ALTEMAR

Marine & Environmental Consultancy

Habitat Management Plan for the proposed Strategic Housing Development (SHD) on the lands at the Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14.

16TH MARCH 2022

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.

On behalf of: Land Development Agency.

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow. 00-353-1-2010713. info@altemar.ie
Directors: Bryan Deegan and Sara Corcoran
Company No.427560 VAT No. 9649832U
www.altemar.ie

Document Control Sheet			
Client	Land Development Agency		
Project	Habitat Management Plan for the proposed Strategic Housing Development (SHD) on the lands at the Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14.		
Report	Habitat Management Plan		
Date	15th March 2022		
Version	Author	Reviewed	Date
Draft 01	Bryan Deegan		25th February 2022
Planning	Bryan Deegan		15th March 2022

CONTENTS

Introduction

Habitat Management Plan

During the planning process, consultation took place with Dun Laoghaire Rathdown County Council (DLRCC) for the proposed Dundrum Central SHD. The following Habitat Management Plan (HMP) has been prepared to address specific items raised in relation to biodiversity/habitats within DLRCC's response to the SHD Pre-Application submission (Biodiversity Report p69):

'2. The following is requested as part of the updated EIAR - Biodiversity Chapter:

e. The project ecologist and bat specialist will liaise with the landscape architect regarding the inclusion of any additional planting enhancement measures. Such additional measures will be included in the landscape design and be set out in the EIAR which will also include a schedule for monitoring post construction that will be provided for agreement with DLR's Biodiversity Officer and with provision for review and improvement of measures in the future, where necessary /appropriate.

f. Green roof design: full details of habitat creation types and techniques; the origin and

composition of soils/compost to be used; the choice and composition of plant species (including the origin of same).

g. Details of the proposed wetlands, eco corridor and other green spaces will be provided including, details of habitat creation types and techniques; origin and composition of soils/compost to be used; the choice and composition of plant species (including the origin of same).

h. A monitoring programme for habitats and species during construction and operations will be provided for agreement with DLR's Biodiversity Officer in respect of the areas of habitat creation, including green roofs; also, in respect of surface water management and the effectiveness of the measures to protect designated conservation sites downstream.

i. A schedule for monitoring post construction and during operations for all habitat creation areas, landscaped areas - including green roofs, with provision for review and improvement of measures in the future, where necessary /appropriate will be provided for agreement with DLR's Biodiversity Officer. A commitment to this will be included in the EIAR.

j. A suitably qualified project ecologist/Ecological Clerk of Works will be retained to ensure that the necessary measures are implemented; to oversee habitat creation and to conduct ecological monitoring.'

The project team assessed the feedback from DLR and incorporated the required elements into the design of the project, particularly within the landscape elements (items e, f & g above). However, it was. felt that a supplementary report i.e. Habitat Management Plan (HMP) was necessary to provide additional information in relation to habitats on site specifically to address items h, I & j above.

Following the decision to incorporate a HMP into the Dundrum Central SHD submissions, discussions took place between the Ecologists (Altemar Limited.) and Aecom (Landscape Architects), in addition to the wider project team, on how to improve the biodiversity value of the site and how to ensure that biodiversity is encouraged on site during the short, medium and long term, in line with the comments received from DLR.

Contents of the Habitat Management Plan

The Habitat Management Plan is primarily the result of consultation between the ecologists (Altemar) and the landscape architects (AECOM) of the proposed development project as well as the wider team. The Habitat Management Plan cross-references both landscape and biodiversity elements. It initially describes the proposed project and outlines a series of mitigation measures to protect important biodiversity/habitats on site during construction and operation. The landscape elements of the proposed project have involved extensive consultation and reiterations of the landscape masterplan, to enhance biodiversity across all landscape components on site. These biodiversity enhancement measures are outlined and will be implemented. Of significant importance to the long term enhancement of the site for biodiversity are the habitat & biodiversity protection and maintenance measures that will be in place during operation. These measures are also outlined and will ensure the long term biodiversity enhancement of the proposed development within the grounds of the former Central Mental Hospital. The Baseline Environment-Terrestrial Habitats, Fauna, Flora and Avian Ecology of the proposed development site are seen in Appendix I. The Conservation Value of Species and Habitats on-site is seen in Appendix II.

Description of the Proposed Project

The Land Development Agency intend to apply to An Bord Pleanála (the Board) for a 10 year permission for a Strategic Housing Development with a total application site area of c.9.6 ha, on lands at the Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14.

The development will consist of the demolition of existing structures (3,736 sq m), including:

- Single storey Former swimming pool / sports hall and admissions unit (2,750 sq m);
- Two storey redbrick building (305 sq m);
- Temporary structures including single storey portacabins (677 sq m);
- Removal of security fence at Dundrum Road entrance;
- Demolition of element of Gatelodge (4 sq m).

The development will also consist of alterations and partial demolition of the perimeter wall, including:

- Removal of section of perimeter wall adjacent to Rosemount Green (south);
- Formation of a new opening in perimeter wall at Annaville Grove to provide a pedestrian and cyclist access and associated gate;
- Removal of section of perimeter wall at the existing Dundrum Road access;
- Alterations and removal of sections of wall adjacent to Dundrum Road, including the provision of a new vehicular, cyclist and pedestrian access;
- Alterations and removal of section of perimeter wall adjacent to Mulvey Park to provide a pedestrian and cyclist access; and
- Removal of walls adjacent to Main Hospital Building.

The development with a total gross floor area of c. 106,770 sq m (c. 106,692 sq m excluding retained existing buildings), will consist of 977 no. residential units comprising:

- 940 no. apartments (consisting of 53 no. studio units; 423 no. one bedroom units; 37 no. two bedroom (3 person) units; 317 no. two bedroom (4 person) units; and 110 no. 3 bedroom units) arranged in 9 blocks (Blocks 02-10) ranging between 2 and 6 storeys (excluding plant) in height, together with private (balconies and private terraces) and communal amenity open space provision (including courtyards and roof gardens) and ancillary residential facilities;
- 17 no. duplex apartments (consisting of 3 no. 2 bedroom units and 14 no. 3 bedrooms units located at Block 02, 08 and 09), together with private balconies and terraces.
- 20 no. two and three storey houses (consisting of 7 no. three bedroom units and 13 no. 4 bedrooms units) and private rear gardens located at Block 02, 08 and 09).

The development will also consist of 3,889 sq m of non-residential uses, comprising:

- Change of use and renovation of existing single storey Gate Lodge building to provide a café unit (78 sq m);
- 1 no restaurant unit (307 sq m) located at ground floor level at Block 03;
- 6 no. retail units (1,112 sq m) located at ground floor level at Blocks 03, 06 and 07;
- 1 no. medical unit (245 sq m) located at ground floor level at Block 02;
- A new childcare facility (463 sq m) and associated outdoor play area located at ground floor level at Block 10; and
- A new community centre facility, including a multi-purpose hall, changing rooms, meeting rooms, storage and associated facilities (1,684 sq m) located at ground and first floor level at Block 06.

The development will also consist of the provision of public open space and related play areas; hard and soft landscaping including internal roads, pathways and boundary treatments, wetland feature, part-basement, car parking (547 no. spaces in total, including car sharing and accessible spaces); motorcycle parking; electric vehicle charging points; bicycle parking (long and short stay spaces including stands); ESB substations, piped infrastructural services and connections; plant (including external plant for district heating and pumping station); waste management provision; SuDS measures; sustainability measures (including green roofs and solar panels); signage; public lighting; any making good works to perimeter wall and all site development and excavation works above and below ground.

The proposed site outline, location, and site plan (existing and masterplan) are demonstrated in Figures 1 – 3.

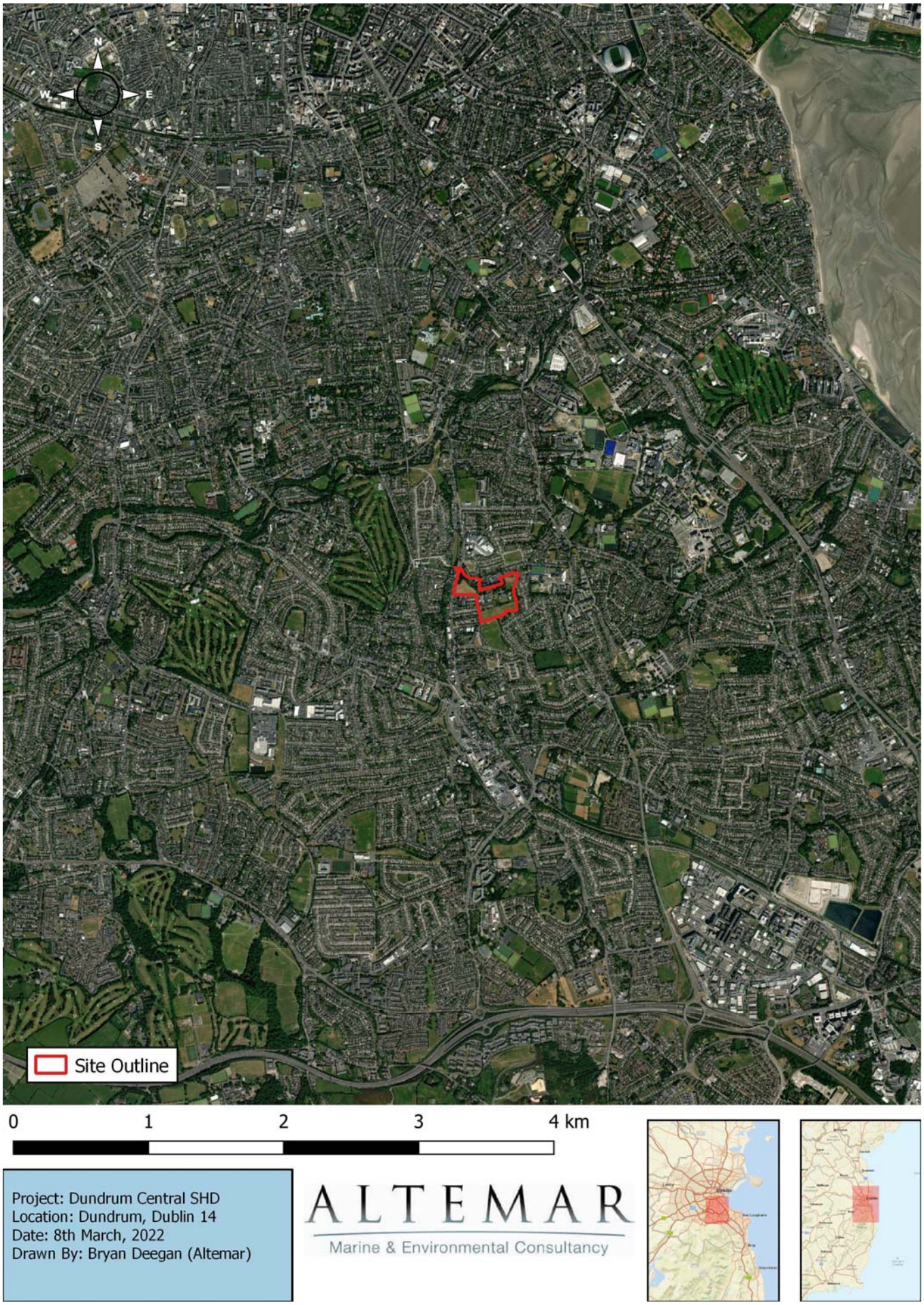


Figure 1. Proposed site outline and location

Figure 2. Proposed site outline

Figure 3. Proposed site plan - Masterplan

Overall Landscape Masterplan

The Dundrum Central SHD Landscape Architecture & Public Realm Design Report has been prepared by AECOM to accompany this planning application. The proposed landscape layout plan is demonstrated in Figures 4-8. This report outlines the following Environment Strategy for the proposed landscaping plan:

