designated as a UNESCO Biosphere Reserve. There are no National Nature Reserves in this area. While 2km is an arbitrary radius, and impacts can occur at distances greater than this, these are considered to be the only areas to fall within the zone of influence of this project.

10.3.5 Scoping of the Study/Literature Review

Information regarding the site exists in a number of forms: the NPWS database and published reports/literature. Data on water quality is available from the EPA. No known previous ecology studies of the subject lands were available for this report.

10.3.5.1 NPWS Database

The NPWS maintains a database that indicates the recorded presence of protected species within 10 km squares. This is indicative only and is not intended to be either comprehensive or up-to-date. The UCD site is located within the square O12 and one animal and five protected species of vascular plant are recorded. Of these records only the Bog Orchid and the Sika Deer are current. The Bog Orchid is known to grow in the Glenasmole Reservoir in the Dublin Mountains.

Table 10.1 Known Records of Protected Species from the O12 Square (from www.npws.ie)

Species	Habitat[1] [2]	Current status
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	Pre-1970
Hammarbya paludosa Bog Orchid	Wet spongy bogs, usually in tufts of *Sphagnum* moss	Current
Misopates orontium Lesser Snapdragon	Arable fields	Not recorded
Pseudorchis albida Small-white Orchid	Upland pastures and heaths	Pre-1986
Sanguisorba officinalis Great burnet	Lakes shores and dry banks	Pre-1970
Cervus nippon Sika Deer	Coniferous woodland and adjacent heaths	Current

10.3.5.2 Ecological Water Quality

According to the www.wfdireland.net web site the lands at UCD are not within the catchment of any significant water course. The EPA shows a number of small water courses that enter Dublin Bay in this vicinity but none flows within the UCD campus. It can be assumed therefore that water falling in this area enters Dublin Bay either via these streams directly, or indirectly via groundwater.

There are no EPA river water monitoring stations in this catchment. Coastal water in Dublin Bay is monitored and has most recently been assessed as 'unpolluted'. Under the Water Framework Directive (WFD) reporting period 2010-2012 this status is 'good'.

10.3.6 Flora

The site is a part of the existing UCD campus and as such the habitat types reflect the level of use to which the land is already put. This is mostly **buildings and artificial surfaces – BL3** which includes car parking areas, roads and a small number of older buildings. These are accompanied by a number of areas of **amenity grassland – GA2**, some of which are used as playing fields but there are also smaller areas of road verges or

[1] Parnell et al., 2012

[2] Hayden & Harrington, 2001

spaces maintained for ornamental purposes. Within these there are a number of mature trees, of varying species, and these are of landscape value as well as providing some resources for wildlife. Within an area of artificial surfaces, used as a storage yard for the landscaping contractors, there is a stand of Japanese Knotweed *Fallopia japonica*. This is listed as an alien invasive species under schedule 3 of SI No.477 of 2011. This is one of a number of stands known to be present within the UCD campus (although the only one within the development site boundary). The existing landscaping contractor at UCD (SAP) has identified the locations of all stands of alien invasive species on this site and have prepared a management plan for their eradication. This includes initial stem injection of the Japanese Knotweed stand within the subject site boundary in August 2017. In advance of any further site works in this location, a 10m buffer zone has been fenced off to prevent further disturbance. Further mitigation has been identified in the plan, including annual, repeat spraying for five years, and two years additional monitoring. This plan is included as an addendum to this report.

A line of native **hedgerow – WL1** bisects the playing fields and this is a remnant of agricultural land. It is composed of Brambles *Rubus fruticosus agg.*, Elder *Sambucus nigra*, Ivy *Hedera helix* and occasional Hawthorn *Crataegus monogyna*. Although composed of native species, it is isolated, with no tall or very old trees and relatively low diversity and so can be considered to be of 'lower significance' (Foulkes et. al, 2013). Other hedgerows are of horticultural origin or consist of lines of younger trees, with little wildlife value.

Bands of **broadleaved woodland – WD2** may be of considerable age as they are noted on historic maps from the OSI. Species composition is variable but includes Lime *Tilia sp.*, Beech *Fagus sylvatica*, Ash *Fraxinus excelsior*, Holly *Ilex aquifolium*, Sycamore *Acer pseudoplatanus,* Scot's Pine *Pinus sylvestris* and Yew *Taxus baccata*. There is some regeneration of Ash. While these woodlands are highly modified they are of significance given the urban character of the locality. In two of these areas there runs a small **drainage ditch – FW4**.

