



SOUTH DUBLIN INTEGRATED CONSTRUCTED WETLANDS (DURL PROJECT # LIFE17 ENV/IE/000281)

KILNAMANGH - Ecological Baseline Report



September 2020



**South Dublin Integrated Constructed Wetlands
(DURL PROJECT # LIFE17 ENV/IE/000281)**

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Ecological Baseline Report**

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EXECUTIVE SUMMARY

Roughan & O'Donovan (ROD) was appointed by South Dublin County Council (SDCC) to undertake ecological surveys of four proposed Integrated Constructed Wetland (ICW) sites in three urban park locations in south County Dublin as part of the Dublin Urban Rivers LIFE Project (DURL) to address the issue of pollution in urban rivers.

The DURL Project (Agreement number: LIFE17 ENV/IE/000281) has received funding from the Union.

SDCC are proposing to construct four ICWs in Dodder Valley Park, Griffeen Valley Park and an amenity area in Kilnamanagh; this report provides information on the baseline ecological conditions at the ICW location within the **Kilnamanagh** site and proposes some recommendations for the protection and enhancement of the biodiversity at the ICW site.

The information from this report will inform the Part 8 planning application process and the Environmental Impact Assessment/"Article 120" Screening (EIA) and Appropriate Assessment (AA) Screening Reports for each of the proposed ICW developments.

The ecological surveys of ICW sites were undertaken in June and July 2020 and the survey methodology was based on the TII/NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (TII/NRA, 2009) and the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine Version 1.1* (CIEEM,2019).

The ecological surveys were designed to provide information on the habitats (classified to Fossitt Level 3), invasive species, key invertebrate species and amphibian habitat suitability within a 150 m buffer zone of the ICW location.

The location for the ICW in the Kilnamanagh amenity area is within an area dominated by amenity grassland, which can be classified as being of low ecological value, and a small proportion of wet grassland.

There were no ecologically sensitive or protected habitats, faunal species, invertebrate or amphibian species, or invasive species found within the footprint of the proposed ICW.

1. INTRODUCTION

1.1 Background

Roughan & O'Donovan (ROD) was appointed by South Dublin County Council (SDCC) to undertake ecological surveys of four proposed Integrated Constructed Wetland (ICW) sites.

The creation of integrated constructed wetlands at three strategic locations in South Dublin County is a key action of the Dublin Urban Rivers LIFE Project (DURL Project Agreement number: LIFE17 ENV/IE/000281). The Dublin Urban Rivers Life (DURL) Project is a collaboration between South Dublin County Council and Dún Laoghaire-Rathdown County Council. The DURL Project aims to address the issue of pollution in urban rivers using techniques with proven results relating to domestic misconnection sources and Integrated Constructed Wetland (ICW) development and which will ultimately improve water quality in South Dublin County.

ICWs are natural water retention measures which will improve the quality of receiving river water, provide flood alleviation, bioretention of particulates and nutrients, improve habitat conditions and biodiversity, and promote the relationship between green infrastructure and public wellbeing. The project will also develop a decision-support tool for water managers, planners, project developers and policymakers to use when deciding on river water quality improvement options in urban areas.

The ICW sites surveyed for this project are situated at the following locations (see Appendix A for site locations):

- Dodder Valley Park – two ICWs
- Griffeen Valley Park – one ICW
- **Kilnamanagh – one ICW**

This report provides the baseline ecological conditions at the ICW location within the **Kilnamanagh** amenity area, and will inform the Part 8 planning application process and the Environmental Impact Assessment/“Article 120” Screening (EIA) and Appropriate Assessment (AA) Screening Reports for each of the proposed ICW developments. The report also proposes some recommendations for the protection and enhancement of the biodiversity at the ICW site.

The ecological surveys and reporting for this report were carried out by Michael Bailey MSc BSc (Hons) MCIEEM, Owen O'Keefe BSc (Hons) MCIEEM, Kate Moore BSc (Hons) GradCIEEM and Kalvin Townsend-Smyth BSc (Hons) GradCIEEM. All ROD ecologists are members of the Chartered Institute of Ecology & Environmental Management (CIEEM).