'*Habitat creation has been a key contribution to the landscape development proposal. The differing SuDs components have helped form a variety of inviting habitats through the development. Waters bodies and ponds are vital habitats for frogs, newts and a variety of insects including dragonflies. The public open spaces through the development have native meadow planting as per the All Ireland National Pollinator Plan. Species rich grasslands provide habitats and food for insects and bees. Other habitats that will be created through the open space will include:*

- *Open bonded brickwork within detailing of infrastructure buildings allowing for bat roosting,*
- *Bird and Mammalian nest boxes throughout the open public space,*
- *Log piles simulate fallen trees, and are valuable habitat for mosses, lichens and fungi, as well as many insects through the wetlands and extensive greenroofs; and*
- *Crushed aggregate pathways along secondary pathways allows water to permeate naturally through the soil, without the need for drainage channels and associated infrastructure.*'

This report also outlines the following in relation to the soft landscaping plan:

'*The overall planting approach is focused on creating a rich and biodiverse planting footprint in the context of a significant re-development of the site. The removal of existing hedgerows and grassland is offset by the addition of pollinator friendly wildflower meadows, tree planting and mixed native woodland along the Eco Corridor and in the community park south of the site. All retained tree and hedgerow protection measures will be in accordance with the mitigation recommendations prescribed in the ecologists and arborist report.*'

In addition: '*All open spaces will be multi-functional, catering for the needs of people, as well as the natural environment, supporting habitat creation, the growing of trees, plants and food. A strong SuDs management Train with collection, conveyance and storing components will not only provide a key blue infrastructure on site but establish new habitats and enhance biodiversity throughout the development. These key components include Green Roofs, Bio retention systems/raingardens, permeable paving, drainage ditches, tree planting and the formation of a integrated constructed wetland in the community park of the development. The integration of these elements in the scheme will not only improve the surface water drainage of the site but improve the surrounding environment and aid climate change mitigation.' 'Dundrum Central SHD contains existing natural assets such as the parkland entrance of mature trees, the walled garden. Other assets and future landscape such as wetland areas can become important educational tools for local children visiting the site, learning about the natural environment, nature and local heritage*.'

There are numerous strategies to enhance biodiversity on site including the 'Elm Park Eco-Corridor', which '*will provide an important habitat corridor on site. The area already contains some semi-mature trees which will be retained, a ditch and some wet grassland areas. The area can be significantly improved, and the areas of wetland habitat increased which will benefit a wide variety of plant and animal species including bats. It will also be designed to provide educational tools/information which can be used by local school children as well as adults, to gain greater understanding of the natural world*.'

Figure 4. Landscape layout – overall plan

Figure 5. Landscape layout – northwestern section

Figure 6. Landscape layout – northeastern section

Figure 7. Landscape layout – southwestern section

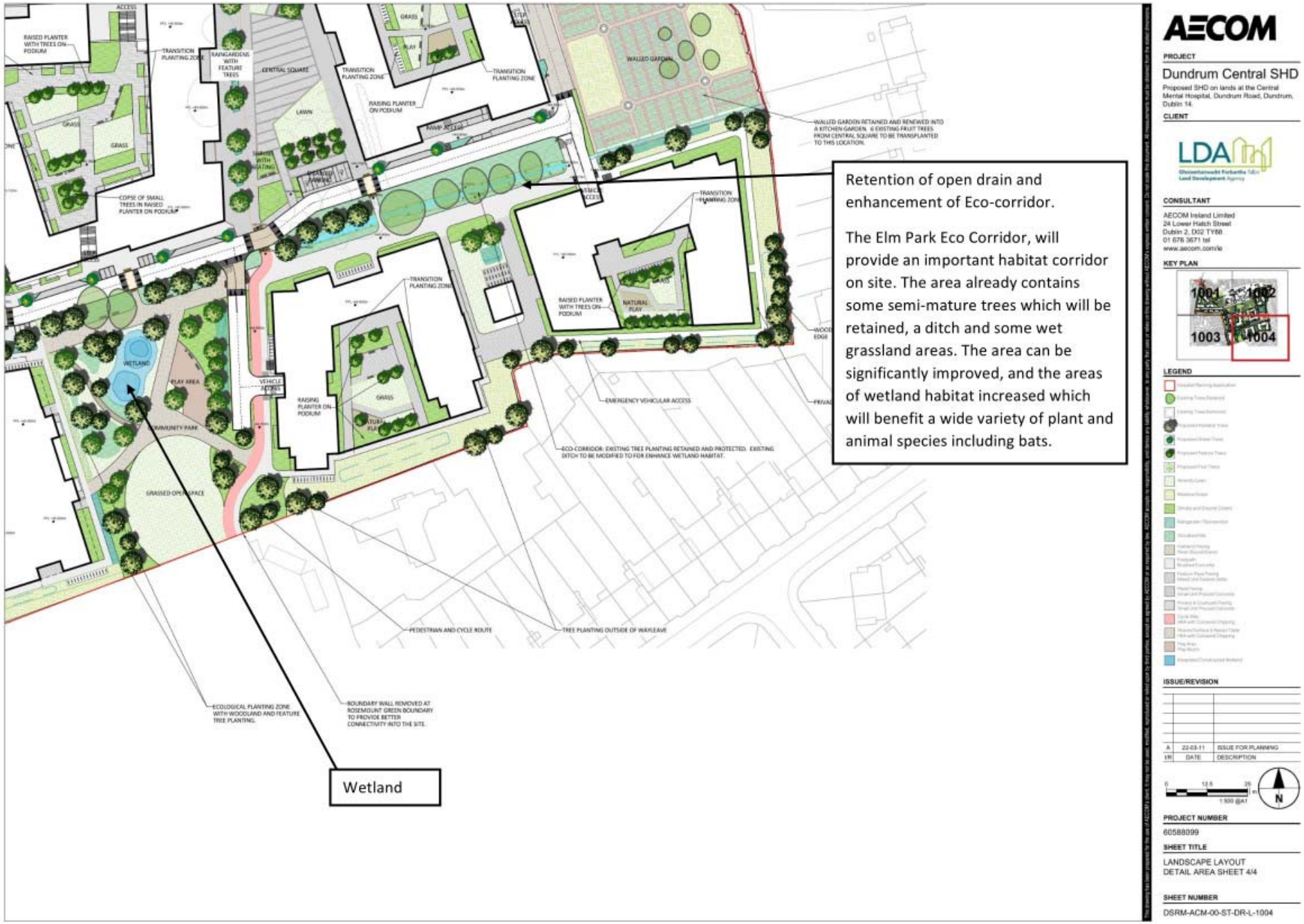


Figure 8. Landscape layout – southeastern section

Habitat Enhancement- Habitats and Overall Implementation

Significant consultation has been carried out between the ecologists (Altemar) and the Landscape Architects (Aecom) in relation to providing biodiversity enhancement measures across the site and these measures are outlined in the Landscape Architecture & Public Realm Design Report. This report states that '*The landscape architecture proposal aims to create a diverse planting scheme that contributes to the overall biodiversity within the development and the wider area. Plant species have been selected with direct reference to the 'All-Ireland Pollinator Plan 2015-2020' and the approach aims to align with the specific policies and objectives as set out in both the Dún Laoghaire- Rathdown Development Plan 2016-2022 and Future draft development plan 2022-2028.*

The overall planting approach is focused on creating a rich and biodiverse planting footprint in the context of a significant re-development of the site. The removal of existing hedgerows and grassland is offset by the addition of pollinator friendly wildflower meadows, tree planting and mixed native woodland along the Eco Corridor and in the community park south of the site. All retained tree and hedgerow protection measures will be in accordance with the mitigation recommendations prescribed in the ecologists and arborist report.'

Extensive Green Roofs

As seen in Figures 9-11 extensive green Roofs are proposed on site. These have been designed to be areas that are inaccessible to residents where biodiversity can thrive without being disturbed. These have been designed to have significant habitat complexity to encourage increased biodiversity across the roof including mounds, log piles, water saturation and unvegetated sand pockets. As outlined in Figure 11 meadow mats will also be introduced.

Intensive Green Roofs

As seen in Figure 12 intensive green roofs will also be utilised. These are shared spaces and will be used for amenity and have a higher capacity to retain water. These areas will include larger plant specimens as outlined in Figure 13.

Integrated Constructed Wetlands

An Integrated Constructed Wetland is also proposed and will incorporate native woodland planting as a backdrop. The species proposed are outlined in Figure 14, the wetland benches and section of the ponds are outlined in Figure 15. In addition, the construction method for the wetland is outlined in Figure 16.

Additional biodiversity enhancement measures.

Additional biodiversity enhancement measures are outlined in the Landscape Architecture & Public Realm Design Report:

'***Meadows and Wild Areas***

Wild areas and verges which are left to grow are increasingly popular aesthetically but importantly due to their benefits to biodiversity and lower maintenance costs. These areas will be located through the open spaces, transitioning from amenity lawn verges along pathway edges to meadow areas in passive open space zones.'

'Wetland Areas

There are a number of wet areas and ditches on site, and proposals for a integrated constructed wetland at the community park. These areas have the potential to form important habitats for local wildlife, and educational tools for local children.'

'Shrubs and Underplanting

A distinctive palette of underplanting will be proposed on site. Structured planting in front of proposed dwellings and ground floor apartments will provide a soft transition from public to private space. Species have been chosen to enhance biodiversity whilst providing structure and being easily maintainable.'

*'**Bioretention Systems / Raingardens***

Bioretention systems will be collect excess surface run off whilst providing a key biodiversity to the streetscape and open space. Species proposed will be tolerate fluctuating soil moisture.'

*'**Tree Strategy***

The general planting strategy throughout the scheme is for significant structure tree planting with 2 metre clear stems to provide a leafy canopy layer, softening the proposed buildings and a base layer of low shrub/ groundcover and hedge planting to create low level seasonal interest and colour softening the hard surfaced areas and car parking. Eye level between the two planting types is kept clear to maintain sight lines throughout the scheme.

Native and naturalised tree species are to be planted within the public open space to increase opportunities for native wildlife. These will ultimately be large scale trees to designate a parkland character.