Patches of **immature woodland – WS2** are areas recently planted with mostly sapling trees and where extensive earthworks have been undertaken.

Figure 10.2 Map of Existing Habitats on the UCD Site

10.3.7 Fauna

The presence of various species is deduced from the existence of suitable habitat. Incidental sightings on the day were also recorded, as were proxy signs such as tracks, trails, droppings and burrows.

10.3.7.1 Mammals

The site presents few resources for protected mammals principally due to the lack of semi-natural habitat. Table 10.2 lists those mammals that are of conservation value.

Table 10.2: Protected mammals in Ireland. Cells are greyed where no record exists from this 2km square (O12Z) from the National Biodiversity Date Centre (www.biodiversityireland.ie). This does not necessarily mean the species is absent.

Species	Level of Protection	Habitat
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands
Lesser horseshoe bat *Rhinolophus hipposideros*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Disused, undisturbed old buildings, caves and mines, west of Ireland only
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats
Natterer's bat *Myotis nattereri*		Woodland
Brown long-eared bat *Plecotus auritus*		Woodland
Leisler's bat *Nyctalus leisleri*		Woodlands and buildings
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland
Daubenton's bat *Myotis daubentonii*		Woodlands and bridges associated with open water
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats
Pine Marten *Martes martes*		Broad-leaved and coniferous forest

Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands
Red squirrel *Sciurus vulgaris*		Woodlands
Irish stoat *Mustela erminea hibernica*		Wide range of habitats
Badger *Meles meles*		Farmland, woodland and urban areas
Red deer *Cervus elaphus*		Woodland and open moorland
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths

Beyond this list it is likely that ubiquitous species that have adapted to urban and/or disturbed environments such as the Fox *Vulpes Vulpes,* Brown rat *Rattus norvegicus*, House mouse Mus *domesticus* and Wood mouse *Apodemus sylvaticus* are present.

No direct evidence of any mammal was recorded. The woodlands are suitable for Red Squirrel, and provide habitat for the population which may be increasing again in Dublin. There is no record yet however of this animal from the woods at UCD. There are no records of deer or Pine Marten using these lands.

No evidence of Badger activity was found in the form of sett entrances, snuffle holes, trails, scat, hair etc. While the habitat is suitable there is no record of the species from this 2km square from the NBDC. Parts of the UCD campus stretch into other 2km squares. During the bat survey, a Badger was seen north of Roebuck Road, within the UCD campus but well outside the current site boundary.

A dedicated bat survey was carried out for this study by Brian Keeley and this took place during the appropriate seasons. Field study was carried out in May and July 2016. This report is presented but its findings are included here. All species of bat found in Ireland are protected by law. Three species were recorded: Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. Bat roosts were recorded at the former chapel, where approximately 51 Leisler's Bats were counted, and an individual Leisler's roost from a tree near the NOVA centre (outside the subject site boundary). Roebuck chapel is therefore considered to be a maternity roost.

10.3.7.2 Birds

February is outside the season for breeding bird survey. A number of direct sightings were made during the survey including: Blackbird *Turdus merula,* Blue tit *Parus caeruleus*, Jackdaw C. *monedula* Magpie *Pica pica*, Great tit P. *major* and Song Thrush T. *philomelos*. All of these species are on BirdWatch Ireland's green list of birds of conservation concern in Ireland (Colhoune & Cummins, 2013) and so are of low conservation concern.

A dedicated bird survey was carried out on August 8th 2017. While August is sub-optimal for breeding bird activity it remains within the breeding season (albeit many birds will have ceased at this time). It was therefore assumed that all birds observed were breeding on the site. Swallow *Hirundo rustica* were feeding across the open areas of amenity grassland. However, no evidence of breeding was noted from buildings within the site boundary.

Table 10.3: Birds recorded from August 2017 survey and their national status (Colhoun & Cummins, 2013)

Species		Status	CBS code
Columba palumbus	Wood pigeon	Green	WP
Accipiter nisus	Sparrowhawk	Green	SH
Carduelis carduelis	Goldfinch	Green	GO
Columba livia	Feral Pigeon	Green	FP
Corvus corone	Hooded crow	Green	HC
Corvus frugilegus	Rook	Green	RO
Corvus monedula	Jackdaw	Green	JD
Erithacus rubecula	Robin	Green	R.
Parus caeruleus	Blue tit	Green	BT
Pica pica	Magpie	Green	MG
Prunella modularis	Dunnock	Green	D.
Pyrrhula pyrrhula	Bullfinch	Green	BF
Sturnus vulgaris	Starling	Amber	SG
Troglodytes troglodytes	Wren	Green	WR
Turdus merula	Blackbird	Green	B.