2. ESTABLISHING THE BASELINE

This section describes the methodologies followed in undertaking the field surveys and in the compilation of this report.

2.1 Establishing the Study Area

This is informed by the findings of desk study (presence/absence of protected habitats, flora or fauna within the receiving environment) and relevant best practice methodology for assessing impacts on those ecological features. The study area in this case included a 150 m buffer around the perimeter of the proposed ICW site.

2.2 Desk Study

A desktop study was carried out to collate information on the ecology of the study area. Information on species listed on Annex II and V to the Habitats Directive; the Wildlife Act; the Flora (Protection) Order; Annex I to the Birds Directive; and, the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations were sourced from the statutory consultee, the NPWS, and the National Biodiversity Data Centre (NBDC). The NPWS online interactive map-viewer provided information relating to designated sites of conservation importance within or connected to the study area. A spatial query of the study area was undertaken using data provided by NBDC.

The desk study undertaken for this report also included a review of available ecological data including from the following sources:

- Records from the NPWS *Map Viewer*;
- Review of the NBDC *Biodiversity Maps*; and,
- Review of *EPA Maps*.

As with all desk studies, the data considered was only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers in relation to the quality and quantity of the data they provide, and these were considered when examining outputs of the desk study.

2.3 Ecological Survey Methodologies

The ecological surveys of ICW sites were undertaken in June and July 2020. The survey methodology is based on the TII/NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (TII/NRA, 2009) and the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine Version 1.1* (CIEEM, 2019). The following sections outline the specific ecological survey methodologies followed.

2.3.1 Habitat Surveys

Habitats were identified in accordance with Fossitt (2000). Habitat mapping was undertaken with regard to guidance set out in Smith *et al.* (2011). Habitats were assessed for correspondence to those listed in Annex I of the Habitats Directive during the walkover survey.

2.3.2 Amphibian Habitat Survey

The amphibian habitat suitability assessment took place alongside the habitat survey. All pools, ponds and ditches within 150 m of the ICW location were assessed for their suitability to support breeding common frog and smooth newt. Characteristics such as the presence of aquatic plants, disturbance, pollution and drying out were recorded.

Habitat surrounding the ponds was also recorded and used in the overall suitability assessment.

2.3.3 Key Invertebrate Survey

A list of invertebrates including butterflies, bees and bumblebees, damselflies, dragonflies etc was recorded during the habitat survey and mammal surveys. These surveys were undertaken in sunny, calm weather only, ideal for flying insects.

2.3.4 Invasive Alien Plant Species

During the walkover surveys, the locations of any invasive species was noted and recorded using high-definition GPS. The focus was on identifying species subject to restrictions under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Target notes were taken of any invasive species identified. Information recorded included the area of infestation, plant condition and height. Site features that could affect control measures such as adjacent land use, structures and services were also recorded.

3. KILNAMANAGH

One ICW is proposed at the Kilnamanagh site. The location of the proposed ICW is displayed in Appendix A.

3.1 Location

The proposed ICW is located within an amenity area at Kilnamanagh which is bounded by the M50 to the north, the R838 to the west, the Greenhills Road to the east and by housing estates to the south. A location map is provided in Appendix A.

3.2 Desk Study Results

The National Biodiversity Data Centre (NBDC) Database was accessed prior to conducting the surveys. Table 3.1 lists the rare and protected species recorded within the study area. Table 3.2 lists NBDC records of invasive species within the Study Area.