Street tree planting will consist of species with fastigiate or neat forms suitable to the scale of the streetscape and those which will thrive in a streetscape environment. Street tree planting is located to avoid impacts with street lighting. Street trees will be planted into a minimum of 7cu.m. topsoil, with the use of urban tree soils, root barriers to protect water utilities and topsoil loaded rootcells to increase rooting areas outside the main tree pit area as necessary.

Courtyard/Podium trees have been chosen for seasonal diversity and small form. They will be planted in raised beds in the podium developments. Private garden dwellings have a fruit tree planting in the gardens to enhance overall biodiversity and habitat creation on site.'

*'**Climbers***

Native/adaptive climbers have been proposed through the scheme along the existing boundary wall. Species are chosen for robustness, seasonality, and biodiversity. Habitats will be formed along this boundary edge to the development public realm providing both visual and ecological rewards.'

*'**Shrub and Groundcover***

Low level shrub and groundcover planting will be in single species blocks taken from an overall palette of species throughout the scheme with flowers and fruits attractive to wildlife such as bees and butterflies. Species will be of maximum 1m height at maturity to maintain clear sight lines.

The principal objective of the landscape proposals is to provide a high quality public realm, which is accessible, safe and distinctive. Planting and landscape works will be carried out in accordance with BS4428. Trees will be advanced/semi-mature rootballed stock, in accordance with BS 8545.

Low level, low maintenance shrub planting will be used in planting beds containerised with a minimum size of 2 litre pots, Climbers will have 1 litre pots, all with a 75mm well composted fine bark mulch.'

*'**Native Woodland Mix***

A woodland mix is proposed in the community park and northern edge of the Eco Corridor the enhance biodiversity and strengthen existing habitats. Species are a mix of sizes and species providing a seasonal interest and strengthen biodiversity.'

*'**Seeding***

The landscape development allows for a variety of seeding in the development to aid habitat creation and enhance biodiversity on site. A 1.5m amenity lawn verge will outline the edges of pathway through the development. Natural meadow planting is to occur through the open space in drifts forming fragmented corridors through the development. Amenity lawn will be placed in passive zones in the open space to allow for passive recreation areas. Meadow seeding to be 100% native sourced Irish provenance wildflower seeds. Amenity lawn seed shall conform in all respects to the European Communities (Seed of Fodder Plants) Regulations, 2002.'

Extensive Green Roof: Substrate and Structure

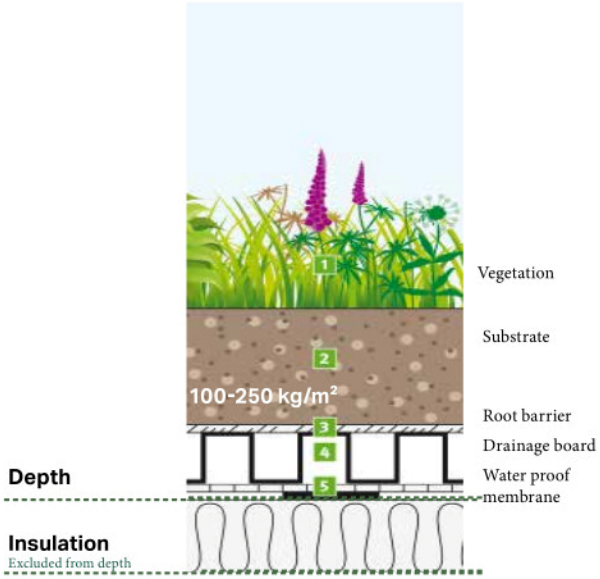
The Green Roof typology will be an extensive green roof and will be inaccessible to residents . It will primarily by a space for biodiversity and heat absorption. The biodiversity will be achieved through a variety of techniques to produce different habitats.

Substrate and Structure

Structure

Green roof structure must adhere to thec criteria set out in BS EN 1990:2002 'Eurocode - Basis of Structural Design' particularly 'EN 1991 - Eurocode 1:Additions on structures.'

The depth of the soil will be an average of 115mm depth total with varying depths of soil up to 150mm thick .



Green roof substrate requirements:

- Light weight, no more than 20% organic content.
- Wind and water erosion resistant
- Promote plant anchorage due to risk of wind uplift
- Essentially free of weeds, diseases and contaminants.
- Peat free and fire resistant.
- Suitable water permability, retention and release.
- Adquete air porosity and resistance to compaction to prevent root damage.
- Not contain sharp points that would damage the water proof layer.

Origin and compostion to be used:

- Green roof substrates must be tested according to BS8616:2019 or equivalent.
- Green roof substrates must be supplied within the Republic of Ireland or within the EU.
- Extensive green roof has a lower nutrient requirement.
- Can contain recycled aggregates.


Green roof substrate cross section

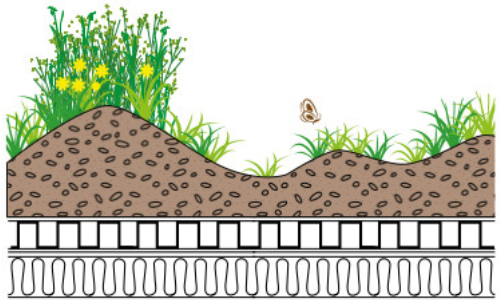

Self seeded brown roof - Laban data centre


Extensive green roof - Swarthmore College

Figure 9. Extensive Green Roof: Substrate and Structure

Extensive Green Roof - Habitat Creation

Habitat techniques and types



Varying substrate depths

Varying depths of substrate allow for a wider range of species to grow.

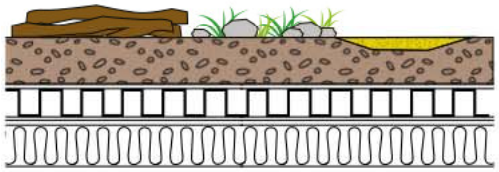
- Among the peaks and valleys of the soil micro climates are created

- Shaded areas provide shelter during peak temperatures

- Encoruages variation different species as the soil depth requirements for roots varies.

Mounds allowing for a variety of wildflowers and shrubs.

Undulating Green roof that has a variety of soil depths.



Additional Materials

Providing additional materials such as sand pockets, coarse gravel beds and deadwood piles allows a variety of species to create habitats.

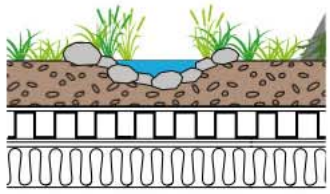
- Sand pockets act as a sun trap, shelter space and breeding ground for burrowing insects.

- Deadwood piles provide a habitat for flora such as lichens, fungi and moss as well as a structural space for insects such as bettles, bees and ants. This can also be mimicked with insect hotels and bee hives. Dead plant stems also support invertebrate life.

- Gravel and boulders provides another habitat type for plants and animals to occupy. Boulders absorb and radiates heat. Gravel allows self-vegetation from the wind.

Log piles and gravel providing a habitats.

Unvegetated sand pockets surrounded by gravel.



Shade and water satuaration conditions

Shade and water saturation can allow for different species to thrive on green roof environments.

- Water bodies that retain rain water for extended periods of time provides a water source for fauna living on the roof as well as a habitat for species that prefer water saturated soils mimicking wetland conditions.

- On green roofs at the top of buildings shade can be scarce, providing shaded spaces allows for plants that prefer partial sunlight or shade to grow further contributing to biodiveristy. Biosolar roofs achieve this with solar panels when installed at an angle, at a height and an adequate distance from each other to allow for some sunlight and water to reach the plants.

Water saturation on the green roof mimicking pond.

Figure 10. Extensive Green Roof: Habitat Creation

Extensive Green Roof-Proposed Meadow Mat

The Green Roof typology is focused on biodiversity as such there will be different species mixes for different conditions and follow the GRO Code by containing 15 species and a range of flowering species;

Wildflower meadow mat (100mm soil depth)
Species
Anchillea millefolium
Anthemis arvenis
Centaurea cyanus
Centaurea nigra
Galium verum
Leontodon autumnalis
Linaria vulgaris
Lotus corniculatus
Rhinanthus minor
Rumex acetosella
Saponaria officinalis
Scorzoneroides autumnalis
Silene flos-cuculi
Thymus polytrichus
Veronica officinalis
Vicia sativa segetalis
Viola tricolour

Figure 11. Extensive Green Roof: Proposed Meadow Mat

Intensive Green Roof: Substrate and Structure

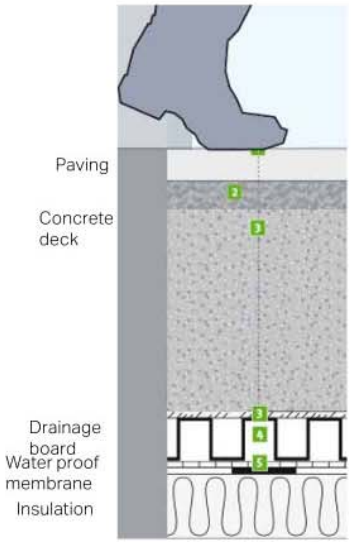
Blue roofs on this project are intensive green roofs, these shared spaces will be used for amenity and will therefore have a higher capacity to retain water contributing to the SUDS network onsite and reducing flood risk. SUDS also improves the water quality of water by allowing contaminants in surface water to be broken down, absorbed and their movement restricted by plants. SUDS methodology for reducing surface run off, the lag time between peak rainfall and peak discharge and removal of pollution is supported by the Water Framework Directive (2000).

Substrate and Structure

Structure

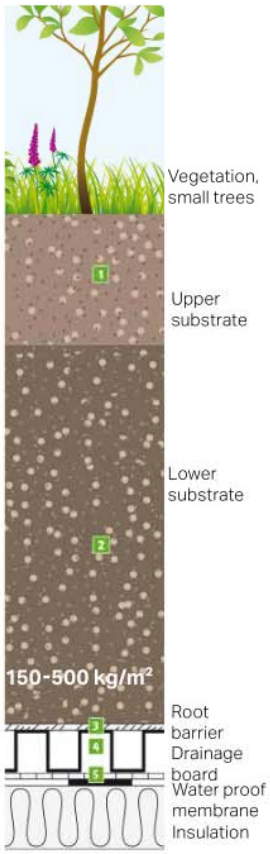
Green roof structure must adhere to thec criteria set out in BS EN 1990:2002 'Eurocode - Basis of Structural Design' particularly 'EN 1991 - Eurocode 1:Additions on structures.'

The flat roof will act as a roof garden having a mixture of hardscape and softscape. A concrete deck will allow for higher loading, a greater depth of soil to be used for shrub and tree planting in planters on the roof podiums.



Origin and compostion of soils/compost to be used:

- Green roof substrates must be tested according to BS8616:2019 or equivalent.
- The upper substrate will be 350-400mm thick and intensive roofs require a higher amount of nutrients to support larger plants.
- The lower substrate will be at least 250mm thick and acts as a drainage layer, less organic matter is needed.