Figure 10.3: Distribution of breeding birds

10.3.7.3 Amphibians and Reptiles

February is within the suitable period for amphibian survey although suitable ponds or wetlands are not available for spawning Common Frog *Rana temporaria* or Smooth Newt *Lissotriton vulgaris*. The Viviparous Lizard *Lacerta vivipara* is present in a wide range of habitats. These species are considered common and widespread and are both assessed as 'least concern' in the red data book (King et al., 2011).

10.3.7.4 Fish

The drainage ditch on the site (Figure 10.2) is of minimal value for fish as it is culverted at either end, presenting a significant barrier for these species. This water course is not connected to any larger river considered to be of salmonid value.

10.3.7.5 Invertebrates

A large number of insect species are likely to be present on the site and even highly modified habitats can harbour diverse insect life. Protected invertebrate species in Ireland are confined to wetland and freshwater habitats and so will not be present on the site.

The site is outside the range of the Marsh *Fritillary Euphydryas aurinia* butterfly, Ireland's only protected species of insect.

10.3.8 Summary

Subsequent to the site survey, consultation and a literature review, the subject lands at UCD were found to contain no records, or suitable habitat, for rare or protected plant species as listed in the Flora Protection Order 2015 or Red Data Lists (Curtis & McGough, 1988). There are no species which are listed as alien invasive[1].

Three bat species were active from the site while a significant maternity roost of Leisler's Bat is located in the Roebuck chapel.

There are no Badger setts or indications of Badger activity although they are present in the vicinity. Woodland areas are likely to be home to some of the smaller protected mammals including Irish stoat, Pygmy shrew and Hedgehog. These areas provide nesting habitat for a range of common garden or countryside birds.

There are no habitats for breeding amphibians, while the water course is of minimal fisheries habitat.

10.3.9 Determination of Current Value

Appendix 3 of the NRA guidelines (NRA, 2009) outlines a 'site evaluation scheme' that is designed to assign value to ecological features.

Table 10.3 lists the habitats that were recorded and their associated value.

[1] Listed on Schedule 3 of Statutory Instrument No. 477 of 2011

Table 10.3 Valuation of habits with reference to Appendix 3 of the NRA guidance.

Habitat	Rating	Criteria
Amenity Grassland – GA2 Horticultural hedgerow – WL1 Buildings & artificial surfaces – BL3 Immature woodland – WD2	Negligible value	Highly modified value with low species diversity and low wildlife value
Native Hedgerow – WL1 Drainage ditch – FW4	Local Importance (lower value)	Sites containing some semi-natural habitat or locally important for wildlife.
Broadleaved woodland – WD2	Local Importance (higher value)	Sites containing semi-natural habitat types with high biodiversity in a local context

10.3.10 Further Study/Constraints

February is a suboptimal season for general habitat or botanical surveys. For this reason, the species list presented must be seen as incomplete. Nevertheless, all habitats were identifiable so that a full evaluation can take place. February is suitable for surveying mammals and breeding amphibians. August is within the bird breeding season but is considered sub-optimal – for this reason, all birds noted were assumed to be breeding. The bat survey meanwhile took place in May and July, with the optimal time for this type of study.

10.4 Characteristics of the Operation

The subject proposal is for the construction, and subsequent occupation, of student accommodation on the site of about 12.95 hectares.

The proposed layout is shown in Figure 10.3.

The construction phase will see clearance of areas subject to building works. This will include earth works and loss of artificial surfaces in areas which are currently playing fields or car parks.

Areas of broadleaved woodland, as well as selected mature trees are to be retained. A tree survey has been carried out and some trees are to be removed due to their condition. It is calculated that 156 such trees are to be removed (see Appendix 10.D).

New infrastructure is to be installed including surface water attenuation and connection to the mains sewer network.

Figure 10.3 Proposed Layout of Student Accommodation Figure to be updated

Figure 10.4 Drawing Showing Trees, Buildings and Vegetation to be Removed

10.5 Impact Assessment

10.5.1 Operation Phase

10.5.1.1 Habitat Loss

During the operation phase, there will be no on-going loss of habitats. Large trees to be conserved are unlikely to require on-going protection as they are already quite mature. The loss of trees and woodland areas (to facilitate the new entrance) will result in a loss of habitat for nesting birds and invertebrates). The bird survey showed that a number of species are nesting in this area. However, these are all common species (specifically, Blackbird, Dunnock, Magpie and Wood Pigeon) and the loss of habitat will not affect their overall population (nationally or locally). New landscaping is likely to provide additional habitat for these species.