Table 3.1 NBDC Records within the Study Area

Common Name	Scientific Name	Status
Common Frog	<i>Rana temporaria</i>	Annex V, WA
Smooth Newt	<i>Lissotriton vulgaris</i>	WA
Barn Owl	<i>Tyto alba</i>	Red, WA
Swallow	<i>Hirundo rustica</i>	Amber, WA
Black-headed Gull	<i>Larus ridibundus</i>	Red, WA
Brent Goose	<i>Branta bernicla</i>	Amber, WA
Coot	<i>Fulica atra</i>	Annex II, III,
Goldeneye	<i>Bucephala clangula</i>	Annex II,
Grasshopper Warbler	<i>Locustella naevia</i>	WA
Greenshank	<i>Tringa nebularia</i>	WA
Kestrel	<i>Falco tinnunculus</i>	Amber, WA
Kingfisher	<i>Alcedo atthis</i>	Annex I
Linnet	<i>Carduelis cannabina</i>	Amber, WA
Pochard	<i>Aythya ferina</i>	Red, WA
Redshank	<i>Tringa totanus</i>	Red, WA
Sandpiper	<i>Actitis hypoleucos</i>	Amber, WA
Snipe	<i>Gallinago gallinago</i>	Annex II, III, Amber, WA
Starling	<i>Sturnus vulgaris</i>	Amber, WA
Swift	<i>Apus apus</i>	Amber, WA
Wood Pigeon	<i>Columba palumbus</i>	Annex II, III, WA
Corncrake	<i>Crex crex</i>	Annex I, Red, WA
Curlew	<i>Numenius arquata</i>	Annex II, WA
Oystercatcher	<i>Haematopus ostralegus</i>	Amber, WA
Teal	<i>Anas crecca</i>	Amber, WA
Tree Sparrow	<i>Passer montanus</i>	Amber, WA

Common Name	Scientific Name	Status
Wigeon	<i>Anas penelope</i>	Red, WA
Golden Plover	<i>Pluvialis apricaria</i>	Red, WA
Great Black-backed Gull	<i>Larus marinus</i>	Amber, WA
Cormorant	<i>Phalacrocorax carbo</i>	Amber, WA
Great Crested Grebe	<i>Podiceps cristatus</i>	Amber, WA
Grey Partridge	<i>Perdix perdix</i>	Red, WA
Greylag Goose	<i>Anser anser</i>	Amber, WA
Hen Harrier	<i>Circus cyaneus</i>	Amber, WA
Herring Gull	<i>Larus argentatus</i>	Red, WA
House Martin	<i>Delichon urbicum</i>	Amber, WA
House Sparrow	<i>Passer domesticus</i>	Amber, WA
Lesser Black-backed Gull	<i>Larus fuscus</i>	Amber, WA
Little Egret	<i>Egretta garzetta</i>	Annex I
Little Grebe	<i>Tachybaptus ruficollis</i>	Amber, WA
Mallard	<i>Anas platyrhynchos</i>	WA
Merlin	<i>Falco columbarius</i>	WA
Mew Gull	<i>Larus canus</i>	WA
Mute Swan	<i>Cygnus olor</i>	Amber, WA
Lapwing	<i>Vanellus vanellus</i>	Annex I, Red, WA
Pintail	<i>Anas acut</i>	Red, WA
Shoveler	<i>Anas clypeata</i>	Red, WA
Wheatear	<i>Oenanthe oenanthe</i>	Amber, WA
Peregrine Falcon	<i>Falco peregrinus</i>	WA
Red Grouse	<i>Lagopus lagopus</i>	Red, WA
Ring Ouzel	<i>Turdus torquatus</i>	WA
Ringed Plover	<i>Charadrius hiaticula</i>	WA
Rock Pigeon	<i>Columba livia</i>	WA
Sand Martin	<i>Riparia riparia</i>	Amber, WA
Sky Lark	<i>Alauda arvensis</i>	Amber, WA
Spotted Flycatcher	<i>Muscicapa striata</i>	Amber, WA
Stock Pigeon	<i>Columba oenas</i>	Amber, WA
Tufted Duck	<i>Aythya fuligula</i>	Red, WA
Water Rail	<i>Rallus aquaticus</i>	WA
Whinchat	<i>Saxicola rubetra</i>	Red, WA
Whooper Swan	<i>Cygnus cygnus</i>	Amber, WA
Wood Warbler	<i>Phylloscopus sibilatrix</i>	Red, WA
Yellowhammer	<i>Emberiza citrinella</i>	Red, WA