Intensive green roof- Magneten sensory garden green roof


Intensive green roof - Dickens Yard apartments roof garden

Figure 12. Intensive Green Roof: Substrate and Structure

Intensive Green Roof: Biodiverse Habitat Creation-Planting Schedule

Courtyard/Podium Trees				
Species		**Girth**	**Clear Stem**	**Height**
Amelanchier lamarckii 'Robin Hill'		18-20 cm	2.0m	min. 450cm
Acer palmatum 'Osakasuki'		18-20 cm	2.0m	min. 450cm
Malus 'Evereste'		18-20 cm	2.0m	min. 450cm
Shrub and Ground Cover Mix 2 (Intensive Green Roof Planting)				
Species	**Designation**	**Root Type**	**Height mm**	**Spread mm**
Pennisetum hamelin	Container Grown	2l	200-300	200-300
Ilex crenata	Container Grown	2l	200-300	200-300
Fatsis japonica	Container Grown	2l	300-500	300-500
Euonymus fortunei 'Emerald Gaiety	Container Grown	2l	300-500	300-500
Sarococcoca hookeriana	Container Grown	2l	100-200	200-300
Pittosporum setiferum	Container Grown	2l	200-300	200-300
Tiarella cordifolia	Container Grown	2l	200-300	200-300
Carex oshimensis 'Everest'	Container Grown	2l	200-300	300-500
Allium Sensation	Bulbs handsown planting 9 per m2			
Muscari	Bulb handsown, planting 9 per m2.			

Pennisetum hameln

Iberis sempervirens

Ilex crenata

Pittosporum

Amelanchier lamarckii 'Robin Hill'

Malus 'Evereste'

Acer palmatum

Carex oshimensis everest

Allium

Figure 13. Intensive Green Roof: Biodiverse Habitat Creation – Planting Schedule

Intergrated Constructed Wetland

Integrated Constructed Wetland (ICW)

An 'Integrated Constructed Wetland' (ICW) is a series of shallow, interconnected, emergent-vegetated, surface-flow wetland compartments that receive/intercept waterflows from a variety of sources. ICW systems are distinguished from traditional 'treatment wetlands' by the integration of water flow and quality management with that of landscape-fit and biodiversity enhancement

Design features should include a safe exceedance route, maintenance access to all areas of the pond, a flat safety bench around the perimeter of the pond.

The ICW (Integrated Constructed Wetland) proposed in the Dundrum scheme aims to create a biodiverse habitat on site. Native woodland planting will be the backdrop of the wetland in the community park. This comprises of a native mix of transplants, standards and semi mature trees and marks a continuation of the Eco Corridor east of the community park. A mix of bird boxes will be placed on the semi mature trees to encourage biodiversity Adaptive/Native plug and seeding for the wetland will provide a rich biodiversity when developed. This location will be wildlife haven for the whole community to enjoy.

The following pages outline the proposed creation and formation of the wetland for Dundrum.

Native tree planting

Bird Boxes

Lythrum salicaria

iris pseudacorus

Sparganium erectum

Schoenplectus lacutris

Glyceria maxima

Butomus umbellatus

Carex paniculata

Figure 14. Integrated Constructed Wetland

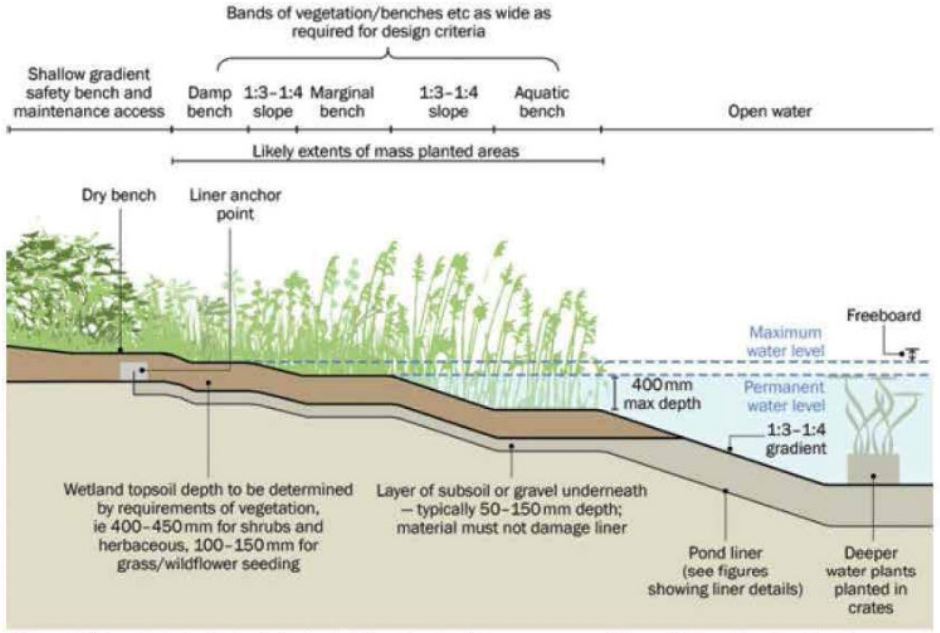
Wetland Benches: Enhanced Biodiversity Habitat Creation

Habitat , Formation & Planting

Habitat and Formation

The design of wetlands should consider the inclusion of several zones:

- Permanent pool - This is the permanent volume of water that will remain in the pond/wetland throughout the year (less any evaporation and infiltration during extended periods of dry weather). The pool acts as the main treatment zone and helps to protect fine deposited sediments from re-suspension.
- Aquatic bench - This is the zone of shallow water along the edge of the permanent pool that supports wetland planting, acting as a biological filter and providing ecology, amenity, and safety benefits. Where the proportion of planting is increased (ie to create wetland features), there may be other "islands" (zones of shallow, vegetated areas) within the permanent pool.
- Attenuation storage volume/Emergent zone - This is the temporary storage volume above the permanent pool that fills as water levels rise during rainfall events, providing the required flow attenuation.



Notes: Width, surfacing and extent etc of safety bench and maintenance access all dependent on site, size of pond, maintenance requirements etc

Figure 23.5 Typical planted pond edge details

Planting

Native/adaptive planting have been specified for the three differing benches in the wetland. Invasive species such as Typha spp. have been omitted from the proposal.

A wetland native seed mix is to be sown alongside the proposed plug planting providing a matrix of diverse plants for the area.

Wetland planting should take place between early April and mid-June, so the plants have a full growing season to develop root reserves they need to survive the winter. Vegetation ideally needs to be established as soon as possible to prevent bankside erosion.

The soils of a pond buffer are often severely compacted during constructions. To mitigate this, it is advisable to excavate large and deep holes around the proposed planting areas and backfill these will uncompacted topsoil. 300mm depth of good quality topsoil is acceptable for proposed plug planting of the wetland.

Wetland Planting			
Species	**Type**	**Plants per sq. m**	**Mix %**
Emergent Aquatic Planting			
Glyceria Maxima	Plug, P9	7	50
Sparganium erectum	Plug, P9	7	30
Schoenplectus lacutris	Plug, P9	9	20
Emergent Planting			
Lythrum salicaria	Plug, P9	13	40
Iris pseudocarus	Plug, P10	13	40
Butomus umbellatus	Plug, P9	13	20
Dry Meadow			
Carex panuiculata	Plug, P9	13	50
Filipendula ulmaria	Plug, P9	13	50
Seeding			
Native Wetland/Pond Edge Seed Mix Reference Code: EC05 -Design by Nature			

Figure 15. Wetland Benches: Enhanced Biodiversity Habitat Creation

Intergrated Constructed Wetland: Formation

A membrane and geotextile shall be laid underneath the wetland to form ponding. Refer to CIRIA, SuDs Manual 2015 figure adjacent and below requirements.

Liner/Membrane & Geotextile:

Single layer robust welded flexible membrane, suitable for waterproofing to structures and for water containment.

Before laying check that substrate surfaces are : -

a) Structurally sound.

b) Free from ridges and undulations.

c) Surface dry.

d) Cleaned of loose and extraneous material.

Before laying check that construction allows membrane continuity to be maintained.

Membrane to be installed by qualified operatives recommended by membrane manufacturer and/or prefabricated into panels where appropriate to suit site requirements. Laid strictly in accordance with manufacturers' recommendations.

All penetrations through the membrane shall be sealed with proprietary water-resistant preformed cloaks. The cloaks shall be compatible with the membrane and approved by The Engineer.

A geotextile will be used in the system to protect liners and act as filters. It shall be laid continuously and have overlaps of a minimum 300mm.

Saftey

A 1.1m timber post and panel fence will be erected along the emergent bench of the wetland protecting against anyone submerging into the pond whilst planting is establishing. Once planting has formed this fence will not be visible

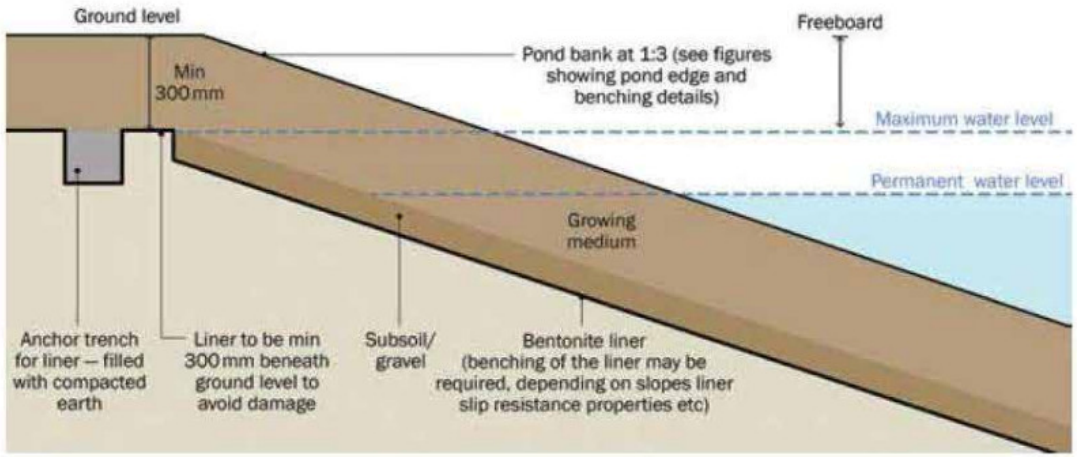


Figure 23.13 Details for a typical geosynthetic liner

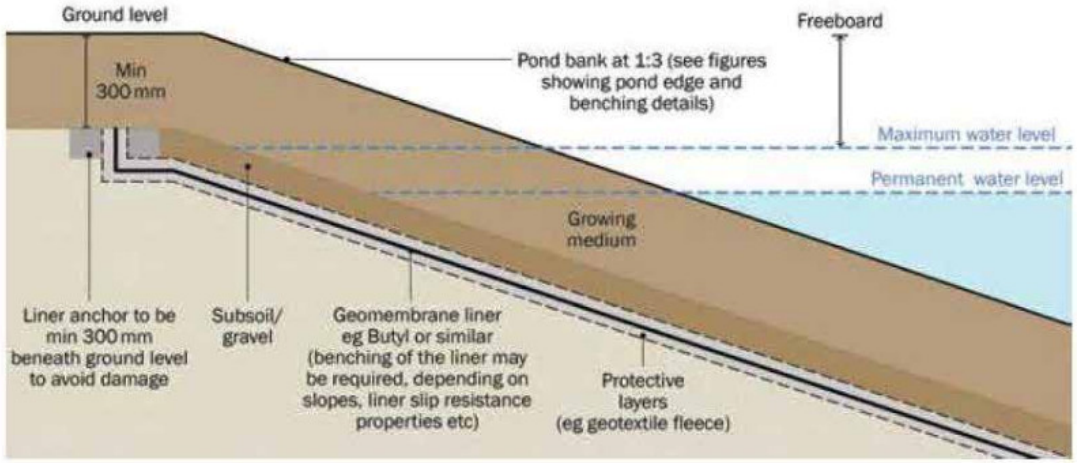


Figure 23.14 Details for a typical geomembrane liner

Figure 16. Integrated Constructed Wetland: Formation

Habitat & Biodiversity protection during construction.