10.5.1.2 Habitat/species disturbance

Activities associated with disturbance include human activity, noise and artificial light. The site and surrounds are already subject to significant human disturbance and noise while features within the project footprint are not sensitive to further activity of this nature.

Artificial lighting can act as an attractive or a repellent force, depending upon the species. High conservation value species such as bats can be very sensitive but the degree of disturbance is dependent upon the species present. According to Bat Conservation Ireland the most sensitive are the Brown Long-eared Bat, Whiskered Bat, Natterer's Bat, Daubenton's Bat and the Lesser Horseshoe Bat. None of these species was recorded from the bat survey.

While Badgers are present within the wider UCD campus no evidence of their presence within the site boundary was recorded. There are no Badger setts within this zone. While Badgers may forage in this area from time to time they will be confined to areas of woodland. The amenity grassland is not considered suitable due to the levels of disturbance from people. There will be no loss of foraging areas which could be considered likely to result in long term effects to the local Badger population.

10.5.1.3 Impact to Water Quality

There are attenuation measures in place under the Roebuck Residences Phases 1 and 2 car parks. In other areas, the surface water enters local drains or flows to open areas where it percolates to soil. This development will be accompanied by a new surface water drainage system which will be entirely separate from the foul network. In accordance with SUDS principles will include attenuation storage for a 1 in 100 year storm event while outfall will be flow limited, before discharging to the lake in the centre of the UDC campus. This ultimately discharges to the Elm Park Stream and so is separate from the foul sewerage system. Class I oil/grit interceptors will ensure pollutants do not enter the wider environment while a range of SUDS measures are also employed to ensure compliance with the Great Dublin Drainage Study.

Foul effluent from the proposed development will be sent to the municipal treatment plant at Ringsend. Emissions from the plant are currently not in compliance with the Urban Wastewater Treatment Directive. Irish Water, the authority in charge of the wastewater treatment network, has prioritised the enhancement of the Ringsend plant in its Proposed Capital Investment Programme 2014-2016. Irish Water is currently finalising proposals to increase the capacity of the plant from 1.64 million PE (population equivalent) to 2.15 million PE. This being done on a phased basis with some elements nearing completion, however full compliance is not anticipated until 2021.

10.5.1.5 Dust/Air emissions

There are no sources of air emissions from this development which could affect ecology

10.5.1.7` Abstraction

This development will increase demand for water, which originates from reservoirs in the Poulaphouca Reservoir in County Wicklow. There is no evidence that abstraction is negatively affecting important features in this area (it is designated as a Special Protection Area for its population of Greylag Geese).

10.5.1.8 Landscaping

Post-construction the site is to be landscaped with a range of native and non-native (but no invasive) species. This will include the planting of 700 new trees. In time, therefore it is predicted that this will more than offset the loss of trees from the construction phase. As part of this phase the developer has committed to the installation of 9 nesting boxes (each with 3 nest holes) for Swifts, a threatened bird. The number, location and installation of these were discussed with the Swift Conservation Ireland group (www.swiftconservation.ie) . The proposed location of these nesting boxes is shown below. They are on vertical surfaces with a 5m ground clearance.

Figure 10.5 – Proposed locations of swift nest boxes shown in blue

10.5.2 Construction Phase

10.5.2.1 Habitat Loss

There will be a loss of lower significance native hedgerow, horticultural hedges, amenity grassland and artificial surfaces. It is estimated that approximately 317 trees are to be removed as part of this project. These are a combination of Ash, Horse Chestnut, Eucalyptus, Willow and Sycamore, the majority of which have been identified in the tree report as 'young' or 'early-mature' (Category B, C or U). No Category A trees ('trees of high quality/value with a minimum 40years life expectancy) are to be removed. The loss of these trees from an ecological perspective is considered minor negative.

Areas of woodland are not to be significantly reduced in size as a result of this project although individual trees may be felled due to their condition. A section will also be removed to allow for a new entrance on Foster's Avenue. Additional area to the south-west and north-east are to be removed also. As noted above this will result in the loss of habitat for some common breeding birds. The removal of trees or other vegetation could result in directly mortality to birds and their young however this depends upon the timing of works. All birds' nests and eggs are protected under the Wildlife Act while the removal of vegetation between the months of March and August is restricted. As such, while these areas will be affected in the short term, in the long term the integrity of these small woods will not be diminished. The ecological impact of this loss of habitat is considered to be minor negative.

