



ECOLOGICAL BASE LINE AND CONCEPT DESIGN

PUBLIC REALM MASTERPLAN FOR THE NORTH LOTTS & GRAND CANAL DOCK SDZ PLANNING SCHEME 2014



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Dublin
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Cover image: Perspective of the liffey, North Lotts and Grand Canal Dock.

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NORTH LOTTS & GRAND CANAL DOCK SDZ

PUBLIC REALM MASTER PLAN

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1. Introduction

On the 16th May 2014 An Bord Pleanála approved the making of the North Lotts and Grand Canal Dock Planning Scheme as prepared by Dublin City Council on the 5th of November 2013. The SDZ scheme with an area of 66ha, has a vision to become a world class maritime quarter with a distinctive Dublin character. It will be a model of sustainable inner city regeneration incorporating socially inclusive urban neighbourhoods, a diverse, green innovation economy contributing to the prosperity of the locality, the city and country, all supported by exemplary social and physical infrastructure and a quality public realm integrated with the wider city.

The purpose of this Report is to set the context for the ecological design that will be embedded within an overall Masterplan for the design of the streets and open public spaces in the SDZ area. It does purport to be a prescription for the detailed design but sets out the basis for a hierarchy of ecological enhancement opportunities that can be integrated into the roll-out of the SDZ.

2. Dublin Docklands - where nature meets the City

Water dominates the ecological landscape in this part of the City and provides food and shelter for a variety of flora and fauna. The Grand Canal basin is home to bats, otters, Terns and several species of fish all of which thrive despite the close interaction with the busy urban environment. All are protected species either at national and international level and require a sensitive design that permits them to stay in the area.

The DDSDZ area is dominated by the Liffey which itself is host to several fish and bird species and also feeds Dublin Bay with valuable nutrients which in turn support the internationally-important bird areas across bull island, Sandymount and beyond. Thousands of birds fly into the bay each autumn and feed on the mudflats and sandbanks. The design of any features in the SDZ must respect the sensitivities of these birds. Black guillemots also are a unique sight along the Liffey and nest and feed in close proximity to the mouth of the Dodder and the north quays.

The Docklands is also the locations where two the capital's other important rivers - the Dodder and the Tolka meet the Liffey. These rivers are both key ribbons of green infrastructure that meander through the heart of Dublin's suburbs and provide safe shelter for a variety of Dublin's fauna.

But despite the knowledge of this nature that exists in our urban fabric, this does not mean that it is always appreciated by the public or properly protected. The Public Realm Masterplan facilitates the opportunity to develop public areas whilst protecting bat roosts, bird nest sites, the Tolka and the Dodder and the Canal and banks. "Protection" *per se* does not always acknowledge the decline of such green infrastructure across the city and in order to offset the decades of urban development that led to loss of biodiversity, we must ensure that where possible we provide enhancement of habitats, provision of new feeding, roosting and breeding sites and allowing the public to appreciate the closeness to nature that is often overlooked in the Docklands.

Our role will be to provide the ecological context of the study area, to provide recommendations on how the ecological assets of the area can be protected and to suggest novel ways to integrate biodiversity into the proposed designs. Suggestions include planting mixes, integrated bird and bat boxes within hard structures, green walls and terraces, reedbed pontoons, sensitive lighting and riparian planting near the Dodder and Tolka to "frame" their confluence with the canals and to provide shelter for the riparian fauna.

3. Legislation and Policy Context

3.1 Development Policies and Legislation

The Dublin City County Development Plan 2011 – 2017 lists several policies in relation to the Docklands area, which includes SDZ. Relevant policies of DCC CDP include:

- GC22 To develop sustainable coastal, estuarine, canal and riverine recreational amenities to enhance appreciation of coastal natural assets;
- GC24 To seek continued improvement of water quality, bathing facilities and other recreational opportunities in the coastal, estuarine and surface waters in the city and to protect the ecology and wildlife of Dublin Bay;
- GC25 To protect and enhance bio-diversity in the city through the protection of nature conservation sites, maintenance of valuable mitigation habitats, the creation of a cohesive network of green corridors, green infrastructure design and also through the identification of opportunities for new habitats, buffer zones and wildlife corridors. Buffer zone is a protective area between wildlife / habitats & human activity, – traffic noise etc.;
- GC26 To protect flora, fauna and habitats, which have been identified by the Habitats Directive, Birds Directive, Wildlife Act 1976 (as amended), the Flora Protection Order (S.I. no. 84 of 1999), and the European Communities (Natural Habitats) Regulations 1997 (S.I. no. 94 of 1997);
- GC27 To conserve and manage all Natural Heritage Areas, Special Areas of Conservation and Special Protection Areas identified and designated, or proposed to be designated, by the Department of Environment, Heritage and Local Government. These designations will allow for protection in the event of any approved boundary changes by the Department of Environment, Heritage and Local Government;
- GC28 To see the conservation and management of areas of natural environmental value;
- GC29 To conserve priority species, habitats, and natural heritage features identified in the Dublin City Biodiversity Action Plan 2008 – 2012 for priority conservation measures;
- GC30 To have regard to the conservation and enhancement of significant non-designated areas of ecological importance in accordance with development standards set out in this plan;
- GC31 That any plan or project with the potential to give rise to significant direct, indirect or secondary impacts on a Natura 2000 site(s) shall be subject to an appropriate assessment in accordance with Article 6(3) of the Habitats Directive;
- GCO27 It is an objective of the DCC to support the implementation of the 'Dublin City Biodiversity Action Plan 2008-12', including *inter alia* (a) the conservation of priority species, habitats and natural heritage features, and (b) the protection of designated sites;
- SI9 To achieve a strategic, coherent and high quality cycle network across the city that is integrated with public transport and interconnected with cultural, recreational, retail, educational and employment destinations and attractions;

3.2 National Biodiversity Plan 2011 – 2016

Ireland's National Biodiversity Plan sets out actions and targets to be achieved in the process of conserving Ireland's ecosystems and biodiversity. The vision of the NBP is "That biodiversity and

ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally.” The overarching target of the NBP is “That biodiversity loss and degradation of ecosystems are reduced by 2016 and progress is made towards substantial recovery by 2020”. The NBP envisages that this vision and overall target will be met through seven strategic objectives and 102 specific actions (DAHG, 2011).

3.3 Dublin City Development Plan 2011 – 2017

A key priority of the Dublin City Development Plan is to reinforce the importance of green infrastructure, recreation and biodiversity as a vital component of a compact city. The introduction of a green infrastructure strategy reflects an integrated approach to the city’s open space, recreational, landscape and biodiversity assets.

The Dublin City Development Plan recognizes that a Green Infrastructure Network connects green spaces and other natural features such as rivers and canals through the city whilst simultaneously linking towns and city areas. It includes and integrates open spaces, corridors for cycling and walking, green corridors, areas of high biodiversity value, and recreational areas and it is a unifying theme of Green Infrastructure strategy in the Dublin City Development Plan. It recognises the importance and benefits of interaction between the man-made city environment, including parks and open spaces and the natural environment (DCC, 2011).

3.4 Dublin City Biodiversity Action Plan 2008 – 2012

The Dublin City Biodiversity Action Plan is intended to be a working document. It includes a summary of the range of priority habitats and species of international, national and local importance in the city. The main content of the plan is a program of actions recommended to protect and enhance the city’s natural heritage. The plan has selected a number of habitats and species of priority conservation importance for Dublin city (DCC, 2011).

3.5 Wildlife Act 1976 and Wildlife (Amendment) Act 2000, 2010

The Wildlife Acts including all amendments are Ireland’s primary national legislation for the protection of wildlife. They cover a broad range of issues, from the designation of nature reserves, the protection of species, regulation of hunting and controls in wildlife trading.

3.6 Flora (Protection) Order 2015.

Plants that are protected under this Order cannot be wilfully cut, picked, uprooted or damaged or parts of the plants removed.

3.7 EC Habitats Directive

The European Union Directive 92/43/EEC of May 1992 on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive) aims to protect important habitats and species throughout the European Union. This is transposed in Ireland primarily by the *European Communities (Birds and Natural Habitats) Regulations 2011* (S.I. 477 of 2011), (more commonly referred to as the Birds and Habitats Regulations) and by the Planning and Development (Amendment) Act 2010, as amended. The Birds and Habitats Regulations also deal with the introduction of non-native invasive plant and animal species.