As outlined in the Biodiversity Chapter of the EIAR, mitigation measures will be incorporated into the proposed project to minimise the potential for negative impacts on the ecology within the site. It should be noted that a project ecologist will be in place and will discuss the proposed project, HMP, and biodiversity mitigation with the DLRCC Biodiversity Officer prior to construction commencing on site. In addition mitigation will be in place to protect the biodiversity within the watercourses and downstream of the watercourses.

Construction Phase

Mitigation measures as outlined in the CEMP include:

General Mitigation Measures

- '*Demolition and Construction methods used will be tailored to reduce, as much as possible, dust and noise pollution.*
- *Mitigation & control measures in relation to hazardous material spillages, plant & equipment emissions, noise, dust, vibration, disturbance to trees & wildlife set out in preceding sections of this report and in the EIAR document, shall be adhered to for the duration of the construction works.*
- *The location and size of stockpile areas for sands and gravel will be specified and identified on the maps.*
- *Sediment runoff will be minimised by standard engineering measures including sediment skirts around soil stockpiles, sediment retention barriers in surface water drains and the use of adequate construction roads.'*

Surface Water Drainage & Ground Water Control

'A method statement will be prepared by the contractor and agreed with Dún Laoghaire-Rathdown County Council prior to commencement of the works, detailing the measures to be taken to ensure that no water run-off from the site occurs during the construction period This method statement must comply with this CEMP document. Any run-off will be intercepted on site, where the ground falls towards adjoining properties or public roads/footpaths. This will be achieved with open drains or French drains and collected for treatment based on the conditions of a DLRCC and/or Irish Water licence, prior to pumping to the surface sewer network. There is a drainage ditch running through the site. Direct uncontrolled run-off into this will not be allowed.

Run-off control measures to include the following:

- *Dewatering measures should only be employed where necessary.*
- *For groundwater encountered during construction phase, mitigation measures will include;*
    - *Dewatering by pumping to an appropriate treatment facility or settlement tanks in order to allow sediment to settle from solution prior to discharge.*
    - *Excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas.*
- *If concrete mixing is carried out on site, the mixing plant will be situated in a designated area with an impervious surface.*
- *Existing surface drainage channels within the site that serve adjacent lands are to be retained where possible to prevent causing increased flooding impacts.*
- *All surface water sewer connections will be made under the supervision of the Local Authority/Irish Water and checked prior to commissioning.*
- *All onsite surface water drains will be tested and surveyed prior to connection to the public sewer to prevent any possibility of ingress of ground water.*
- *All surface water manholes and drains will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur.*
- *Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.*
- *Areas surrounding the site will be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the demolition and construction phase. To prevent this from occurring, surface water discharge from the site will be managed and controlled for the duration of the construction works, as noted in the points above, until the permanently attenuated surface water drainage system of the proposed site is complete.*
- *Regular inspections of settlement tanks are to be carried out and additional treatment used if settlement is not adequate.*
- *Bunded areas will be created for the storage or use of any fuels, oils, greases, cement, etc.*
  Emergency spill kits will be kept close to works.'

Dust

'The Contractor's proposals will include dust control measures in accordance with best practice and with reference to the following:

- *Air Pollution Act 1987*
- *BS 6187: Code of Practice for Demolition*

A dust minimisation plan will be formulated for the construction phase of the project. The Contactor will put in place a regime for monitoring dust deposition rates in the vicinity of the site during the works using the Bergerhoff Method. The amount of dust deposited anywhere outside the proposed development, when averaged over a 30-day period, will not exceed the values below:

- *130mg/m2 per day when measured according to the BS method which takes account of insoluble components only or,*
- *350mg/m2 per day when measured according to TA Luft, which includes both so soluble and insoluble matter. (EPA compliance monitoring is based on the TA Luft method).*

Refer to Section 10 of this report for the proposed dust monitoring regime. Dust mitigation & control measures will include the items listed below. Dust generating activities will cease if limits are exceeded until appropriate mitigation measures are put in place by the contractor.

- *Spraying: During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water. Stockpiles of excavated material, demolition rubble, sand etc shall be covered with tarpaulins or if this is impracticable should be sprayed with water from a bowser.*
- *A road sweeper is to be used to keep hard surfaced roads inside the site and in it's vicinity, clean.*
- *Use of rubble chutes and receptor skips during construction activities.*
- *Construction vehicle speeds are to be restricted to less than 15 kph to avoid raising dust. The overloading of tipper trucks exiting the site shall not be permitted and such trucks shall be covered. Skips containing dust generating material should also be covered.*
- *Vehicles & construction plant/equipment are to be regularly serviced to ensure that exhaust emissions are within permissible limits. Idling of vehicles to be avoided.*
- *For concrete cutting or stone cutting operations, dust emissions controls are to be in place.*
- *Dust netting on scaffolds and along boundaries shall be installed as necessary to avoid escaping dust emissions from the site falling on third party lands and existing residential areas.*
- *As per Section 8.11 of this report, a Liaison Manager appointed from the contractor's senior staff on site shall deal with complaints and liaise with the local community, the Local Authority and other stakeholders as necessary in relation to dust issues, out-of-hours work etc. All complaints are to be recorded and responded to. Appropriate actions to be taken to avoid similar future causes for complaint.'*

Soil

- *'If un-contaminated, any existing topsoil will be retained on site if possible to be used for the proposed development. Topsoil will be stored in an appropriate manner on site for the duration of the construction works and protected for re-use on completion of the main site works.*
- *During the demolition and construction phase, all excavations and exposed sub-soils in open cuts will be blinded and protected with clean broken stone as soon as possible after exposing the subsoil in order to prevent erosion.'*

Storage of Hazardous Materials

'*To minimise environmental risks the following requirements shall be adhered to:*

- *Hazardous liquid materials or materials shall be stored in the site compound in a bunded area (for liquids). All oils, fuels and other hazardous liquid materials will be clearly labelled and stored in an upright position. The capacity of the bunded area shall conform with EPA Guidelines e.g. hold 110% of the contents or 110% of the largest container whichever is*
- *greater.*

- *Fuel may also be stored in fuel bowsers located in the proposed compound location. Fuel bowsers shall have certificates of conformity or shall be integrity tested.*
- *Smaller quantities of fuel may be carried/stored in clearly labelled metal jerry cans. These cans shall be in good condition, have secure lockable lids and be stored in an appropriate manner i.e. over drip trays. Contents of drip trays to be suitably disposed by a licensed waste disposal contractor.*
- *Inductions and regular toolbox talk to be carried out for all operatives in relation to the material storage arrangements and actions to be taken in the event of an accidental spillage.*'

Reinstatement/Road cleaning

'*Construction Stage*

Prior to the works commencing, detailed photograph surveys (condition schedules) of adjoining walls, roads, footpaths, grass verges etc. is to be prepared. Copies of the relevant parts are to be made available to adjoining owners and Dún Laoghaire-Rathdown County Council. This record will form the basis of assessing repairs to adjoining areas in the future should a dispute arise as to their cause. Roadways are to be kept clean of muck and other debris. A road sweeping truck is to be provided if necessary to ensure that this is so.

Reinstatement at completion of the works will involve:

- *The cleaning of the existing sewers in the vicinity of the development as required.*
- *Testing and cleaning of all watermains in the development to the requirements of the Local Authority prior to connection to the public watermain. This will reduce the risk of contamination to the public water supply when the new network is connected to the system.*
- *Repair of any damage to any adjacent public roadways, kerbs, grass verges etc. in accordance with Dún Laoghaire-Rathdown County Council requirements.*
- *Reinstatement of all excavations to the requirements of Dún Laoghaire-Rathdown County Council*
- *Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during construction works.*'

Plant & Equipment

'*To minimise environmental risks the following requirements shall be adhered to*

- *Plant and equipment to be used during works, will be in good working order & regularly maintained with no evidence of leaks or damaged exhausts. Equipment will be parked in areas remote from any environmentally sensitive locations at the end of each day i.e. the open channel drainage ditch crossing the site.*
- *Exhaust silencers to be fitted to plant and machinery that is likely to cause a noise nuisance. Construction plant used on site will comply with the relevant Irish regulations in relation to noise and vibration requirements.*
- *The contractor will have a re-fuelling protocol in place. Re-fuelling to be carried out inside the site compound area in a designated area.*
- *Toolbox talks are also to be held with all operatives to highlight environment risk areas or works. Environmental control measures are also to be highlighted.*'

Noise

'Some impact of noise is likely to occur as a result of the construction activity. Construction work is of a temporary nature and the resulting noise levels are usually acceptable, subject to typical management and time control procedures which are common to most urban based development projects.

Attention should be paid to the recommendations given in BS 5228. 'Noise Control on construction & Open Sites' & BS 6187 Code of Practice for Demolition (latest editions).

The noise limits to be applied for the duration of the infrastructure works are those specified below.

- *Daytime (07:00 to 19:00 hrs) – 55dB Laeq, 15 m ins.*
- *Evening (19:00 to 23.00 hrs) – 50dB Laeq, 15 mins*
- *Night-time (23:00 to 07:00 hrs) – 45Db Laeq, 15 mins*

Refer to Section 10 of this report for the proposed noise monitoring regime.