10.5.2.2 Habitat Disturbance

The storage of materials or the movement of machinery can result in soil compaction, which can in turn damage the roots zones of trees, leading to poor growth or disease. Without mitigation, this could affect many of the tall trees within this site.

Works to the Roebuck chapel will result in the loss of a significant maternity roost of Leisler's Bat. This work can only proceed under licence from the National Parks and Wildlife Service. In order to comply with licence conditions suitable replacement roost conditions must be provided. The developer, in consultation with the bat specialist and NPWS ranger for the area, has committed to providing this facility within the nearby Roebuck Castle, 60m from the existing roost, and the Gate Lodge, 125m from the roost. These provide suitable available space and additional works will be needed to provide entrance access and a degree of heating to meet the bats' requirements. At the time of application these details have been submitted to the NPWS as part of a derogation licence application.

The smaller roost, which was located in a tree near the NOVA centre will not be affected as trees in this area are to remain in place.

10.5.2.3 Pollution

There are no significant water courses in the catchment of the site and run off enters small streams before discharging to the Irish Sea. Best practice site management will ensure that toxic substances such as oils are stored in bunded areas while concrete is not poured during wet weather. Significant effects to fish life or aquatic habitats are unlikely to occur. A Construction Management Plan has been prepared and is included as an addendum to this report. This addresses how silt will be managed through silt traps, prior to the discharge of run-off water to the artificial pond in UCD. It has been prepared in accordance with guidance from Inland

Fisheries Ireland (2016). With the measures outlined in the CMP fully implemented, significant negative effects to surface water quality during construction are not expected.

10.5.2.4 *Japanese Knotweed*

An invasive species management plan has been prepared by SAP. Initial stem injection of the stand of Japanese Knotweed has taken place and a cordon established. This cordon will remain in place for the duration of work. Annual stem injection has been scheduled in the plan for a further five years, with monitoring inspections thereafter for two years.

10.5.3 Cumulative Impacts

Certain impacts in relation to biodiversity are particularly susceptible to cumulative effects. For instance, water quality can experience large-scale deterioration as a result of numerous piecemeal projects. This project is likely to contribute to cumulative improvements to water quality across Dublin in conjunction with the Greater Dublin Drainage programme (see http://www.greaterdublindrainage.com/). This has been in effect since 2005 in promoting the integration of Sustainable Drainage Systems (SUDS) in new developments. While it will also contribute to the loading at the Ringsend wastewater treatment plant, there is no evidence that this is resulting in negative ecological effects.

In urban areas, an increase in artificial light may cause impacts but there is little direct evidence for this. May species continue to inhabit cities despite disturbance effects when habitat is available.

Cumulative effects can occur from small losses of habitat, e.g. hedgerows. This can be offset to a degree by new landscaping planting. This project will see new trees and landscaping which will enhance local wildlife value.

10.5.4 Impacts to Areas Designated for Nature Conservation

There are pathways from the site to areas designated for nature conservation in Dublin Bay, via both surface water and foul wastewater. A separate Screening Report for Appropriate Assessment has been prepared which specifically address potential effects to sites within the Natura 2000 network. It has concluded that effects to these areas are not likely to occur.

10.5.5 Impacts

10.5.5.1 The nature of the impacts can be summarised in a table as follows.

Table 10.4 The Nature of Predicted Impacts

Impact	Direct/ Indirect	Cumulative	Duration[2]	Reversible?	Positive/ Negative
Habitat loss (operation phase)	Direct	Yes	Permanent	No	Negative
Habitat disturbance (operation phase)	Direct	Yes	Permanent	Yes	Negative
Impact to water quality – surface water	Direct	Yes	Permanent	Yes	Positive
Impact to water quality – wastewater	Direct	Yes	Permanent	Yes	Negative
Air Emission	None	N/A	N/A	N/A	Neutral
Abstraction	None	N/A	N/A	N/A	Neutral
Landscaping	Direct	Yes	Permanent	Yes	Positive
Habitat Loss (Construction phase)	Direct	Yes	Temporary	Yes	Negative
Habitat disturbance (Construction phase)	Indirect	No	Permanent	Yes	Negative
Pollution to surface water (Construction phase)	None	N/A	N/A	N/A	N/A
Japanese Knotweed	Direct	Yes	Permanent	Yes	Negative
Cumulative impacts	Lighting/ Surface water	-	N/A	N/A	Negative Positive
Impacts to designated sites	None	No	N/A	N/A	Neutral

10.5.5.2 Scale and Likelihood of Predicted Impacts in the Absence of Mitigation

Impacts are quantified where possible, both in absolute terms and as an impact of the whole resource.