3.8 EC Birds Directive

The Birds Directive [2009/147/EC](#) on the conservation of wild birds requires the protection of areas containing protected bird species (listed on Annex I of the Directive), regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

3.9 Bern Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) was ratified by Ireland in 1982. The principal aims of the Convention are to ensure

conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix 3 of the Convention. To this end the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species. The Bern Convention was the forerunner to the Habitats Directive and many of the measures, habitats and species listed in it were carried forward into the Habitats Directive. Ireland is a Contracting Party to the convention.

3.10 Bonn Convention

The Convention on the Conservation of Migratory Species of Wild Animals (also known as Bonn Convention) aims to conserve terrestrial, marine, aquatic and avian migratory species throughout their range. It is a 92 member intergovernmental treaty concerned with the conservation of wildlife and habitats on a global scale. Ireland is a Contracting Party to the convention.

3.11 Ramsar Convention

Ramsar is the Convention on Wetlands of International Importance especially waterfowl habitat which covers all aspects of wetland conservation and wise use. The Convention has three main 'pillars' of activity: the designation of wetlands of international importance as Ramsar sites; the promotion of wise use of all wetlands in the territory of each country; and international co-operation with other countries to further the wise-use of wetlands and their resources. Ireland is a Contracting Party to the convention. To date Ireland has designated 45 sites designated as Wetlands of International Importance, with a surface area of 66,994 hectares (www.ramsar.org, September 2012)

3.12 EUROBATS

Eurobats, the Agreement on Convention on the Conservation of Populations of European Bats, recognises that endangered migratory-species can be properly protected only if activities are carried out over the entire migratory range of the species. The agreement aims to protect all 52 species of bats identified in Europe, through legislation, education, conservation measures and international co-operation with agreement members and with those who have not yet joined. Ireland ratified the Convention in 1995 with 9 bat species currently known to occur in Ireland.

4. Areas of nature conservation importance

Two Natural Heritage Area’s (NHA) which are designated for their nature conservation interests are located directly within the Docklands Public Realm area. These are the Royal Canal NHA (2103) and the Grand Canal NHA (2104). No other designated sites are located within or immediately adjacent to the docklands area.

4.1 European sites SACs, SPAs, RAMSARS

Table 1 presents the list of sites of European-scale ecological importance. They are designated under the EC Habitats Directive and the EC Birds Directive on the basis of the presence of certain species and habitats as set out in the Table.

Table 1 International designated areas within 15km of the SDZ

Site	Qualifying Interests/Special Conservation Interests
Special Areas of Conservation (SAC) Sourced: npws.ie (December 2015)	

North Dublin Bay (IE000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	North Bull Island (IE00406)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Wetland and Waterbirds [A999]
South Dublin Bay (IE000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	Dalkey Island (IE004172)	Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194]
Baldoyle Bay (IE000199)	Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	South Dublin Bay & River Tolka Estuary (IE004024)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetland and Waterbirds [A999]
Howth Head (IE000202)	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030]	Howth Head Coast (IE004113)	Kittiwake (<i>Rissa tridactyla</i>) [A188]
Irelands Eye (IE002193)	Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Baldoyle Bay (IE004116)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Wetland and Waterbirds [A999]
Malahide Estuary (IE000205)	Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Spartina swards (<i>Spartinion maritima</i>) [1320] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Irelands Eye (IE004117)	Cormorant (<i>Phalacrocorax carbo</i>) [A017] Herring Gull (<i>Larus argentatus</i>) [A184] Kittiwake (<i>Rissa tridactyla</i>) [A188] Guillemot (<i>Uria aalge</i>) [A199] Razorbill (<i>Alca torda</i>) [A200]
Glenasmole Valley (IE001209)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]	Special Protection Areas (SPA) Sourced: npws.ie (December 2015)	
Rockabill to Dalkey Islands (IE003000)	Reefs [1170] <i>Phocoena phocoena</i> (Harbour Porpoise) [1351]		
Wicklow Mountains (IE002122)	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110] Calcareous rocky slopes with <i>chasmophytic</i> vegetation [8210] Siliceous rocky slopes with <i>chasmophytic</i> vegetation [8220] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] <i>Lutra lutra</i> (Otter) [1355]		

Malahide Estuary (IE004025)	Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Pintail (<i>Anas acuta</i>) [A054] Goldeneye (<i>Bucephala clangula</i>) [A067] Red-breasted Merganser (<i>Mergus serrator</i>) [A069] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Wetland and Waterbirds [A999]
Wicklow Mountains (IE004040)	Merlin (<i>Falco columbarius</i>) [A098] Peregrine (<i>Falco peregrinus</i>) [A103]
RAMSAR Sites Sourced: http://irishwetlands.ie/index.php/irish-sites/ (December 2015)	
Baldoyle Bay (413)	Special Protection Area EC Directive Nature Reserve. (Source: Irishwetlands.ie)
Broadmeadow Estuary (833)	An estuary cut off from the sea by a large sand spit. The site includes well-developed saltmarshes, salt meadows, rocky shores, a well-developed outer dune ridge and sand mudflats exposed at low tide. Vegetation consists of a large bed of eelgrass (<i>Zostera noltii</i> and <i>Z. angustifolium</i>) and extensive mats of green algae (<i>Enteromorpha</i> , spp., <i>Ulva lactuca</i>). The estuary is an important wintering site for numerous species of waterbirds. The Brent goose population is of international importance. The high numbers of diving birds reflects the lagoon-type nature of the inner estuary. Human activities include water sports. There is a marina and some housing. (Source: Irishwetlands.ie)
North Bull Island (406)	Biosphere Reserve Special Protection Area EC Directive, Special Protection Area and Special Area of Conservation. (Source: Irishwetlands.ie)
Sandymount Strand / Tolka Estuary (832)	An intertidal system supporting a large bed of eelgrass (<i>Zostera noltii</i>) with extensive areas of sandflats. The site is important for various species of waterbirds, supporting internationally important numbers of Brent Geese and large numbers of roosting gulls and terns. Various species of annalids, bivalves and small gastropods occur. Bait-digging is a regular activity on the sandy flats. (Source: Irishwetlands.ie)

4.2 National sites and Salmonid waters

Two proposed Natural Heritage Area’s (NHA) are located directly within the SDZ area. These are the Royal Canal pNHA (2103) and the Grand Canal pNHA (2104). No other designated sites are located within or immediately adjacent to the SDZ. Table 2 below lists nationally designated sites within 15km of the SDZ. The Dolphins pNHA within the River Liffey near Pigeon House Harbour supports nesting terns with approximately 350 pairs of Common tern recorded in 2006¹ but this number has reduced significantly in the last few years.

The Grand Canal regularly supports 11 different bird species over the winter months include Cormorant, Little Grebe, Coot, Moorhen and Black-headed Gull. Opposite-leaved pondweed

¹

<http://www.dublincity.ie/sites/default/files/content/SiteCollectionDocuments/DCC%20Biodiversity%20Action%20Plan.pdf>

Groenlandia densa which is protected under the Flora Protection Order 2015, can be found in the Grand Canal.