The following shall be implemented to mitigate & control construction noise impacts in order to avoid unacceptable impact on sensitive receptors in particular local residents:

- *Noise Management Procedures: Prior to the start, strictly enforced noise management procedures shall be put in place by the contractor and communicated to staff via an induction and follow-on toolbox talks.*
- *Noisy operation shall be avoided where possible or replaced with a lower noise alternative if possible.*
- *Noise shall be controlled at source in accordance with BS 5228 (latest edition). Measures used should include the use of exhaust silencers on vehicles and machinery that have the potential to cause a nuisance, the use of rubber wheeled/tracked vehicles where possible, the use of low noise generators and other machinery with manufacturer approved acoustics covers or linings. Electrically powered equipment to be used in preference to diesel/petrol powered equipment. Pneumatic percussive tools will be fitted with manufacturer approved mufflers or silencers. All excavator mounted pneumatic breakers used for demolition and concrete/rock breaking activities shall be fitted with effective dampeners. Where breaking out work is likely to be prolonged, the work area should be enclosed within a noise absorbing blanket structure to ensure noise emissions are within the defined limits. Such enclosures should also be considered for other static noise generating operations or machinery as necessary.*
- *Idling and rev'ving of machinery & vehicles is to be avoided. Vehicles and machinery not in use should be shut down.*
- *Noisy operations should be staggered to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.*
- *Dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.*
- *Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, tonal reversing alarms on construction vehicles shall be replaced with broadband alarms.*
- *As per Section 8.11 of this report, a Liaison Manager appointed from the contractor's senior staff on site, shall deal with complaints and liaise with the local community, the Local Authority and other stakeholders as necessary in relation to noise issues. All complaints are to be recorded and responded to. Appropriate actions to be taken to avoid similar future causes for complaint.'*

Additional measures to be carried out to prevent impacts on Habitats, Botany and Avian Ecology

Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will be followed e.g. do not remove trees or shrubs during the nesting season (1st March to 31st August).

- A pre-construction inspection for terrestrial mammals will be carried out.
- Removal of deciduous trees. Should any mature broadleaved tree be scheduled for removal as part of the development plans, it should first be surveyed for bat presence by a suitably experienced specialist. If bats are found, an application for a derogation licence should be made to the National Parks and Wildlife Service to allow its legal removal. Such trees should ideally be felled in the period late August to late October, or early November, in order to avoid disturbance of any roosting bats as per National Roads Authority guidelines (NRA 2006a and 2006b) and also to avoid the bird breeding seasons. Tree felling should be completed by mid-November at the latest as bats roosting in trees are very vulnerable to disturbance during their hibernation period (November – April). Trees may be removed at other times but the likelihood of encountering bats during works will be higher. Trees with ivy-cover, once felled, should be left intact onsite for 24 hours prior to disposal to allow any bats beneath foliage to escape overnight.
- Trees to be retained. Several species of bats roost in trees. Where possible, treelines and mature trees that are located immediately adjacent to planned construction areas or are not directly impacted should be avoided and retained intact. Retained trees will be protected from root damage by machinery by an exclusion zone of at least 5 metres or equivalent to canopy height. Such protected trees should be fenced off by adequate temporary fencing prior to other works commencing.
- A pre-construction bat assessment will be carried out on all buildings to be demolished.

- Native species will be chosen in all landscaping schemes. Planting schemes should attempt to link in with existing wildlife corridors (hedgerows and treelines), both onsite and off, to provide continuity of wildlife corridors. Retention of boundary hedgerows and treelines will also serve to screen the development.
- Lighting restrictions. In general, artificial light creates a barrier to bats so lighting should be avoided where possible. Where lighting is required, directional lighting (i.e. lighting which only shines on work areas and not nearby countryside) will be used to prevent overspill during construction. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only. Mature trees should not be directly lit during construction or operation of the proposed development.
- 45 bird boxes and 10 bat boxes will be placed on site as an enhancement and mitigation measure. The position of these boxes will be carried out in consultation with an ecologist.

Operational Phase

- Compliance with Water Pollution Acts will be carried out in relation to drainage on site.
- A post construction inspection of drainage connections to the onsite drain will be carried out by the project ecologist to ensure that the petrochemical interceptor is in place and working.

Habitat & Biodiversity protection and maintenance during Operation.

Following the completion of the proposed development, including planting, the main objective for the HMP is to preserve the ecological diversity of the areas which have been developed and to ensure that adjacent areas are not impacted negatively. Specifically in relation to this development, the objectives are:

A. Maintain and enhance the landscape elements.
B. Prevent the introduction of invasive species
C. Maintain biodiversity elements of the core biodiversity habitats
D. Prevent deterioration of the habitats
E. Monitor the impacts of the Habitat Management practices.

A) Landscape

Of specific importance will be the management of the habitats for the first 5 years so that that the habitats and maintenance methodologies on site can be refined with the assistance of an ecologist. Following the first 5 years of maintenance, a refined HMP will be provided to the DLRCC biodiversity officer outlining the ongoing maintenance on site that will be carried out into the future. Initial planting and layout should be as per AECOM landscaping guidelines with follow up maintenance as follows:

Table 2. *All Areas*

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Watering	Young plants post planting are particularly prone to desiccation. All areas of grass, perennials, shrub, and tree planting should be sufficiently watered during the establishment period.	Once a week, or for first year (more, or less, frequent depending on weather.)
Plant replacements	All plants that have been removed should be replaced as soon as practical. If necessary, establish cause of death if specific areas are prone to plant deaths.	As required
Maintenance of infrastructure	Plants and in particular climbers can have a tendency to block areas that are important to the running of the building e.g. gutters, ventilation inlets or exhausts, drains, paths etc. Maintenance will be required.	Once a month
Litter	Litter can be unsightly and, in some cases, e.g. food waste, attract vermin. Litter should be removed from the landscaped area.	Each week
Weed Control	Particularly when young plants are establishing it is important to keep weeds under control and remove nuisance weeds.	Every two weeks

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Digging Over	All planting beds, should be lightly forked over to maintain health soil condition to a depth of 75mm.	Once a year in Spring
Invasives/Habitats	Ecologist inspection of habitats on site during summer months and assessment of site for invasive species. Modification to HMP if required	Annual

Trees

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Establishment	All newly planted trees should be inspected to ensure strong growth. Replace any dead or dying trees. Watering should be supplemented in periods of dry weather.	Twice a year Spring and Autumn for first 3 years
Assessment	All trees should be inspected by a qualified arborist to ensure longevity of trees.	Once every 5 Years
Pruning Young trees up to 4m	Type and timing to suit species. Do not prune during late winter/ early spring sap flow period. Remove duplicated branches and potential weak forks. Pruning waste should be used to make piles and areas for biodiversity.	Once a year late spring or early autumn
Annual Maintenance	Check tree ties, stakes and loosen as required. Replace broken stakes or damaged ties.	Twice a year March and August
Annual Maintenance Year 5 onwards	Remove dead or decaying trees or branches. Material should be used as log piles or other features to enhance biodiversity.	Remove tree ties and stakes

Herbaceous Perennials and Ornamental Grasses

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Deciduous Species	Prune to remove dead and remaining foliage in late November to 150mm. Material should be used features to enhance biodiversity.	Once a year in Winter
Evergreen Species	Trim down foliage to 150 mm above ground	Once every two years in Spring

Wildflower Meadow

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Watering	Watering will be required during initial germination, meadow establishment and prolonged dry weather.	As required
Weeding	Weeding is essential during the establishment phase to ensure that the mix is given sufficient light and space to establish.	As required
Cutting	Mow to top grass (50-75mm) in first year	September or October
	Additional cutting should only be needed once a year. However, the cuttings should be left in situ for at least two weeks for the seed heads to dry and loose seeds.	Once a year in October

Green Roof

A detailed maintenance schedule has been provided by AECOM and is seen in Figure 17.

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Watering	Watering may be required during initial establishment in prolonged dry weather.	As required
Fertiliser	Fertiliser may be required for the first few years it is establishing in its new environment. Guidelines for the specific mixes should be acquired during installation.	As required
Weeding	Weeding is essential during the establishment phase to ensure that the Green roof is given sufficient light and space to establish.	As required
Diseases	Green roof plants need to be inspected for fungal diseases and insect problems on a regular basis.	Once a year in October
Drainage	The drainage system on the roof, underneath the green roof modules needs to be inspected regularly to make sure there are no backups that could cause puddling or pooling.	Once a year in October

Native Hedgerows

ITEM	ACTIVITIES	SUGGESTED FREQUENCY
Broken or dead matter	In autumn all hedges should be checked for broken or dead material, which should be removed.	Once a year in late Autumn
Pruning	Hedge trimming should be carried out in winter when birds are not nesting.	Once or twice a year depending on species

Monitoring

Planting on the site will commence with the completion of each stage of the works and, as a result, the programme is closely tied to construction operations. Ground preparation will precede planting and will include weed clearance and amelioration where necessary. Planting of species will be carried out in the dormant period from November – March, with grass seeding carried out from April – September. This will unsure ample opportunity for planting to establish properly and reduce casualties during the maintenance period. It should be noted that a post construction lighting and bat assessment will also be carried out.

Intensive landscape aftercare for each area will run for 12 months from the practical completion date using contact herbicides and hand weeding. There will be a period of 12 months defects liability on all planting with plant failures being replaced in the following planting season.

The landscaping of the proposed development will be regularly monitored to ensure that the elements and mitigation measures outlined in this report and the Habitat Management Plan are maintained and as per proposals. This would include the monitoring of key habitat areas on site. However, it should also be noted that annual ecological monitoring will be required. This will include a site visit by the project ecologist to examine the habitats on site to ensure that their integrity is maintained or enhanced. This will require the monitoring of specific ecological parameters to measure the success of certain aspects of the HMP and the overall ecological 'health' of the site. The monitoring for birds, bats, flora and amphibians in particular should occur annually for the first 3 years and biennially thereafter. Monitoring would focus on the diversity and abundance of these species. Following the 5th year, a revised HMP will be prepared and submitted to the DLRCC Biodiversity Officer. This HMP will outline a summary of the successes and failures of the first 5 years and outline the long-term maintenance strategy and monitoring proposed for the site.

Extensive Green Roof - Maintenance

Extensive Green Roof Maintenance

General Maintenance

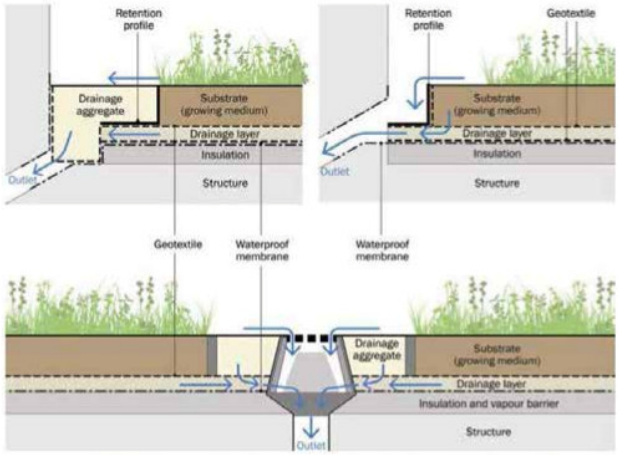
During installation of the green roof and during extended periods without rainfall green roofs will need to be watered every 6 weeks. Irrigation systems should be in line with BS 7562-3:1995 "Planning, design andinstallation of irrigation schemes - Part 3:Guide to irrigation water requirements." Remote monitoring systems can be used to observe any maintenance needed.