Common Name	Scientific Name	Status
Daubenton's Bat	<i>Myotis daubentonii</i>	Annex IV
Otter	<i>Lutra lutra</i>	Annex II, IV, WA
Badger	<i>Meles meles</i>	WA
Pine Marten	<i>Martes martes</i>	Annex V, WA
Eurasian Pygmy Shrew	<i>Sorex minutus</i>	WA
Hedgehog	<i>Eraceus europaeus</i>	WA
Eurasian Red Squirrel	<i>Sciurus vulgaris</i>	WA
Red Deer	<i>Cervus elaphus</i>	WA

Status (listing conferring protection or describing conservation status) abbreviations: Annex II/IV/V (non-avian species) = Habitats Directive (HD); Annex I, II, III = Birds Directive (BD); WA = Wildlife Acts and Red/Amber/Green = Birds of Conservation Concern in Ireland, 2014 to 2019 (BOCCI). All bird species in Ireland are protected under the Wildlife Acts 1976 to 2012.

Table 3.2 Invasive Species Recorded within the Study Area

Common Name	Scientific Name
Giant Hogweed	<i>Heracleum mantegazzianum</i>
Butterfly Bush	<i>Buddleja davidii</i>
Three-cornered Garlic	<i>Allium triquetrum</i>
Sika Deer	<i>Cervus nippon</i>
Brown Rat	<i>Rattus norvegicus</i>

3.3 Habitats

The following section describes the habitats recorded within the study area. A total of 10 habitats, including one mosaic habitat were recorded within the study area (see Table 3.3). A habitat map is provided in Appendix B.

Table 3.3 Habitats recoded within the study area

Habitat	Fossitt Code
Depositing/ Lowland River	FW2
Amenity Grassland	GA2
Dry Meadows and Grassy Verges	GS2
Wet Grassland	GS4
Mixed Broadleaved Woodland	WD1
Scattered Trees and Parkland	WD5
Scrub	WS1
Treelines	WL2
Buildings and Artificial Surfaces	BL3
Buildings and Artificial Surfaces/ Amenity Grassland/ Flower Beds and Borders	BL3/GA2/BC3

Depositing/ Lowland River (FW2)

This habitat was represented by the Kilnamanagh Stream, a tributary of the Camac River, which runs in a north easterly direction through the park. The stream emerges from a culvert at the western end and much its banks have modified with walls. The stream was cloudy grey in appearance indicating poor water quality and the stream bed was silted up in parts. The banks were steep and overgrown with scrub (See Plate 3.1 for an example of this habitat type at Kilnamanagh).



Plate 3.1 Kilnamanagh Stream (FW2) with steep embankment covered in dry meadows and grassy verges (GS2).

Amenity Grassland (GA2)

Amenity grassland was common throughout study area. This habitat was actively managed and was characterised by a low sward height and low species diversity (See Plate 5.2 for an example of this habitat type at Kilnamanagh).

Dry Meadows and Grassy Verges (GS2)

This habitat was associated with grassland at the western end of the park along the verges where regular mowing has not been implemented. The sward was high and consisted a diversity of species including Red Fescue (*Festuca Rubra*) Meadow Buttercup (*Ranunculus acris*) Red Clover (*Trifolium pratense*) Sowthistle (*Sonchus arvensis*), Nettle (*Urtica dioica*) and Chickweed (*Stellaria media*) (See Plate 3.1 and 3.2 for an example of this habitat type at Kilnamanagh).



Plate 3.2 Dry meadows and grassy verges (GS2) (foreground) and amenity grassland (GA2) (middle ground) bounded by treelines (WL2).