Table 2 National designated areas within 15km of the Dublin Docklands Public Realm						
Nature Reserves and Wildfowl Sanctuaries ²	Proposed Natural Heritage Areas ³		Shellfish Areas ⁴	Salmonid Areas ⁵	Special Amenity Area Orders ⁶	FPO Sites ⁷
Baldoyle Estuary Nature Reserve and Wildfowl Sanctuary	Royal (2103)	Canal	Malahide	The River Dargle and its tributaries (>14km south)	North Bull Island	North Bull Island is listed for Lesser Centaury, Hemp Nettle and Meadow Saxifrage.
North Bull Island Nature Reserves	Grand (2104)	Canal			Note: There is a proposed SAAO under consideration for the River Liffey Valley	
	Liffey (0128)	Valley				
	Dodder (0991)	Valley				
Sandymount Strand Nature Reserve	Feltrim (01208)	Hill				The Royal Canal is listed for Opposite-Leaved Pondweed.
	Santry Demesne (0178)					
	North Dublin Bay (0206)					
	South Dublin Bay (0210)					
	Sluice Marsh (1763)	River				
	Baldoyle (0199)	Bay				
	Ireland’s (0203)	Eye				
	Howth (0202)	Head				
	Malahide Estuary (0205)					
	Lugmore (1212)	Glen				
	Glenasmole					

² Sourced: <http://www.npws.ie/protectedsites/> (December 2015)

³ Sourced: <http://www.npws.ie/protectedsites/> (December 2015)

⁴ Sourced: <http://www.environ.ie/en/Environment/Water/WaterQuality/ShellfishWaterDirective/#StatutoryInstruments> (December 2015)

⁵ <http://gis.epa.ie/Envision> - Salmonid Rivers and those in Salmonid Regs (S.I. 293 only) (accessed December 2015)

⁶ http://dublincitydevelopmentplan.ie/downloads/Vol5_Strategic-Environmental-Assessment-Draft.pdf (Accessed December 2015)

⁷ http://dublincitydevelopmentplan.ie/downloads/Vol5_Strategic-Environmental-Assessment-Draft.pdf (Accessed December 2015)

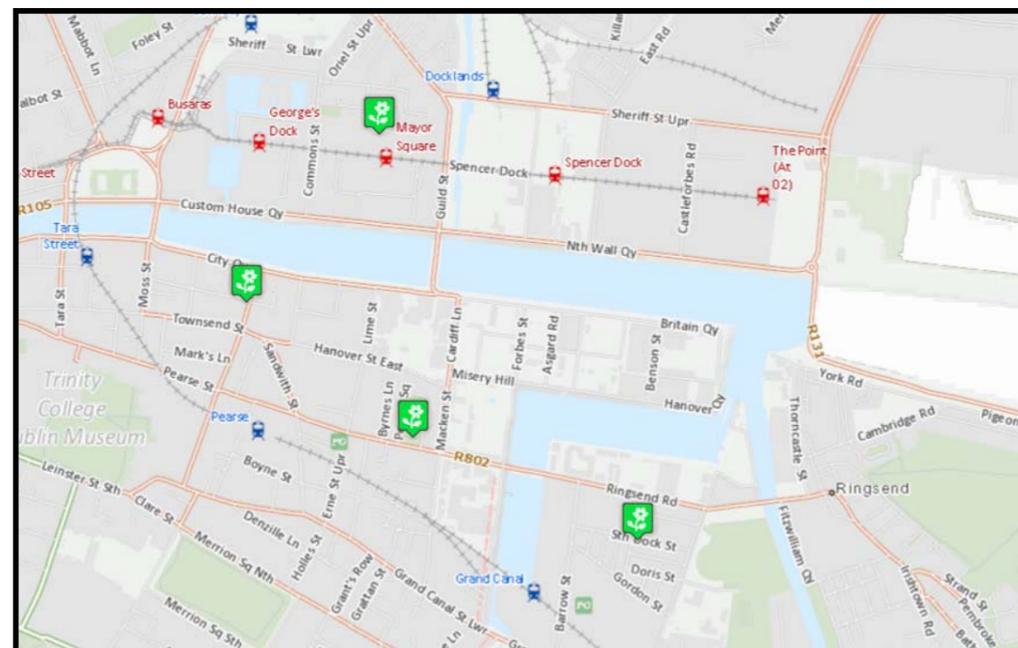
Valley (1209)				
Fitzsimon's Wood (1753)				
Dingle Glen (1207)				
Loughlinstown Woods (1211)				
Dalkey Coastal Zone and Killiney Hill (1206)				
Ballybetagh Bog (1202)				
Dolphins Docks (0201)				

4.3 Areas of local biodiversity importance

Sites listed as being of local Importance in Dublin (“Conservation Areas”)⁸ include the rivers Dodder, Tolka and Liffey. North Bull Island was recognised on the UNESCO World Network of Biosphere Reserves in 1981. North Bull Island is unique among Biosphere Reserves given its close proximity to a capital city. This Biosphere reserve was recently extended to encompass the Tolka and Baldoyle Estuaries, Howth Head, Dalkey Island, Killiney Hill and Booterstown Marsh.

There are a number of listed open spaces within the Dublin City Area⁹, these include parks which lie in close proximity to or within the Docklands SDZ Public Realm area such as Sheriff Street Park, City Quay, Pearse Square, South Dock Street and Sean Moore Park.

Figure 1



Open Spaces within and near the SDZ (Source: DCC Location Publisher)

The River Dodder flows into the Docklands next to the outflow of Grand Canal basin. Protected and/or notable species that have been recorded on this river include Bats, Otter *Lutra lutra*, Kingfisher *Alcedo atthis*, Dipper *Cinclus cinclus*, Brown trout *Salmo trutta* and Salmon *Salmo salar*. Rare plants that might still be found on the River Dodder (according to the DCC Biodiversity Action Plan, records for the BAP were provided by Dublin Naturalists Field Club) include: *Malva neglecta*, *Agrostemma githago*, *Rorippa palustris*, *Hypericum hircinum*, *Mimulus guttatus*, *Allium carinatum*, *Barbarea intermedia*. However it should be observed that a number of these species are non-native or have naturalised aside from their status as rare plants.

The River Tolka runs to the north of the SDZ and in addition to supporting the species of mammal, bird and fish mentioned above, rare plant species such as *Diplotaxis muralis*, *Anemone nemorosa*, *Salix viminalis* x *S. caprea*, *Ranunculus aquatilis*, *R. tricophyllus*, *Cornus sericea*, *Carex strigosa*, *Spergula arvensis*, *Orobanche hederarum*, *Milium efusum*, *Thlaspe arvense*, *Solanum migrum*, *Betula pendula*, *Salix fragilis* var *russellia* and *Sparganium emersum* might exist here.

⁸ Draft Dublin City Development Plan 2016 – 2022 Strategic Environmental Assessment – Volume 5

⁹ <http://www.dublincity.ie/LocationPublisher/default.aspx?themenam=Planning&mapname=Planning>

The DCC BAP also lists the Liffey, which flows into the Docklands area, as also supporting Otter, Kingfisher, Dipper, Brown Trout (According to the Inland Fisheries Ireland, Atlantic Salmon, River Lamprey *Lampetra fluviatilis* and Eel *Anguilla anguilla* are also recorded in this River). Rare plants that have been historically recorded on the river Liffey (which may still be present) include: *Botumus umbellatus*, *Chara globularis*, *Erigeron karvinskianus*, *Hieracium gougetianum*, *Myriophyllum spicatum*, *Potamogeton lucens* x *P. perf.*, *P. natans*, *P. pusillus*, *Sambucus ebulis*, *Scrophularia umbrosa*, *Senecio viscosus*, *S. vulgaris* f. *radiatus*, *Sparganium emersum* and *Vulpia myuros*.

5. Rare, Protected or Notable Flora and Fauna

Distribution records (some historic) for many rare/protected species in Ireland are provided in a grid of 10km x 10km that cover all of Ireland on www.npws.ie. Records were obtained from the online database in December 2015 for the study area, which lies within Irish National Grid 10km square O13. The results are displayed in Table 3 below.

No protected flora (with the exception of Meadow Barley *Hordeum secalinum*) are known from within the SDZ. Meadow Barley was recorded at “Lotts” in 1836, but the precise location is unknown. This grass species is protected under the *Irish Flora Protection Order (2015)* but is not likely to occur here now. There are a number of rare plant species (some of which are non-native) which might still be found along the Royal and Grand Canals (according to the DCC BAP).

Distribution records for rare/protected or notable species were also obtained from the National Biodiversity Data Centre’s (NBDC) online database (<http://maps.biodiversityireland.ie>) for the SDZ. The results are listed below in Table 3.

British Trust for Ornithology (BTO)/BirdWatch Ireland Bird Atlas 2007-2011 project maintains downloadable bird sighting records for the 2007-2011 breeding and wintering seasons at a 2 x 2km or ‘tetrad’ scale, and these were downloaded for the SDZ. Bird species of conservation concern known from the area are listed below in Table 3. A number of the bird records were also obtained from the National Biodiversity Data Centre database.

Bat records were obtained from Bat Conservation Ireland (BCI) for the site and environs in December 2015.

Where available, a literature review examined ecological assessments undertaken for previous planning applications, as per the reference list at the end of this report. The results are listed below in Table 3 and include invasive species, protected species and those deemed of conservation interest.