Water Bodies Maintenance

Wetland green roofs or greens roofs with waterbodies will require maintenance including, monitor accumulation and remove invasive species periodically. Water depths should be design to be kept under 30cm. An irrigation pump can be used to maintain water levels which will need to be cleared of vegetation and tree seeds.

Shaded Areas Maintenance

Maintenance carried out biannually, during the spring and autumn, removal of leaf litter, remove weeds, cut wildflowers to a height of 50-70mm, apply slow release organic fertiliser in the spring if needed.



Drainage systems for an extensive green roof.

Saftey and Systems

Saftey and Access

Teams carrying out green roof maintenance should be the only ones accessing the extensive green roof. Their saftey must be ensured through both/either a 1.1m minumum upstand around the perimetre of the roof measured from the top of the substrate surface or fall arrest/restraint systems.

Fire saftey

Fire breaks are required, 300mm width around parameters and outlets and 500mm around openings such as doors and windows. Material for fire breaks include 20-50mm size rounded pebbles at least 50mm deep over a drainage board or concrete paving stone. These breaks need to maintained and cleared of vegetation. Seasonal clearing of wildflowers and tall grasses will be required to reduce fire risk and alter the structure and weight of the green substrate.

Drainage systems

Drainage systems for green roofs must adhere to BS EN 12056-3:2000, Gravity Drainage systems inside buildings and BS 6229:2019, Flat roofs with continuously supported flexible waterproof coverings.

Fall arrest system for the saftey of maintenance people.

Figure 17. Extensive Green Roof-Maintenance

Conclusion

The Habitat Management Plan has been prepared by Altemar with the support of AECOM Ireland Ltd. It involves the implementation of significant Habitat Management measures in line with the Dun Laoghaire Rathdown County Council Development Plan 2016-2022 Biodiversity Objectives that are seen in Appendix III. The proposed planting schedule outlines the heavy reliance on native and pollinator friendly species.

The landscape elements of the proposed project have involved extensive consultation and reiterations of the landscape masterplan, to enhance biodiversity across all landscape components on site. These biodiversity enhancement measures are outlined and will be implemented. Of significant importance to the long term enhancement of the site for biodiversity are the habitat & biodiversity protection and maintenance measures that will be in place during operation. These measures are also outlined and will ensure the long term biodiversity enhancement of the proposed development within the grounds of the former Central Mental Hospital. The works in relation to the Habitat Management plan will be overseen by a project ecologist to ensure that the specifications outlined will be carried out.

Appendix I Baseline Environment-Terrestrial Habitats, Fauna, Flora and Avian Ecology

As outlined in the Biodiversity Chapter of the EIAR, the proposed development area was surveyed 13th August 2020, 21st August 2020, 23rd February 2021, 10th August 2021, 15th September 2021 and 12th October 2021. Additional surveys were carried out for wintering birds in 2020, 2021 and in 2022. Habitats encountered were classified according to Fossitt (2000) and are seen in Figure 10, based on the site visit in August 2021. Distinct habitats were noted and species detailed. It should be noted that the site is maintained to a high standard with full time gardeners on site. There is evidence of herbicide use and regular mowing. As a result, biodiversity is greater in the more neglected areas of the site. However, these areas make up very little of the site. The following habitats were noted:

Plate 1. GA2- Amenity grassland (improved).

GA2- Amenity grassland (improved).

Much of the open space on site consists of mown amenity grassland. Three large areas are noted on site. The first it to the south of the main treelined entrance, the second borders the southern boundary wall and the third is an area to the east of the main Central Mental Hospital building in the vicinity of some outbuildings. All areas were regularly mown and were poor in species diversity. Species included clovers (*Trifolium spp*.), plantains (*Plantago spp*.), thistles (*Cirsium arvense & C. vulgare*), creeping buttercup (*Ranunculus repens*), ivy (*Hedera helix*), common birds-foot-trefoil (*Lotus corniculatus*), docks (*Rumex spp*.), bramble *(Rubus fruticosus agg*.), daisy (*Bellis perennis*), and nettle (*Urtica dioica*).

Plate 2. WD5-Scattered Trees and Parkland.

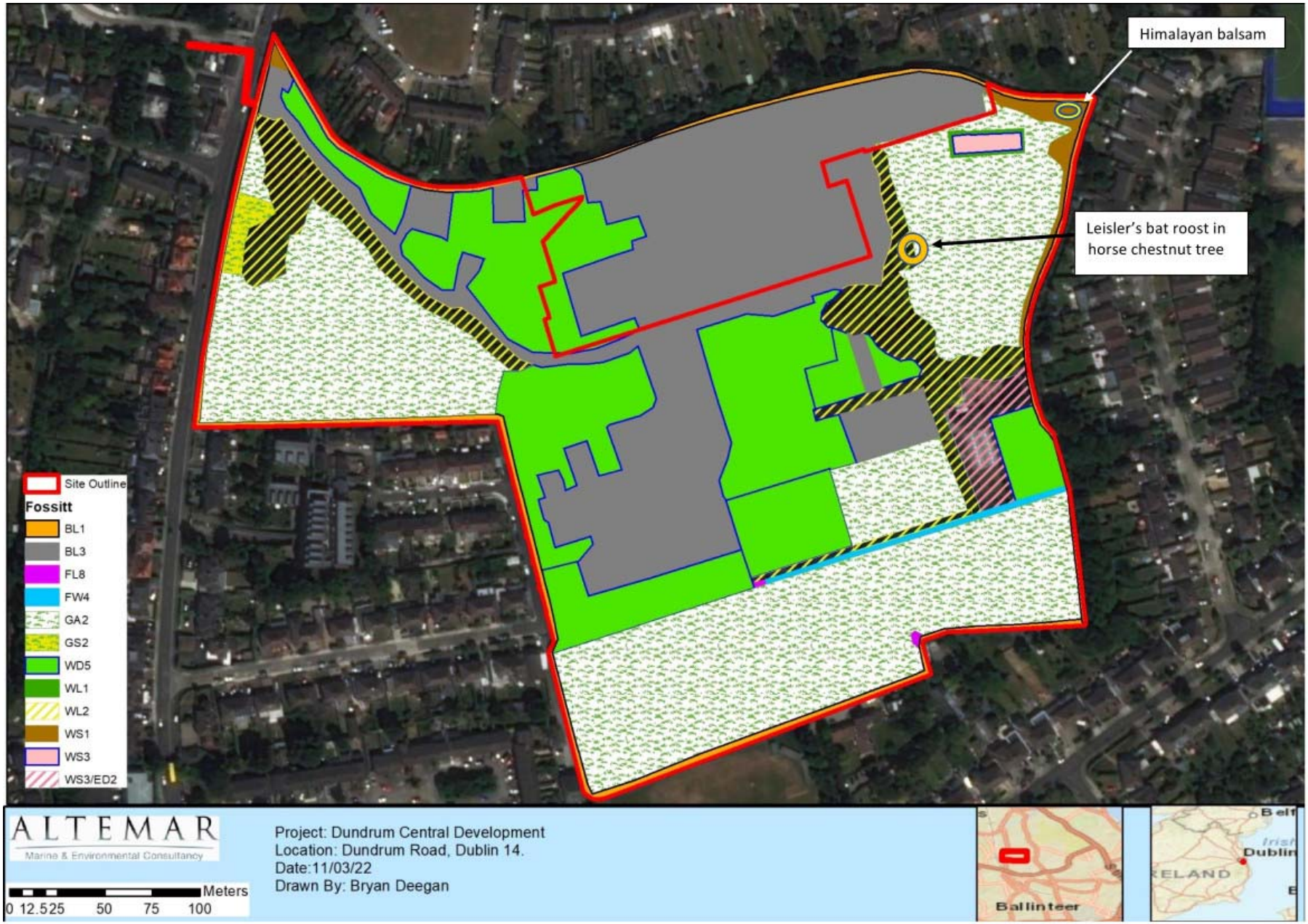


Figure 10. Fossitt Habitat map

Plate 3. WD5-Scattered Trees and Parkland (Orchard).

WD5-Scattered Trees and Parkland.

The grassland extends into significant areas of the site where scattered trees are noted. Similar flora are noted in these areas as was noted in the Amenity Grassland areas. However, tree species included Copper Beech (Fagus sylvatica 'Purpurea'), Norway Maple (Acer platanoides), Atlas Cedar (Cedrus atlantica), Atlas Cedar (*Cedrus atlantica*), Holly cv. (Ilex aquifolium), Sycamore cv. *(Acer pseudoplatanus*), White Flowering Cherry (*Prunus Sp*.), Monkey Puzzle (*Araucaria Araucana*), Douglas Fir (Pseudotsuga menziesii), Deodar Cedar (*Cedrus deodara*), Monterey Pine (*Pinus radiata*). Of note is the orchard on site which is located on the central area of the site proximate to the drainage ditch. Here the grass was less maintained the amenity grassland included white clover (*Trifolium repens*), red clover (*Trifolium pratense*), daisy (*Bellis perennis*), plantains (*Plantago spp*.), thistles (*Cirsium s*p.), creeping buttercup (*Ranunculus repens*), docks (*Rumex spp*.), cat's-ear (*Hypochaeris radicata*), nettle (*Urtica dioica*), dandelion (*Taraxacum spp*.), cow parsley (*Anthriscus sylvestris*), lesser trefoil (*Trifolium dubium*, bramble (*Rubus fruticosus*), hedge bindweed (*Calystegia sepium*), ground-elder (*Aegopodium podagraria*). Herbicide use on site was noted around trees and along paths.

GS2- Dry meadows and Grassy Verges

Dry meadows and grassy verges were noted in areas where the grass was left unmown. Species included meadow buttercup (*Ranunculus acris*), ragwort (*Senecio jacobaea*), thistles (*Cirsium s*p.), wild carrot (*Daucus carota*), rape (*Brassica napus*), kidney vetch (*Anthyllis vulnerary*), field bindweed (*Convolvulus arvensis*), cow parsley (*Anthriscus sylvestris*), clovers (*Trifolium spp*.), cleavers (*Galium aparine*), creeping cinquefoil (*Potentilla reptans*) and nettle (*Urtica dioica*).

Plate 4. WS1- Scrub

WS1- Scrub

Several areas on site were unmaintained and were let "go wild". This was particularly evident on the north east corner of the site along the boundary wall. Species in this area included thistles (*Cirsium sp*.), creeping buttercup (*Ranunculus repens*), common ragwort (*Senecio jacobaea*), colt's Foot (*Tussilago farfara*), winter heliotrope (*Petasites pyrenaicus*), hoary willowherb (*Epilobium parviflorum*), blackcurrant (*Ribes nigrum*), wild teasel (*Dipsacus fullonum*), butterfly-bush (*Buddleja davidii*), rosebay willowherb (*Chamaenerion angustifolium*), hedge bindweed (*Calystegia sepium*), ivy (Hedera helix), honeysuckle (*Lonicera periclymenum*), cleavers (*Galium aparine*), great willowherb (*Epilobium hirsutum*), common vetch (*Vicia sativa ssp. Segetalis*), bramble (*Rubus fruticosus agg*.), field forget-me-not (*Myosotis arvensis*), rape (*Brassica napus*), meadowsweet (*Filipendula ulmaria*), common mallow (*Malva sylvestris*), great mullein (*Verbascum thapsus*) and traveller's-joy (*Clematis vitalba*). It is important to note that an area of Indian Balsam (*Impatiens glandulifera*) was noted in a small area of damp ground in the north east corner of the site. This is an invasive species that is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) which makes it an offence under Regulation 49 to plant, disperse, allow or cause to grow this plant.