[2] Temporary: up to 1 year; Short-term: 1-7 years; Medium-term: 7-15 years; Long-term: 15-60 years; Permanent: >60 years (NRA, 2006)

Table 10.5 Quantification and Probability of Predicted Impacts

Impact	Magnitude	As proportion of resource	Likelihood
Habitat loss (operation phase)	native hedgerow 156 individual trees Woodland	100% Number of trees estimated at 156 @8.5% (total area of woodland in this area estimated at 14,300m^2	Certain
Habitat disturbance (operation phase)	Will affects bats	Significant roost	Certain
Impact to water quality – surface water	Not possible to quantify	-	Certain
Impact to water quality – wastewater	None	N/A	N/A
Dust/Air emissions	None	-	Likely
Abstraction	None	-	N/A
Landscaping	670 new trees are to be planted	-	Certain
Habitat loss (Construction phase)	156 trees ~1,200m^2 of woodland ~120m of 'lower significance'	As above	Certain
Habitat disturbance (Construction phase)	Could affect remaining trees to be conserved	100%	Possible
Pollution to surface water (Construction phase)	None	N/A	N/A
Japanese Knotweed	One existing stand which has had initial treatment	N/A	Possible
Cumulative impacts	Not possible to quantify	-	Possible
Impacts to designated sites	None	N/A	N/A

10.5.5.4 Assessment of Impact Significance

Appendix 4 of the NRA guidelines (NRA, 2006) provides guidance on assessing impact significance. This is done by combining the magnitude of the impact (from sections 3.2 and 3.3) with the value of the ecological resource as assessed in section 2.6. This table shows the impacts prior to mitigation.

Impact	Significance
Habitat loss (operation phase)	Minor negative – permanent impact to a small areas of lower value habitat
Habitat disturbance (operation phase)	Moderate negative – impacts to population of a protected species (bats)
Impact to water quality – surface water	Minor positive
Impact to water quality – wastewater	Neutral – not significant
Dust/Air emission	Neutral – no impacts
Abstraction	Neutral – no impacts
Habitat Loss (Construction phase)	Minor negative – temporary impact on a small portion of locally important habitat. Over time this will be off set and residual impact is likely to be minor positive.
Habitat Disturbance (Construction phase)	Moderate negative – permanent impact upon a locally important habitat
Pollution to surface water (Construction phase)	Neutral – not significant
Japanese Knotweed	Moderate negative
Cumulative impacts	Neutral – not significant
Impacts to designated sites	Neutral – no impacts

Overall there are neutral, minor negative and two moderate negative impacts that may arise as a consequence of this project. The installation of Swift nest boxes will result in a positive impact for these threated birds.

10.6 Remedial and Mitigation Measures

Mitigation is required where significant, negative impacts are likely to occur as a result of this project. The threshold for significance is not often clearly stated however and this frequently leads to impacts being assessed as 'not significant' in order to avoid imposing mitigation measures. For the purposes of this study an impact is considered to be significant if it is moderate negative or greater. By this criteria, there are two significant effects that may arise.

10.6.1 Impact Mitigation

Two significant negative effects are likely to occur as a result of this proposal. Mitigation is therefore required to address the potential impacts on bats from lighting on the site as well as to trees to be retained.

Mitigation Measure 1

A replacement roost location is to be provided in Roebuck Castle and the Gate Lodge. This is to be done under the supervision of a bat ecologist and in accordance with a derogation licence from the National Parks and Wildlife Service. In addition, felling of mature trees and the disturbance of the existing roost is to be done under supervision of a qualified bat ecologist.

Mitigation Measure 2

To avoid damage to trees the developer will follow the guidance from the National Roads Authority in establishing root protection areas (RPA) along hedgerows to be retained.

The NRA gives the following equation for calculating the root protection area (RPA) (NRA, unknown year):

$$RPA(m2) = \pi(\text{stem diameter mm } 12)/1{,}000) \text{ x}2$$

The RPA gives the area around which there should be no disturbance or compaction of soil. This will be calculated for the largest tree within each hedgerow. Prior to construction this area will be clearly labelled 'sensitive ecological zone', fenced off with durable materials and instruction given to construction personnel not to disturb this buffer zone. As a rule of thumb this buffer zone should extend at least to the canopy of the trees concerned.