Sightings and strandings for cetaceans were obtained from the Irish Whale and Dolphin Group website (www.iwdg.ie) for the Dublin Bay Area. The results are also listed below in Table 3.

Species that would be expected to occur within the SDZ lands are highlighted in bold text

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
Flora						
Opposite-leaved Pondweed	<i>Groenlandia densa</i>	In Grand Canal near Ringsend basin.	9.12.2009	Flora Protection Order (1999)	Endangered	NPWS in Site synopsis for Grand Canal pNHA
Meadow Barley	<i>Hordeum secalinum</i>	Lotts	1836	Flora Protection Order (1999)	Endangered	NPWS Website (10km square)
Tufted salt-marsh grass	<i>Puccinellia fasciculata</i>	Sandymount	1840	Flora Protection Order (1999)	Vulnerable	NPWS Website (10km square) Friends of Booterstown Marsh Committee
		Booterstown marsh	2014			
Divided Sedge	<i>Carex divisa</i>	North Lotts	1886	Flora Protection Order (1999)	Critically Endangered	NPWS Data Request
Opposite-Leaved Pondweed	<i>Groenlandia densa</i>	Royal Canal 4th and 5th locks	1990	Flora Protection Order (1999)	Endangered	NPWS Data Request
Yellow Archangel	<i>Lamiastrum galeobdolon</i>	Cardiff's Bridge, Co. Dublin	1794	None	Vulnerable	NPWS Data Request
Fish						
Twaite Shad	<i>Alosa fallax</i>	-	2000	Habitats Directive (Annex II & V)	Vulnerable	NPWS Data Request

¹⁰ Habitats Directive http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm, Flora Protection Order <http://www.irishstatutebook.ie/1999/en/si/0094.html>, Irish Wildlife Act (1976) and Amendments (2000) <http://www.npws.ie/legislationandconventions/irishlaw/>; Birds Directive <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF>.

¹¹ Green/Amber/Red-listed for birds from Birds of Conservation Concern in Ireland (Colhoun and Cummins 2013), Irish Red list No. 3 Terrestrial Mammals (Marnell et al., 2009), Vascular Flora from the Irish Red List Book No. 1 Vascular Plants (Curtis & McGough, updated 2005); Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish (King et.al, 2011)

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
Riparian Mammals						
Otter	<i>Lutra lutra</i>	Artificial Holt on River Dodder below Aviva stadium (status unknown - particularly since Dodder floods in 2012).	04/07/2005	Habitats Directive (Annex II & IV), Irish Wildlife Acts.	Near Threatened	NPWS Local Staff
		Grand Canal, Irishtown, Dublin 2	03/08/2010			
Amphibians						
Common Frog	<i>Rana temporaria</i>	River Dodder, Co. Dublin O13 Tetrads Square	1968 2014	Habitats Directive (Annex V), Irish Wildlife Acts.	Least Concern	NPWS Data Request NBDC - Amphibians and Reptiles of Ireland
Smooth Newt	<i>Lissotriton vulgaris</i>	O13 Tetrads Square	2013	Irish Wildlife Acts		NBDC – National Newt Survey
Birds						
Common Sandpiper	<i>Actitis hypoleucos</i>	O13 Tetrads Square	1991	Irish Wildlife Acts	Amber	NBDC – Bird Atlas 1988-1991
Sky Lark	<i>Alauda arvensis</i>	O13 Tetrads Square	2012	Irish Wildlife Acts	Amber	NBDC – Ireland's Bioblitz
Kingfisher	<i>Alcedo atthis</i>	O13 Tetrads Square 2 birds recorded commuting down River Liffey. Birds historically known from Halfpenny bridge and River	2015	Irish Wildlife Acts, EU Birds Directive (Annex I)	Amber	NBDC – Birds of Ireland Scott Cawley Ltd. (RF)

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
		Liffey within SDZ, particularly in late summer.				
Sparrowhawk	<i>Accipiter nisus</i>	O 13 Tetrads Square	2014 2007-2011	Irish Wildlife Acts	Amber	NBDC – Birds of Ireland BTO Bird Atlas
Northern Shoveler	<i>Anas clypeata</i>	O 13 Tetrads Square	2011	Irish Wildlife Acts	Red	NBDC - Bird Atlas 2007 - 2011
Teal	<i>Anas crecca</i>	O 13 Tetrads Square	2012	Irish Wildlife Acts	Amber	NBDC – Birds of Ireland
Wigeon	<i>Anas penelope</i>	O 13 Tetrads Square	2011	Irish Wildlife Acts	Red	NBDC - Bird Atlas 2007 - 2011
Gadwall	<i>Anas strepera</i>	O 13 Tetrads Square	2011	Irish Wildlife Acts	Amber	NBDC - Bird Atlas 2007 - 2011
Scaup	<i>Aythya marila</i>	O 13 Tetrads Square	2011	Irish Wildlife Acts	Amber	NBDC - Bird Atlas 2007 – 2011
Tufted Duck	<i>Aythya fuligula</i>	O 13 Tetrads Square	2007-2011	Irish Wildlife Acts EU Birds Directive (Annex III)	Amber	BTO Bird Atlas
Pochard	<i>Aythya ferina</i>	O 13 Tetrads Square	2011	Irish Wildlife Acts	Red	NBDC - Bird Atlas 2007 - 2011
Light bellied Brent Goose	<i>Branta bernicla subsp. hrota</i>	O 13 Tetrads Square	2012	Irish Wildlife Acts	Amber	NBDC - Birds of Ireland
Barnacle Goose	<i>Branta leucopsis</i>	O 13 Tetrads Square	2015	Irish Wildlife Acts	Amber	NBDC - Birds of Ireland
Twite	<i>Carduelis flavirostris</i>	O 13 Tetrads Square	1984	Irish Wildlife Acts	Red	NBDC Bird Atlas The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
Black Guillemot	<i>Cephus grylle</i>	O 13 Tetrad Square Breeding population in quay walls along both sides of River Liffey. Roosting on rooftops of Jurys Hotel.	2013 2012, but Liffey breeding sites almost certainly still occupied in 2013	Irish Wildlife Acts	Amber	NBDC - Birds of Ireland Stephen Newton, Pers. Communication(RF), 2013
Ringed Plover	<i>Charadrius hiaticula</i>	O 13 Tetrad Square	2011	Irish Wildlife Acts	-	NBDC - Bird Atlas 2007 - 2011
Hen Harrier	<i>Circus cyaneus</i>	O 13 Tetrad Square	2011	Irish Wildlife Acts EU Birds Directive (Annex I)	Amber	NBDC - Bird Atlas 2007 - 2011
House Martin	<i>Delichon urbicum</i>	O 13 Tetrad Square	2012	Irish Wildlife Acts	Amber	NBDC – Ireland’s Bioblitz
Great Sotted Woodpecker	<i>Dendrocopos major</i>	O 13 Tetrad Square	2012	-	-	NBDC – Ireland’s Bioblitz
Little Egret	<i>Egretta garzetta</i>	O 13 Tetrad Square	2015	Irish Wildlife Acts EU Birds Directive (Annex I)	-	NBDC - Birds of Ireland
Yellowhammer	<i>Emberiza citrinella</i>	O 13 Tetrad Square	2011	Irish Wildlife Acts	Red	NBDC - Bird Atlas 2007 - 2011
Swift	<i>Apus apus</i>	O 13 Tetrad Square	2015	Irish Wildlife Acts	Amber	NBDC - Birds of Ireland
Common Tern (Breeding)	<i>Sterna hirundo</i>	O 13 Tetrad Square Tern species nesting on Grand Canal Basin and locks 2-3.	2007-2011 Summer 2012	Irish Wildlife Acts EU Birds Directive (Annex I)	Amber	BTO Bird Atlas Stephen Newton, Pers. Communication(RF), 2013