Wet Grassland (GS4)

An area of wet grassland was recorded next to the Kilnamanagh Stream. Species including Nettle (*Urtica dioica*), Creeping Thistle (*Cirsium arvense*) and Field Horsetail (*Equisetum arvense*) were recorded within the grassland. This habitat lies adjacent to and overlaps to the site of the proposed ICW.

Mixed Broadleaved Woodland (WD1)

A pocket of mixed broadleaved woodland was recorded outside the retaining wall marking the boundary of the amenity area. The woodland consisted mix of native and non-native tree species including Elder (*Sambucus nigra*), Horse Chestnut (*Aesculus hippocastanum*), Rowan (*Sorbus aucuparia*) and Beech (*Fagus sylvatica*). Bramble was also recorded within the woodland.

Treelines (WL2)

A treeline was recorded along the northern boundary of the site outside the retaining wall (See Plate 3.2 for an example of this habitat type at Kilnamanagh).

Scattered Trees and Parkland (WD5)

This habitat was recorded south of the proposed ICW in an area created for amenity use.

Scrub (WS1)

Scrub was recorded along the northern boundary of the park, encroaching on grassland habitats and on the banks of the Kilnamanagh Stream

Recolonising Bare Ground (ED3)

A small area of recolonising bare ground was recorded next to the Kilnamanagh Stream. Plant species recorded within the habitat include Common Poppy (*Papaver rhoeas*), Black Medic (*Medicago lupulina*), Ragwort (*Senecio jacobaea*) and Bramble (*Rubus fruticosus*).

Buildings and Artificial Surfaces (BL3)

The roads, footpaths and sport facilities including the AstroTurf pitch within the study area fall under this category. Generally built habitats are not considered of ecological significance.

Buildings and Artificial Surfaces/ Amenity Grassland/ Flower Beds and Borders (BL3/GA2/ BC3)

This habitat is used to represent private dwellings with gardens. This habitat mosaic is not considered of high biodiversity value.

3.4 Invertebrates

A number of key invertebrate species were recorded during the survey (See Table 3.4). Bumblebees and butterflies were associated with the grassland habitats within the park.

Table 3.4 Key invertebrate species recorded during walkover survey

Common Name	Scientific Name
Bumblebees	
Common Carder Bee	<i>Bombus pascorum</i>
Red-tailed Bumblebee	<i>Bombus lapidarius</i>
White-tailed Bumblebee	<i>Bombus locurum agg.</i>
Butterflies	
Green-veined White	<i>Pieris nap</i>
Small Tortoiseshell	<i>Aglais urticae</i>
Small White	<i>Pieris rapae</i>
Red Admiral	<i>Vanessa atalanta</i>

3.5 Amphibians

No evidence of Common Frog or Smooth Newt was recorded at Kilnamanagh. There were no pools, ponds or ditches recorded within the study area. Common Frog may use the riparian habitat along the Kilnamanagh stream however given that the stream is subject to pollution and is silted up, the watercourse along this stretch does not provide high quality habitat for amphibians.

3.6 Invasive Species

There were no invasive species recorded at Kilnamanagh.

3.7 Recommendations

The following sections provide recommended measures for the protection and enhancement of biodiversity within and around the site of the proposed ICW.

3.7.1 Wetland Construction

The construction of the ICW should be carried out with regard to guidance set out in the *Guidance on good practice in the management and creation of small waterbodies in Scotland* (SEPA, 2000) in order to maximise their biodiversity potential. If fencing is required, it should include gaps to allow amphibians and small mammals to get in. Consideration should be given to the creation of terrestrial refugia will be next to the constructed wetlands which may consist of either log piles or clean inert material covered with topsoil.

3.7.2 Natural Colonisation

The creation of the ICW will involve the loss of areas of amenity and wet grassland. Existing grassland outside these sites should be retained. Areas of bare ground should be allowed to re-seed naturally throughout the site, and no commercial/new seed mixes should be utilised.