Mitigation Measure 3

The removal of vegetation, including tree felling, should not occur during the nesting season. Where this cannot be avoided, removal can only take place where it has been demonstrated that bird nesting is not occurring. The disturbance of birds' nests can only take place under licence from the NPWS. Vegetation must be inspected by a suitably qualified ecologist and, if no nesting is recorded, vegetation can be removed within 48 hours.

Mitigation Measure 4

The invasive species management plan will be implemented in full. This will ensure that Japanese Knotweed is eradicated from the site.

10.7 Residual Impacts of the Operation

With the implementation of mitigation measures residual significant impacts to biodiversity are not expected to arise. There will be minor negative effects to bats as their current roost location is destroyed. This is to be done under supervision of a bat ecologist to ensure no direct mortality of bats occurs.

10.8 Monitoring

Monitoring is required where there may be significant residual impacts despite implementation of mitigation measures. No significant residual impacts are predicted to occur. Mitigation measures are proposed with a high degree of certainty with regard to their success. No further monitoring is proposed.

10.9 Interactions

There are interactions between biodiversity and water/hydrology.

10.10 References and Bibliography

Atherton I, Bosanquet S. & Lawley M. (editors) 2010. Mosses and Liverwort of Britain and Ireland: a field guide. British Bryological Society.

Bailey, M. and Rochford J. 2006. Otter Survey of Ireland 2004/2005. Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Balmer D.E., Gillings S., Caffrey B.J., Swann R.L., Downie I.S., Fuller R.J. 2013. Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford, UK.

Bullock C., Kretch C. & Candon E. 2008. The Economic and Social Aspects of Biodiversity. Stationary Office.

Burke B.J., Clarke D., Fitzpatrick A., Carnus T. & McMahon B.J. 2015. Population Status and Factors Affecting the Productivity of Peregrine Falcon Falco peregrinus in county Wicklow, Ireland 2008-2013. Biology and Environment. Volume 115B. Issue 2. Royal Irish Academy.

Clabby, K.J., Bradley, C., Craig, M., Daly, D., Lucey, J., McGarrigle, M., O'Boyle, S., Tierney, D. and Bowman, J. 2008. Water Quality in Ireland 2004 – 2006. EPA.

Colhoun K. & Cummins S. 2013. Birds of Conservation Concern in Ireland 2014 – 2019. Irish Birds. Volume 9 Number 4 pg523-541.

Cooney R. & Dickson B. 2005. Biodiversity and the Precautionary Principle. Earthscan.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Council Directive 97/11/EEC of 3rd March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment

Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy – more commonly known as the Water Framework Directive

Council Directive 2014/52/EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

Curtis T.G.F.& McGough H.N. 1988. The Irish Red Data Book 1: Vascular Plants. Stationary Office.

Dempsey E. & O'Cleary M. 2010. The Complete Guide to Ireland's Birds. Gill & Macmillan.

DG Environment. 2010. Natura 2000 European Commission Nature and Biodiversity Newsletter. Number 28. June 2010. ISSN: 1026-6151.

Dúchas. 2002. National Biodiversity Action Plan. Department of the Arts, Heritage, Gaeltacht and the Islands.

EPA. 2002. Guidelines on the information to be contained in Environmental Impact Statements.

EPA, 2003. Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)

EPA. 2008. Ireland's Environment

EPA 2017 Draft Guidelines on Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017)

Fitter R., Fitter A. & Farrer A. 1984. Grasses, sedges, rushes and ferns of Britain and Northern Europe. Collins.

Fossitt J. 2000. A Guide to Habitats in Ireland. Heritage Council.

Foulkes N., Fuller J., Little D., McCourt S. & Murphy P. 2013. Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report [pdf].

Harris S. & Yalden D.W. 2008. Mammals of the British Isles: Handbook, 4th Edition. The Mammal Society.

Heritage Council. 2002. Draft Habitat Survey Guidelines. The Heritage Council.

Hickie D. 2004. Irish Hedgerows: Networks for Nature. Networks for Nature.

Hill M.O., Blackstock T.H., Long D.G. and Rothero G.P 2008. A Checklist and Census Catalogue of British and Irish Bryophytes. British Bryological Society.

Hundt L. 2012. Bat Surveys: Good Practice Guidelines. 2nd Edition. Bat Conservation Trust.

IEEM. 2006. Guidelines for Ecological Impact Assessment in the United Kingdom. Institute of Ecology and Environmental Management.