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
House Sparrow (Breeding)	<i>Passer domesticus</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Mute Swan	<i>Cygnus olor</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Cormorant	<i>Phalacrocorax carbo</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Red	BTO Bird Atlas
Common Gull	<i>Larus canus</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Lesser Black-backed Gull	<i>Larus fuscus</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Herring Gull	<i>Larus argentatus</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Red	BTO Bird Atlas
Kittiwake	<i>Rissa tridactyla</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Starling	<i>Sturnus vulgaris</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Peregrine Falcon	<i>Falco peregrinus</i>	O 13 Tetrad Square	2014	Birds Directive (Annex I), Irish Wildlife Acts.	Green	Anecdotal
Kestrel	<i>Falco tinnunculus</i>	Nest c. 50ft high on harbour site of Dublin Electricity Generating Station.	Summer 2012	Irish Wildlife Acts	Amber	Stephen Newton, Pers. Communication(RF), 2013
Kingfisher	<i>Alcedo atthis</i>	Buckingham lock in Ringsend	No Date Provided by Moriarty	Birds Directive (Annex I), Irish Wildlife Acts.	Amber	(Moriarty, 1998)

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
Meadow pipit	<i>Anthus pratensis</i>	Grand Canal Dock	28/06/1905	Irish Wildlife Acts.	Green	Grand Canal Dock Planning Scheme (2006)
Linnet	<i>Carduelis cannabina</i>	O 13 Tetrad Square	2007-2011	Irish Wildlife Acts	Amber	BTO Bird Atlas
Bats						
According to the BCI records database (Accessed in December 2015) there are 48 bat roosts within 10km of the study area. Species roosting include: Leisler's Bat <i>Nyctalus leisleri</i> ; Common Pipistrelle Bat <i>Pipistrellus pipistrellus</i> ; Soprano Pipistrelle Bat <i>Pipistrellus pygmaeus</i> ; Myotis species <i>Myotis spp.</i> including Daubenton's Bat <i>Myotis daubentonii</i> ; Natterer's Bat <i>Myotis nattereri</i> and Whiskered Bat <i>Myotis mystacinus</i> in addition to Brown Long-eared Bat <i>Plecotus auritus</i> . Bats that have been recorded roosting within the Grand Canal Dock area include <i>Nyctalus leisleri</i> ; <i>Pipistrellus pipistrellus</i> . Precise locations of bat roosts are not provided here due to their sensitivity. All bats are protected under the Habitats Directive (Annex IV) and the Irish Wildlife Acts. All of the species listed here were also recorded during bat activity transect surveys within 10km of the SDZ.						
Marine Mammals – No recent sightings listed on IWDG website in December 2015						
Common Seal	<i>Phoca vitulina</i>	Recorded swimming in the lower reaches of the Liffey and are found in nearby Islands.	No Date Provided	Habitats Directive (Annex II), Irish Wildlife Acts.	No published redlist	DUBLIN DOCKLANDS NORTH LOTTS PLANNING SCHEME: POINT DEPOT AREA
Harbour porpoise	<i>Phocoena phocoena</i>	Stranding at Sandymount, Dublin	18/05/2012	EC Habitats Directive (Annex II & IV) Irish Wildlife Acts. OSPAR Convention	Least Concern	IWDG Website
Common dolphin	<i>Delphinus delphis</i>	Stranding at Sandymount, Dublin	03/02/2012	EC Habitats Directive (Annex IV)	Least Concern	IWDG Website

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
				Irish Wildlife Acts.		
Harbour porpoise	<i>Phocoena phocoena</i>	Dublin Bay, Dublin	28/06/2011 09/07/2009 24/12/2008 17/09/2006 04/06/1996 02/06/1996 01/06/1996 30/05/1996 21/12/1994 13/06/1994 20/03/1994 17/12/1993	EC Habitats Directive (Annex II & IV) Irish Wildlife Acts. OSPAR Convention	Least Concern	IWDG Website
Humpback whale	<i>Megaptera novaeangliae</i>	Dublin Bay, Dublin	12/07/2010	EC Habitats Directive (Annex IV) Irish Wildlife Acts.	Least Concern	IWDG Website
Bottlenose dolphin	<i>Tursiops truncatus</i>	Dublin Bay, Dublin	02/05/2010	EC Habitats Directive (Annex II & IV) Irish Wildlife Acts.	Least Concern	IWDG Website

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
"Dolphin" species	<i>Unknown</i>	Dublin Bay, Dublin	21/10/2007	EC Habitats Directive (Annex IV) Irish Wildlife Acts.	Least Concern	IWDG Website
Minke whale	<i>Balaenoptera acutorostrata</i>	Dublin Bay, Dublin	22/05/2005	EC Habitats Directive (Annex IV) Irish Wildlife Acts.	Least Concern	IWDG Website
Fish						
Brook lamprey	<i>Lampetra planeri</i>	Grand Canal below 7th lock	22/06/1905	EC Habitats Directive (Annex II) Irish Wildlife Acts.	Least Concern	Caffery et al., 2006
Atlantic salmon	<i>Salmo salar</i>	River Liffey River Dodder	Unknown	EC Habitats Directive (Annex II & V) Irish Wildlife Acts. Fisheries Acts 1959 to 2006	Vulnerable	Pers Comm. Inland Fisheries Ireland (2012)
Sea trout	<i>Salmo Trutta</i>	River Liffey River Dodder	Unknown	Fisheries Acts 1959 to 2006	Least Concern	Pers Comm. Inland Fisheries Ireland (2012)

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
Eel	<i>Anguilla anguilla</i>	River Liffey River Dodder	Unknown	Fisheries Acts 1959 to 2006	Critically Endangered	Pers Comm. Inland Fisheries Ireland (2012)
Invasive Species						
Nuttall's pondweed	<i>Elodea nuttallii</i>	River Liffey	00.00.10	Offence to spread under Bird & Habitat Regulations	Invasive Species	Tubridy and Associates (2010)
Giant hogweed	<i>Heracleum mantegazzianum</i>	Banks of the River Liffey upstream	00.00.10	Offence to spread under Bird & Habitat Regulations	Invasive Species	Tubridy and Associates (2010)
Himalayan balsam	<i>Impatiens glandulifera</i>	Banks of the River Liffey upstream	00.00.12	Offence to spread under Bird & Habitat Regulations	Invasive Species	Scott Cawley Ltd. (2012)
Japanese knotweed	<i>Fallopia japonica</i>	Banks of the River Liffey upstream	00.00.12	Offence to spread under Bird & Habitat Regulations	Invasive Species	Scott Cawley Ltd. (2012)
Rhododendron	<i>Rhododendron spp.</i>	Located along east wall road north of Point Depot	21/03/2005	Offence to spread under Bird & Habitat Regulations	Invasive species	DUBLIN DOCKLANDS NORTH LOTTS PLANNING SCHEME: POINT DEPOT AREA
Entire-leaved Cotoneaster	<i>Cotoneaster integrifolius</i>	Located along east wall road north of Point Depot	21/03/2005	-	Invasive species	DUBLIN DOCKLANDS NORTH LOTTS PLANNING

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
						SCHEME: POINT DEPOT AREA
Nutall's pondweed	<i>Elodea nuttallii</i>	Grand Canal Basin	Unknown	Offence to spread under Bird & Habitat Regulations	Invasive species	IFI Invasive Species Map Viewer (viewed February 2012).
Zebra Mussel	<i>Dreissena polymorpha</i>	Royal Canal East (NOTE SHOWN ON VIEWER AS GRAND CANAL)	02/07/1905	Offence to spread under Bird & Habitat Regulations	Invasive species	IFI Invasive Species Map Viewer (viewed February 2012).
Butterfly Bush	<i>Buddleja davidii</i>	Sheriff Street Bridge	03/07/1905	None	Invasive species	Ecoserve (2011), Waterways Ireland
Sycamore	<i>Acer pseudoplatanus</i>	Westmoreland Sea Lock to Ringsend McMahon Bridge, Ringsend	03/07/1905	None	Invasive species	Ecoserve (2011), Waterways Ireland
Red Valerian	<i>Centranthus ruber</i>	Westmoreland Sea Lock to Ringsend McMahon Bridge, Ringsend	03/07/1905	None	Invasive species	Ecoserve (2011), Waterways Ireland
Littleleaf Cotoneaster	<i>Cotoneaster microphyllus</i>	Westmoreland Sea Lock to Ringsend McMahon Bridge, Ringsend	03/07/1905	None	Invasive species	Ecoserve (2011), Waterways Ireland
Freshwater shrimp	<i>Crangonyx pseudogracilis</i>	GCE12 - Above the 3rd Lock Main Line and GCE14 - above the 4th Lock on the Circle Line	2006 & 2009	None	Invasive species	Ecoserve (2011), Waterways Ireland

Table 3 Records of Protected, Rare and other Notable Flora and Fauna Species on or within 10km of the site						
Common Name	Scientific Name	Location (if known)	Year (if known)	Legislative Protection ¹⁰	Conservation Status ¹¹	Data Source
Note: Due to the numbers of records within Grid Square O13 this table does not provide an absolute list of records available, in addition it does not include notable or rare invertebrates such as <i>Leipdoptera</i> or <i>Hymenoptera</i> - records for these can also be found on The National Biodiversity Data Centre database.						