WL2- Treelines & Hedgerows WL1

Large mature treelines dominate the site particularly along the entrance driveway and to the south east of the main building. Combined with the scattered trees and parkland they provide a mature sylvian dominated landscape. Species include Corsican pine (*Pinus nigra sub sp*.), ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), red oak (*Quercus rubra*), lime (*Tilia sp*.), birch (*Betula sp*.), blue cedar (*Cedrus Atlantica* 'Glauca'), copper beech (*Fagus sylvatica 'Purpurea'*), horse chestnut (*Aesculus hippocastanum*). As seen in Figure 8-11 a Leisler's bat roost was noted in a horse chestnut tree (0401) to the east of the main building.

Hedgerows are present on site but these are made up primarily of non native ornamental species including Leyland Cypress (*Cupressocyparis x leylandii*), Contoneaster sp., Griselinia (*Griselinia littoral*s), privet (*Ligustrum sp.*), Pittosporum sp., laurel (*Laurus nobilis*) and cherry laurel (*Prunus laurocerasu*s). However, some native species were noted including Hawthorn (*Crataegus monogyna*), Holly (Ilex aquifolium), yew (*Taxus baccata*), and elder (*Sambucus nigra*) were noted.

Plate 5. Brightly lit buildings on site. All buildings were inspected for bat use (inset).

BL-Built Land

As previously stated, the proposed development site is maintained to a high level with the use of herbicide evident across the site. As seen in appendix I the buildings on site were inspected for bat presence and use. As stated in Appendix I no evidence of bat use was noted within the buildings on site. It should be noted that the buildings on site are brightly lit with halogen lamps overnight and this would deter bats from using the buildings on site.

Appendix II- Conservation Value of Species and Habitats on-site

Evaluation of Habitats

The site is relatively poor in biodiversity value. Much of the site is highly maintained with a strong management regime. No rare or protected habitats were noted. However, the treelines and mature trees within the scattered trees and parkland habitats would be deemed to be of local biodiversity importance primarily as a result of being a foraging and roosting habitat for both birds and bats.

Plant Species

The plant species encountered at the various locations on-site are detailed above. No protected species were noted. Records of rare and threatened species from NPWS were examined. No rare or threatened plant species were recorded in the vicinity of the Site. A small stand of Himalayan balsam (invasive species listed under S.I. 477) is noted on site.

Fauna

As outlined in the Mammal survey "The survey yielded few signs of mammals other than foxes (*Vulpes vulpes)*. Fox signs (droppings) were found at several locations on site and were observed freely roaming on site. Also noted were signs of brown rat Rattus norvegicus and fieldmouse *Apodemus sylvaticus*. Other species that will be present include the hedgehog *Erinaceous europaeus* and pygmy shrew *Sorex minutus*. The house mouse *Mus musculus* is likely to be present. The Irish hare Lepus *timidus hibernicus* was not observed on site. No signs of squirrels were seen. Red squirrel *Sciurus vulgaris* are not likely to occur on site given the lack of suitable habitat. Other fauna of interest that might occur on site include common frogs *Rana temporaria* and common lizards *Lacerta vivipara*. Frogs are to be expected on site as they are common in rank grasslands which provide good foraging habitat. However, only one very small pool was seen on site and no frog spawn was present at time of survey. The common or viviparous lizard occurs in many habitats in Ireland and is potentially present on site.

Bat fauna

A bat survey was carried out which included a bat emergent and detector survey (Appendix 8.3). The survey also carried out an inspection of the buildings on site and static detector s were placed on site. As outlined Appendix 8.3 "*No evidence of bat activity was noted in the buildings on site. No bats emerging onsite buildings were noted. However, a single Leisler's bat was observed bat was emerging from a Horse Chestnut (Tree 0401) on the eastern section of the site. Foraging activity was also noted of a common pipistrelle (to the south of the drain on site and around the farm buildings to the north east of the site*." The removal of the trees on site will result in a loss of foraging areas and a loss in potential bat roosts.

Avian Fauna

Wintering bird assessments are seen in Appendix 8.1 and Appendix 8.2. As outlined in Appendix 8.1 "Black-headed gull flocks of county importance (>90 birds; 1% of the county population) were observed on one occasion commuting over the proposed development site. Brent goose flocks of county importance (>84 birds; 1% of the county population) were observed on one occasion commuting over the proposed development site and curlew flocks of county importance (>29 birds; 1% of the county population) were observed on two occasions commuting over the proposed development site. Flocks of importance relative to the local population (1% of the Dublin Bay I-WeBS site population) were recorded for black-headed gull on fifteen occasions, brent goose on one occasion and curlew on four occasions." "On the 4th of January, curlew were observed using an area of amenity grassland within the proposed development site for foraging. Herring gull, black-head gull, lesser black-backed gull and common gull were frequently observed using the proposed development site for foraging and roosting. Black-headed gull and herring gull were observed regularly commuting over the proposed development. Curlew and brent geese were observed commuting over the proposed development site infrequently." The updated wintering bird assessment relating to the 2021/2022 season (Appendix 8.2) noted that "Of the target species of the bird survey, only one SCI species listed for the Special Protection Areas within the ZOI of the proposed development was recorded. This was Black-headed Gull. This species was also recorded in the previous survey by MKO (2021). Two other SCI species recorded in the previous survey (Curlew and Brent Goose) were not recorded within the survey period of this present survey."

In addition to the birds noted in Appendices 8.1 & 8.2, the following birds were noted on site:

Table 8.5. Bird species noted on site

Common Name	*Scientific Name*
Woodpigeon	*Columba palumbus*
Wren	*Troglodytes troglodytes*
Robin	*Erithacus rubecula*
Blackbird	*Turdus merula*
Blue tit	*Parus caeruleus*
Starling	*Sturnus vulgaris*
Great tit	*Parus major*
Rook	*Corvus frugilegus*
Song Thrush	*Turdus philomelos*
Dunnock	*Prunella modularis*
Goldfinch	*Carduelis carduelis*
Hooded Crow	*Corvus cornix*
Herring gull (on roof possibly nesting)	*Larus argentatus*
Magpie	*Pica pica*
Great tit	*Corvus monedula*

Invasive Species

Himalayan balsam (*Impatiens glandulifera*) was noted on site. No other invasive plant or animal species listed under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) Section 49, the Third Schedule: Part 1 Plants, Third Schedule: Part 2A Animals were noted on site.

Appendix III- Dun Laoghaire Rathdown Development Plan 2016-2022 Biodiversity Objectives.

As outlined in the Biodiversity section of the DLR Development Plan 2016-2022 '*The natural heritage of Dún Laoghaire-Rathdown includes flora, fauna, geology and landscape. This variety of life is often referred to as biological diversity or 'biodiversity'. The policy objectives are outlined below and were considered by the project team when creating the landscape strategy and HMP for the proposed development. The DLR Development Plan 2016-2022 Biodiversity Objectives that have been outlined (below) are the objectives that the project team, the proposed Landscape Masterplan and Habitat Management Plan have specifically and successfully addressed*.'

Policy LHB19: Protection of Natural Heritage and the Environment*

It is Council policy to protect and conserve the environment including, in particular, the natural heritage of the County and to conserve and manage Nationally and Internationally important and EU designated sites - such as Special Protection Areas, candidate Special Areas of Conservation, proposed Natural Heritage Areas and Ramsar sites - as well as non-designated areas of high nature conservation value which serve as 'Stepping Stones' for the purposes of Article 10 of the Habitats Directive.

Policy LHB20: Habitats Directive*

It is Council policy to ensure the protection of natural heritage and biodiversity, including European sites that form part of the Natura 2000 network, in accordance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines.

Policy LHB21: Biodiversity Plan*

It is Council policy to implement the provisions of the County Biodiversity Plan 2009-2013 and to produce a second Biodiversity Plan which will be set within the context of the second National Biodiversity Plan, 'Actions for Biodiversity, 2011 – 2016' prepared by the Department of Arts, Heritage, Gaeltacht and the Islands. Due regard shall be had to the recommendations arising from the implementation of the current 2009 – 2013 Dún Laoghaire-Rathdown Biodiversity Plan or its successor plan.

Policy LHB22: Designated Sites*

It is Council policy to protect and preserve areas designated as proposed Natural Heritage Areas, candidate Special Areas of Conservation, and Special Protection Areas. It is Council policy to promote the maintenance and as appropriate, delivery of 'favourable' conservation status of habitats and species within these areas.

Policy LHB23: Non-Designated Areas of Biodiversity Importance*

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 notable sites, habitats and features of biodiversity importance - including species protected under the Wildlife Acts 1976 and 2000, the Birds Directive 1979, the Habitats Directive 1992, and rare species - are adequately protected. Ecological assessments will be carried out for all developments in areas that support, or have potential to support, features of biodiversity importance or rare and protected species and appropriate mitigation/ avoidance measures will be implemented. In implementing this policy regard shall be had to the recommendations and objectives of the Green City Guidelines (2008) and 'Ecological Guidance Notes for Local Authorities and Developers' (Dún Laoghaire-Rathdown Version 2014).

Policy LHB24: County-Wide Ecological Network*

It is Council policy to develop an Ecological Network throughout the County which will improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive. The network will also include non-designated sites.

Policy LHB25: Rivers and Waterways*

It is Council policy to maintain and protect the natural character and ecological value of the river and stream corridors in the County and where possible to enhance existing channels and to encourage diversity of habitat. It is also policy (subject to the sensitivity of the riverside habitat) to provide public access to riparian corridors to promote improved passive recreational activities.

Policy LHB26: Hedgerows*

It is Council policy to protect hedgerows in the County from development, which would impact adversely upon them. It is Council policy to promote the County's hedgerows by increasing coverage, where possible, using locally native species and to develop an appropriate code of practice for road hedgerow maintenance.

Policy LHB27: Geological Sites

It is Council policy to protect, promote and preserve sites of Geological and Geomorphological importance, in particular the proposed Natural Heritage Areas (NHAs) and any County Geological Sites (CGS) that become designated during the lifetime of this Plan.

Policy LHB28: Green Belts*

It is Council policy to retain the individual physical character of towns and development areas by the designation of green belt areas where appropriate.

Policy LHB29: Invasive Species

It is Council policy to support as appropriate the National Parks and Wildlife Service efforts to seek to control and manage alien / invasive species (e.g. Japanese knotweed, Giant hogweed, Himalayan balsam, etc.) and noxious weeds (e.g. ragwort, thistle, dock, etc.) within the County.