IEEM. 2006. Proceedings of the 22nd Conference of the Institute of Ecology and Environmental Management.

Institute of Environmental Assessment, 1995. Guidelines for Baseline Ecological Assessment'

Johnson O. & More D., 2004. Tree Guide', Collins

King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. 2011. Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Lynas P., Newton S.F., & Robinson J.A. 2007. The Status of birds in Ireland: an analysis of conservation concern 2008 – 2013. Irish Birds: Volume 8; Number 2.

McConnell B. & Gatley S. 2006. Bedrock Geological Map of Ireland. Geological Survey of Ireland.

Morris P. & Therivel R., 2001. Methods of Environmental Impact Assessment, Spon Press

NPWS. 2013. The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NRA. 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority.

Oxford Brookes University. 2001. Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission, Environment DG.

Preston C.D., Pearman D.A. & Dines T.D. 2002. New Atlas of the British & Irish Flora. Oxford University Press.

Reid, N., Dingerkus, K., Montgomery, W.I., Marnell, F., Jeffrey, R., Lynn, D., Kingston, N. & McDonald, R.A. 2007. Status of hares in Ireland. Irish Wildlife Manuals, No. 30. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.

Sargent G. & Morris P. 2003. How to Find & Identify Mammals. The Mammal Society.

Scannell M.J.P. & Synnott D.M. 1987. Census catalogue of the Flora of Ireland. Stationary Office.

Smal C. 1995. The Badger and Habitat Survey of Ireland. Department of Agriculture, Food & Forestry.

Smith G. F., O'Donoghue P., O'Hora K. and Delaney E. 2010. Best Practice Guidance for Habitat Survey and Mapping. Heritage Council.

Smith R.L & Smith T.M. 2003. Elements of Ecology. Benjamin Cummings.

Stace C. 2010. New Flora of the British Isles. Cambridge University Press

Statutory Instrument No. 94 of 1999. Flora (Protection) Order

Toner P., Bowman J., Clabby K., Lucey J., McGarrigle M., Concannon C., Clenaghan C., Cunningham P., Delaney J., O'Boyle S., MacCárthaigh M., Craig M. & Quinn R. 2005. Water Quality in Ireland 2001 – 2003. Appendix 1: Biological and Physico-Chemical Surveillance and Water Quality Assessment of Rivers. EPA.

Treweek J., 1999. Ecological Impact Assessment', Blackwell Science.

United Nations. 1992. Convention on Biological Diversity

Webb D.A. 1977. An Irish Flora. Dundalgan Press.

Whilde A. 1993. Threatened Mammals, Birds, Amphibians and Fish in Ireland. Irish Red Data Book 2: Vertebrates. Belfast: HMSO.

Appendix 10.A Bat Report prepared by Brian Keeley

Appendix 10.B Correspondence from the Development Applications Unit (DAU) of the Department of the Arts, Heritage and the Gaeltacht

Appendix 10.C Species Lists for Surveyed Habitats

Species indicated with an asterisk, *, are known to have been introduced to Ireland by humans. DAFOR is a subjective abundance scale where D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare.

Native hedgerow - WL1		**DAFOR**
Anthriscus sylvestris	Cow Parsley	O
Arum maculatum	Lords-and-Ladies	R
Crataegus monogyna	Hawthorn	O
Galium aparine	Cleavers	F
Hedera helix	Common Ivy	F
Heracleum sphondylium	Hogweed	R
Ranunculus repens	Creeping Buttercup	O
Rubus fruticosus agg.	Brambles	A
Sambucus nigra	Elder	O
Urtica dioica	Common Nettle	O

Immature woodland - WS2		**DAFOR**
Corylus avellana	Hazel	R
Pinus sylvestris	Scots Pine	R
Quercus sp.	Non-native Oak	O
Taxus baccata	Yew	O
Extensive bare earth		

Broadleaved Woodland - WD2		**DAFOR**
*Acer pseudoplatanus**	Sycamore	O
Anthriscus sylvestris	Cow Parsley	O
Betula sp.	Birch	O
*Fagus sylvatica**	Beech	R
Fraxinus excelsior	Ash	O
Hedera helix	Common Ivy	A
Heracleum sphondylium	Hogweed	O
Ilex aquifolium	Holly	R
Pinus sylvestris	Scots Pine	O
Rubus fruticosus agg.	Brambles	F
Sambucus nigra	Elder	O
*Tilia sp.**	Lime	O

Appendix 10.D Tree Survey