6. Comments on Flora in the SDZ area

The background study for the SDZ notes that from a botanical perspective the docks and quays along the River Liffey are of interest as non-native (but not invasive) plants have been introduced through shipping activities over the centuries and many foreign plants have been recorded at Dublin port and St James Gate brewery in the past due to movement of cereal cargo. However due to recent large scale land clearance it is likely that many of these have been lost.

The mouth of the two canals, in particular the Grand Canal which is more regularly used by vessels is a potential access route or corridor to both terrestrial and freshwater habitats across Ireland, mainly through boating activities. Any proposals for the canals, including the Grand Canal basin, should be given adequate consideration to the threat of introduction. Invasive species currently found along the canals, River Liffey and Dodder include (but possibly not limited to) Japanese knotweed, Himalayan Balsam, Rhododendron, Nuttall's pondweed, Giant hogweed and Zebra mussel. For each of these invasive species it is considered an offence under the European Communities (Birds and Natural Habitats) Regulations (2011), for anyone who "plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place". Adequate consideration should be given to ensure the spread of such invasive species is avoided.

Opposite-Leaved Pondweed, Meadow Barley and Divided Sedge are three examples of rare flora with records in the SDZ area, protected under the Irish Flora Protection Order (2015). It should be noted that there are no records for the latter two species since the 1800's, however this does not rule out their existence.

7. Comment on Birds in the SDZ Area

The quay walls along the River Liffey and within the Grand Canal basin have been recently used by Black Guillemots as breeding sites. All works within this area must ensure that these birds are not disturbed during the breeding season and their breeding sites protected. Peregrine Falcons are known to occur in Dublin with nesting sites located both east and west of the SDZ (please noted for protective reasons, nesting locations are considered confidential by NPWS local staff). The EU Birds Directive requires "special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution" for bird species listed in Annex I, including Peregrine Falcon, Common Tern and Kingfisher (all associated with the SDZ area). Common Tern were also noted to attempt breeding within the locks of the Canal Basin during field surveys in 2015.

The SDZ area covers a potential population link for Kingfisher between the Rivers Dodder and River Liffey. Potential exists for the provision of future nesting sites for all species in the design of new developments/infrastructure. It must also be ensured that commuting corridors and feeding areas be protected.

8. Comment on Mammals in the SDZ Area

All bat species are protected under the EC Habitats Directive and the Irish Wildlife Acts. Various species are known to utilise the SDZ area for commuting, feeding with suspected roosting locations in old buildings, including those along the Grand Canal basin. Both canals and rivers are important corridors for which lighting proposals must ensure dark corridors remain for commuting/feeding bats. Any demolition/alteration of existing buildings must ensure no adverse impacts on bat populations.

Otter is known to occur along the Dodder and Liffey and along stretches of both canals (personal observations of the author). Records of their presence at the SDZ area is anecdotal however as

the SDZ area covers the confluence of the two rivers and canals it must be ensured that this corridor is not impeded. Similarly it must be ensured that there is no impediment of the channels or deterioration of water quality for aquatic fauna including fish such as Salmon, Twaite Shad, Eel and Brown Trout. Seals and larger cetaceans have been known to use the area so all future works must ensure their protection and avoid any potential hazards or obstructions to their movement. These aquatic species are protected under a range of legislation including the Irish Wildlife Acts, EU Habitats Directive, Fisheries Acts and international agreements including OSPAR.

Badger are known to occur within 1km of the SDZ boundary but would not be expected to use the SDZ lands. Mink, an invasive mammal species, is present on the Dodder and is currently being trapped as part of a catchment-wide initiative.

9. Hierarchy of Ecological Design Concepts

The proposed elements of the ecological design aim to address the following overarching objectives:

- Extending the Dodder, Tolka, Grand Canal and Royal Canal ecological corridors to the Liffey.
- Providing stepping stone habitats for invertebrates and birds that move in daytime.
- Providing refuges and dark corridors for species that move at night.
- Providing breeding sites for invertebrates, birds and mammals (bats and otters).

The following table sets out the hierarchy of the ecological design principles that may be integrated into the Masterplan. Each of the interventions is then described in the following sections.

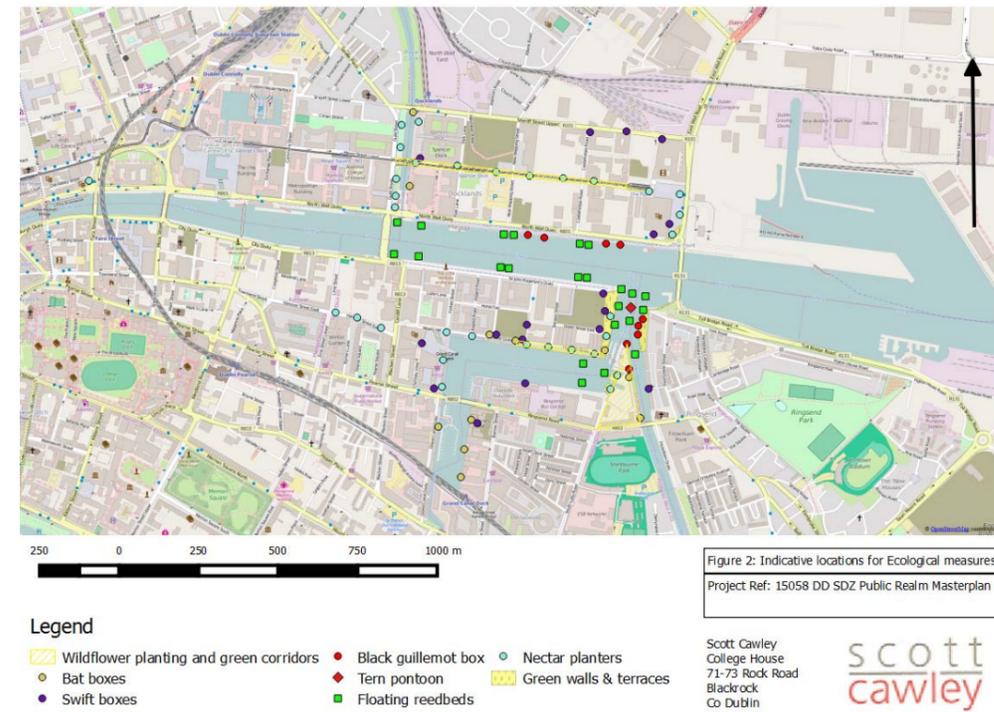
Primary measures are those that are targeted at specific habitat types or species and have a high degree of success as they may be catering to the needs of existing species.

Secondary measures are those that may be used to provide linkages across the urban landscape and are usually more diluted measures with a limited degree of anticipated success given the exposed, windy and disturbed nature of some of these areas.

Disjunct/Scattered/Ad-hoc measures are small discrete measures that can be implemented almost anywhere to provide local biodiversity benefits. Cumulatively they can add up together to create a significant gain in diversity.

Table 4 Ecological design hierarchy

Level	Location	Targets	Measures in plan
Primary	Grand Canal Basin, Grand Canal, Royal Canal (Spencer Dock), River Dodder, River Liffey.	Increase floral diversity, invertebrates, food for birds. Breeding Black Guillemots, Common and Arctic Tern.	1.1 Green walls/terraces, 1.2 Reedbed pontoons, 1.3 Black Guillemot nesting boxes along Dodder mouth and Liffey quays in areas not disturbed by pedestrians. 1.4 Tern nesting areas formerly on Grand Canal Basin Lock could be reinstated as moored pontoon at Dodder mouth from April-August. 1.5 Artificial otter holt in undisturbed areas such as east side of Dodder mouth. 1.6 Swift boxes on elevated poles or at 2 nd storey level where possible.
Secondary	Road verges Median strips Courtyard landscaping.	Common Swift, Increase floral diversity, invertebrates, food for birds.	2.1 Wildflower planting strips.
Disjunct/Scattered/Ad-hoc	Rooftops Terraces Walls Flat roofs.	Solitary bees and wasps, bats, invertebrates, urban birds.	3.1 Bee tubes, 3.2 Bat boxes >4m above ground, 3.3 Nectar plants in planters, 3.4 Bird boxes for sparrows, starlings, Pied Wagtails.