3.7.3 Management of Scrub

Scrub is an important nesting and foraging habitat for birds and sheltering habitat for mammals. Scrub should be protected except in areas where it is encroaching on species-rich grassland (i.e. covering more than 20% of grassland). Cutting of scrub should only be carried out between early September and the end of February to avoid the bird-breeding season, while cutting at the end of winter allows birds and mammals time to eat any berries. Cutting will be carried out with special hedge trimmers that do not damage small fauna.

3.7.4 Vegetation Removal

The protection of bird breeding habitats during the nesting season (1st March to 31st August, inclusive), are set out in the Wildlife Act. Any removal of vegetation within this period will require the supervision of a suitably qualified and experienced ecologist to ensure that no nesting birds are present.

3.7.5 Landscaping

Planting should consist of locally sourced native species only. Planting should be undertaken in accordance with the Pollinator Friendly Planting Code in the All Ireland Pollinator Plan 2015-2020. If soil/substrate needs to be imported to the site for the purposes of development, the Contractor should ensure that the imported soil/substrate is free from invasive species.

3.8 Summary of Ecological Assessment

This ICW location is dominated by improved grasslands and/or managed habitat features which can be classified as being of low ecological value. There were no species listed in the FPO nor any invasive species or rare/protected faunal species found within the footprint of this proposed ICW site.

4. REFERENCES

- CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- Colhoun, K. & Cummins, S. (2013) Birds of Conservation Concern in Ireland 2014–2019. *Irish Birds* 9: 523–544.
- Collins, J. (Ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Edition). The Bat Conservation Trust, London.
- EPA (2020) ENVision Map Viewer. [Accessed 21/06/2020] <https://gis.epa.ie/EPAMaps>. Environmental Protection Agency, Wexford.
- EPA Catchments (2020) Maps – Catchments.ie [Accessed 21/06/2020] <https://www.catchments.ie/maps/>. Environmental Protection Agency, Dublin.
- Fitzpatrick, U., T.E. Murray, R.J. Paxton & M.J.F. Brown (2006). Building on IUCN National Red Lists to produce national lists of conservation priorities – a model using Irish bees (submitted to *Conservation Biology*).
- Flora (Protection) Order, 2015. SI No. 356/2015.
- Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.
- NPWS (2020) *Online Map Viewer* <<http://webgis.npws.ie/npwsviewer/>> [Accessed 21/06/2020]. Department of Culture, Heritage and the Gaeltacht, Dublin.
- NBDC (2015) All Ireland Pollinator Plan 2015-2021. National Biodiversity Data Centre, Waterford.
- NBDC (2016) Councils: actions to help pollinators. *All-Ireland Pollinator Plan 2015-2020*. National Biodiversity Data Centre, Waterford.
- NBDC (2020) *Biodiversity Maps* <<https://maps.biodiversityireland.ie/>> [Accessed 21/06/2020]. National Biodiversity Data Centre, Waterford.
- Regulation (EU) No. 1143/2014 of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (the IAS Regulation). Official Journal of the European Union, L317/35.
- ROD (2019) Multi-Sports Facility at Mount Carmel Park Pre-Construction Ecology Report
- SEPA (2000) Guidance on good practice in the management and creation of small waterbodies in Scotland
- Smith, G.F., O'Donoghue, P., O'Hora, A. and Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council, Kilkenny.
- TII/NRA (2006a) Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.

TII/NRA (2006b) Guidelines on the Treatment of Badgers Prior to the Construction of National Road Schemes. National Roads Authority, Dublin.

TII/NRA (2008a) Guidelines on the Treatment of Otters Prior to the Construction of National Road Schemes. National Roads Authority, Dublin.

TII/NRA (2009a) Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

Wildlife Act, 1976. No. 39 of 1976.

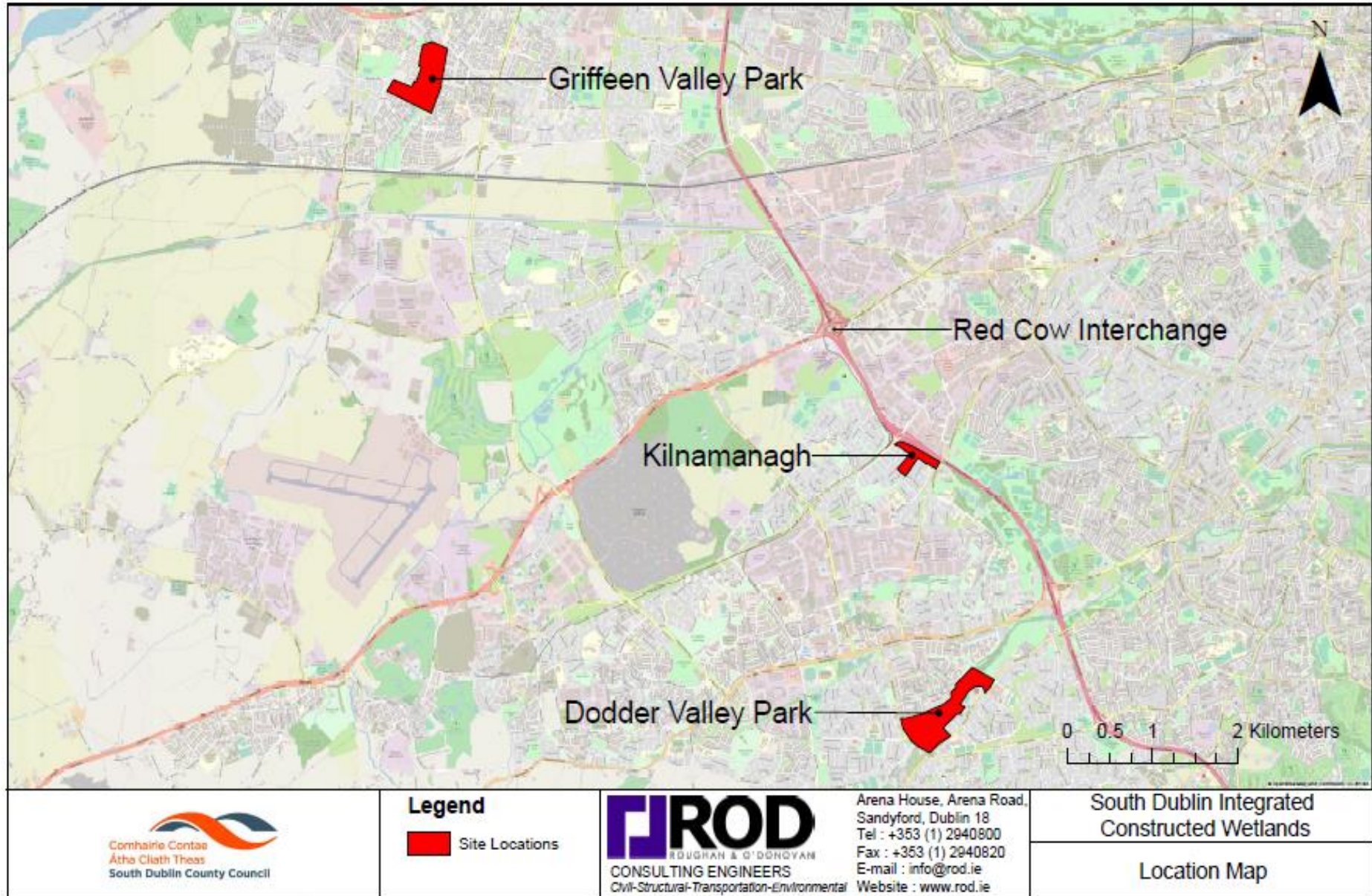
Wildlife Act, 1976 (Protection of Wild Animals) Regulations, 1990. SI No. 112/1990.

Wildlife (Amendment) Act, 2000. No. 38 of 2000.

Wildlife (Amendment) Act, 2012. No 29 of 2012.

APPENDIX A

LOCATION MAP



APPENDIX B

KILNAMANAGH HABITAT MAP