- **Green walls/terraces**

- These features comprise specially-designed artificial structures that can be effectively horizontal planters, vertical walls with cellular components to retain growth substrates or stepped wall/terrace structures to create a variety of surfaces. When planted with species of native provenance and those that are suited to the exposed saline environment that the area can present, can increase the floristic diversity of the area. When nectar-producing plants are included then this can attract invertebrates and the birds and bats and other invertebrates that feed upon them.
- They can also be used as SUDS measures as grey water and rainwater can be used for irrigation, thereby slowing the release of rainwater to the surface drainage network.
- The scale of the features can range enormously from small patches scattered along the street to long continuous swathes of vegetation.
- The primary challenge is that of maintenance, preventing vandalism and irrigation.
- In the context of the DDSDZ, such features could provide a variation from traditional planters and allow greater vegetation cover within the limited space available but with equal if not greater effect than horizontal planting alone.
- Locations where green terraces and walls would be suitable include the confluence with the Dodder near the lock gates and at the Point Village area where these features can be admired at a distance and also receive enough sunlight. They can also be added as part of building design as shown in the images below.



Source: <http://www.landtechsoils.ie/green-walls-ireland-england/>



Source: <http://blog.boundaryspace.com/2011/06/green-walls/>

Figure 1a and b Examples of green walls

- **Reedbed pontoons**

- These consist of tethered pontoons made up of cellular plastic grids with growth media such as coir or synthetic material to allow vegetation to grow. The pontoon is moored to the bed of the watercourse. The floating reedbeds are modular in design and can be created in a variety of permutations to meet any area size or shape requirement.
- They provide small islands of vegetation in open water bodies which, depending on the location, size and species planted, can provide benefits to both water quality and biodiversity.
- The root systems grow down through the water column providing BOD and nutrient removal. The roots of the wetland plants also encourage settlement of solids and provide a polishing treatment for BOD and nutrients, but they can also be used for the treatment of metals. (Ref: (<http://www.armreedbeds.co.uk/wp-content/uploads/2013/01/ARM-floating-reed-beds-tech-specific-LR.pdf>))
- Floating reedbeds are not generally proposed for brackish and estuarine locations such as those outside the Canal locks in the River Liffey. In these locations the type of planting may have to be experimented with as the faster growing freshwater reed *Phragmites australis* will not tolerate the saline conditions of the river mouth. Here such species such as Sea rush *Juncus maritimus* or even salt marsh plants may be suitable. Further research may be required to see what would tolerate the saline influx at high tides and the example in Bristol harbour may be worth investigating. Contained pontoons that could ensure that only freshwater was used for irrigation could be used but this may be costly and unsustainable.
- Within the Canal basins it is reasonable to propose several small pontoons with Common reed, Reed Canary Grass and perhaps some tall sedges being planted. These can offer shelter to ducks and geese and even otter if planted correctly with an outer dense fringe and patchy centre.

- pontoons are proposed in pairs to allow the phased management of the reed growth. Reeds must be cut back every year to remove the biomass from the system. Harvesting allows the removal of nutrients from the Canal area and helps to improve the water quality in the Canal.



Source: <http://superiorjetties.com/floating-reed-beds/>



Source: <http://www.grant-associates.uk.com/approach/bristol-harbourside-floating-gardens/>

- **Black Guillemot nesting boxes**

- This species is known to nest in at least two locations in the quay walls in the Liffey and near the mouth of the Dodder. Typical nesting sites are in old stone walls where stones may be missing and internal voids are used for nesting. Such locations are often temporarily available as quay walls are repaired and such gaps are removed.
- New nesting sites could be integrated into any repair works in the area of the SDZ where human disturbance is not expected.
- Locations must be above the high water mark and safe from gulls and rats that could prey on young birds.
- An excellent example worth following up can be found at <http://www.bto.org/national-offices/ireland/what-we-do/black-guillemot> which describes the installation of 40 nest boxes in Bangor Marina in Northern Ireland for this species.



Source: <http://www.carrickfergustimes.co.uk/news/carrickfergus-news/nesting-boxes-to-attract-more-black-guillemots-1-6625231>

- **Tern nesting pontoons.**

- Both Common and Arctic Terns breed in the Liffey estuary and are currently vulnerable to boat disturbance, rain events and predation by rats and gulls. Whilst there are currently efforts to create new nesting sites further out toward Ringsend, there is a need to replace the former roost sites at the Grand Canal Basin locks that was previously used for breeding.
- The location of any pontoon that is offered for breeding must be located away from areas of lighting and human disturbance so inland sites such as the Canal basins are not suitable. The mouth of the Dodder may be suitable for a small pontoon but may be too close for successful breeding.
- Further consultation with the National Parks and Wildlife Service and Birdwatch Ireland may be required to determine the feasibility and location requirements.
- The design of the pontoon should prevent entry by rats and therefore have raised edges or a low wire fence such as that seen below:



Source: http://lakepuckaway.blogspot.ie/2013_05_01_archive.html

- Signage on the exterior is essential to prevent recreational disturbance.

- This pontoon may be removed in the winter period as it will only be used from April to August.

- **Artificial otter holt**

- Note: The location of any proposed otter breeding site should be regarded as confidential to prevent wilful interference. Suitable locations are those in quiet, undisturbed areas close to natural vegetation cover and within 50m of water.
- Otters are known to frequent the Grand Canal basin and the Liffey and there are anecdotal records of holts nearby. This iconic, large, mammal species will tolerate a degree of daytime activity but needs undisturbed dusk and dawn periods for movement and feeding.
- Potential holt structures can be integrated into banksides and also onto pontoons. The latter type of structure may be suitable for resting areas away from the illuminated quaysides and buildings. Pre-made holt structures are shown below. This could be placed on one of the reedbed pontoons:



Source: www.filcris.co.uk/products/wildlife-products/otter-holts

- **Swift boxes**

- Dublin City Council and Birdwatch have highlighted the local and national-scale decline of this species and this was covered in Dublin City Urban Birds Project 2014. As a result of the surveys undertaken in 2014, 75 nests were identified at a total of 51 locations in Co. Dublin, and this includes 57 nests at 40 locations within Dublin City. There were no records for the SDZ area despite its suitability for feeding and nest sites.
- Considerable emphasis is now placed on establishing a network of nest boxes across the city and the SDZ provides a good opportunity to erect such boxes on existing and new buildings. Planning applications that may involve demolition of buildings in Dublin city that host swift colonies may include commitments to provide nesting boxes and acoustic lures to attract birds to nesting sites, but these are often constrained by the form and function of the building. The following article highlights the interest in this species at present:

“.....Helen Burke, a community officer with Dublin City Council invited Eric Dempsey, national bird expert, to address a meeting of “planners, architects and parks people” about the threat to swifts’ nesting habitat. “These are Dublin swifts,” he told them. “They have a Dublin passport. They are as much a part of our heritage as the Irish language or Christ Church.” The response was immediate. “Alan Hester, the buildings superintendent, spoke from the back of the room. He simply said, ‘We’ll put 10 nest boxes on the roof. And so some nest boxes have been installed in the heart of the city, complete with recordings of swifts calling, to attract others. It is much too early to say whether they will be successful, although further projects are planned in Ballyfermot and Chapelizod. According to Maryann Harris, Dublin’s biodiversity officer, Dublin City Council is planning to assess the populations of swifts in Dublin in conjunction with Birdwatch Ireland. This will inform future measures for swift conservation, including planning controls, provision of nesting areas, understanding the connections between Dublin and the wider east-coast ranges and awareness-raising.” <http://actionforswifts.blogspot.ie/2013/06/will-swift-response-save-devil-bird.html>

- Installation of Swift boxes can take the form of precast boxes integrated into walls and pillars or pole-mounted boxes as shown below. The latter can be part of modern street art sculptures but is may be unwise in some locations to draw attention to nest sites



Taken from <http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=NRN%2bd9iMWaE%3d&tabid=1389>



Source:

<http://www.birdwatchireland.ie/OurWork/ResearchSurveys/SwiftConservationProject/tabid/1389/Default.aspx>

- Note that the locations of these boxes can be flexible as there are no swift “hotspots” in the existing SDZ area. Indicative locations are shown on the concept design location map.
- **Wildflower planting strips.**
 - The success of wildflower planting in terms of attracting invertebrates and birds is dependent on several factors including size, species mix and diversity, connectivity to other sites, shelter from winds and aspect.
 - In reality there are only limited locations where large swathes of wildflower planting can be provided. Median strips along roads and edges of the canals and the Liffey could be created but need to be compatible with pedestrian traffic and recreation. It may be better to create wildflower islands connected by amenity grasslands. In the case of the North Lotts area, undeveloped plots may include landscaped courtyards whereby there are enlarged areas of wildflower and native shrub planting. These courtyards can be connected to each other across the wider landscape by narrow grassland strips and patches of enlarged wildflower planting.
 - Opportunities for wildflower sowing should be considered around all redundant areas such as around the base of trees, lighting poles and bases of pillars.



Source: <http://www.dundeewestend.com/2015/08/wildflower-planting-success.html>

- **Bee tubes**

- These are small boxes containing larger numbers of wooden or plastic tubes that are used by solitary bees for laying eggs. Unlike the domesticated honey bee, solitary bees exist as a male and a female. When a male and female solitary bee have mated and prepared a nest for their eggs, they die off in winter and leave behind the eggs to hatch out the following Spring.

- Ireland has 98 bee species, of which 77 are solitary bees. Irish solitary species nest in various different ways. Leafcutter solitary bees cut circular pieces out of leaves with their teeth and carry them back to line their nests, often in hollowed out twigs or bamboo canes. Mining solitary bees make their nests by digging holes in the ground. The bee tubes provide the habitat to make their nests in and hence provide important refuges for these threatened key pollinators.
- The bee tubes are arranged in boxes and should be located in sheltered sunny areas such as in the courtyards of new apartment and office developments. They can be integrated into sculpture and into the walls of new developments as well. Examples are shown below:



Source: <http://www.kinsmangarden.com/product/Mason-Bee-House-Tubes/Mason-Bee-Kit-Replacement-Tubes>



Source: <http://panoramax.canalblog.com/archives/2009/11/10/15753092.html>

- **Bat boxes**

- The DD SDZ area is known to be frequented by several species of bats including Leisler’s bats, Soprano and Common Pipistrelle bats. These are all reasonably tolerant of the urban environment but will generally frequent the darker areas and areas that offer good feeding on insects. Bat boxes can be effective artificial roosts if correctly designed and located and will help to bolster local populations.

- Bat boxes can be integrated into walls, erected on poles and hung on walls and trees depending on what is available. All bat access should be a minimum of 3m above the ground and preferably away from pedestrian and vehicle traffic routes. Bats boxes were previously erected on the walls of Waterways house in Grand Canal Basin but were probably too low to attract bats.
- The types of bats boxes that should be erected are shown below. These are all of the Schwegler woodcrete type which is more resistant to weathering than traditional wooden boxes:



Bat tubes integrated into walls, also suitable for quays when located well above high water. Source:

https://www.arkwildlife.co.uk/Item/Wildlife_Habitats~Ark_Environmental~Bat_Habitats/SC-1FR/Schwegler_1FR_Bat_Tube.html



1FF bat boxes suitable for mounting on walls and trees. Source:

https://www.arkwildlife.co.uk/Item/Wildlife_Habitats~Ark_Environmental~Bat_Habitats/SC-1FF/Schwegler_1FF_Bat_Box.html



Brick box capable of being integrated into walls and pillars. Source:

https://www.arkwildlife.co.uk/Item/Wildlife_Habitats~Ark_Environmental~Bat_Habitats/SC-27/Schwegler_Brick_Box_27.html

- Nectar plants in planters
 - The value of carefully chosen nectar-bearing plants even in smaller groups of planters will benefit the overall biodiversity of the area.
 - Planters can be scattered across the SDZ area but should be close to other wildflower areas or areas of semi-natural vegetation. Locating planters in “wind tunnels” between buildings will not allow invertebrates to reach them.
 - Dublin City Council offer the following advice regarding setting up a nectar patch:

“Butterflies will be attracted to the non-native butterfly bush (Buddleia spp.), Lavender, Candytuft, Marjoram, Yellow alyssum, Ice plant, Verbena, Red valerian and early flowering spring bulbs such as Grape hyacinths and Crocus. They will also love the native Bramble, Devil's bit scabious, Knapweed, Primrose and Self-Heal. If nettles are grown in a container nearby, species such as the Red Admiral, Peacock and Tortoiseshell will lay eggs on them. Their caterpillars will eat no other plant except the nettle. Bees will be attracted to the native Gorse, Ivy, Broom and Clover, and the non-native Borage, Mint, Hyssop, Sage, Viburnum species and flowering Currant. Moths like evening and night-scented plants like the native and non-native Honeysuckles, Tobacco plant, Evening primrose and Night-scented stock. This nectar-patch area should face southwards, as insects like warmth. A south-facing wall is an ideal to have as a backdrop to the nectar bed.”
 - Not all of these species may be suitable (Buddleja and Bramble can be invasive and require intensive management to prevent their spread).
- Bird boxes for sparrows, starlings, Pied Wagtails.

- Species such as Gulls and Pigeons are often seen as nuisance bird species and indeed in some locations their presence is not compatible with use by pedestrians. However the population of Herring Gull and Black headed Gulls are known to be in decline with one of the reasons being lack of breeding sites. Both the Herring Gull and Black-headed Gull are Red-listed on the list of Birds of Conservation Concern in Ireland. There is a current Birdwatch Ireland Survey to identify known roost sites.
- Providing suitable habitat for breeding gulls should be considered for some of the buildings that front the Liffey. This would provide a suitable buffer between residential areas and the gull colonies.
- Bird boxes may be erected almost anywhere in the SDZ providing they are inaccessible for predators (cats) and unlikely to be vandalised. The following boxes are recommended:
 - Sparrow boxes: House sparrows have undergone declines in recent years due to loss of nest sites. It will readily use nest boxes and nests in colonies under the eaves and in cavities on ledges. Suitable boxes are shown below:



Source: <http://www.schwegler-natur.de/index.php?main=produkte&sub=vogelschutz&psub=nisthilfen-spezial&pcontent=sperlingskolonie-1sp>

- Starlings can best in large numbers and cause nuisance with their droppings, therefore any proposed nesting site should be located away from sensitive locations. These can be in parkland trees and buildings or on flat roofs away from pedestrian and traffic routes. They have also undergone declines in their European population often due to removal of traditional nesting sites.



Source:

http://www.birdfood.co.uk/ctrl/node:169;product:936;/woodstone_starling_nest_box#.VI7vqnbhCUk

- Pied wagtails are a ubiquitous sight in Dublin City and have been recorded in the City Centre for many decades, especially their famous roosting sites in the Plane trees on O'Connell Street. They will use an open fronted nest box fixed to stonework often under bridges or arches. It is recommended that these boxes are installed in the area near the mouth of the Dodder, and in locations in Spencer Dock and Grand Canal Dock. Dipper that use the River Dodder and Tolka may also use these boxes.



Source: <http://www.arborvitae.uk.com/shop/schwegler-dipper-and-pied-wagtail-nest-box-no-19/>

10. Conclusions

The design concept focusing on enhancing the ecological diversity and richness in the SDZ area focussed on the following issues:

- Extending the Dodder, Tolka, Grand Canal and Royal Canal ecological corridors to the Liffey: this has been proposed via floating reedbeds near the River mouth, green walls and wildflower strips and provision of artificial refuges for native invertebrates birds, bats and mammals.

- Providing stepping stone habitats for invertebrates and birds that move in daytime: This has been proposed via wildflower planting, green walls and terraces, bee tubes and nest boxes.
- Providing refuges and dark corridors for species that move at night. This has been achieved through provision of reedbed pontoons and wildflower strips that will be unlit at night except from low level safety lighting.
- Providing breeding sites for invertebrates, birds and mammals (bats and otters): a range of breeding boxes and tubes are proposed across the SDZ area to address invertebrates, mammals and birds.

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