

Kilcarbery - Grange Preliminary Masterplan

APPENDIX 2. Reports

**** Updated Strategic Environmental Assessment**

**** Updated Appropriate Assessment**

Strategic Flood Risk Assessment

Transport Impact Assessment

Archaeological Impact Assessment

**** Geophysical Survey Report**

**** Ecology Baseline and Biodiversity Management**

**** Green Infrastructure Guidelines**

**** Construction Environmental Management Plans**

Updated Strategic Environmental Assessment Screening Report-Kilcarbery Grange Updated Masterplan

Prepared under the Planning and Development
(Strategic Environmental Assessment)
Regulations 2004. (S.I. 435/2004)

Minogue and Associates

12/11/2017

Note updated sections highlighted in yellow

This report has been prepared by Minogue & Associates with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for South Dublin County Council and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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1 INTRODUCTION

1.1 PURPOSE

Under Directive 2001/42/EC - Assessment of Effects of Certain Plans and Programmes on the Environment, certain plans and programmes require an environmental assessment. This is known as the Strategic Environmental Assessment (SEA) Directive. Article 1 of this Directive states that its objective is:

'to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.'

The Planning and Development (Strategic Environmental Assessment) Regulations, 2004 (as amended) state that SEA is mandatory for certain plans while screening for SEA is required for other plans that fall below the specified thresholds.

This Framework Masterplan is a non-statutory land use plan and in line with the precautionary principle and best practice is being screened in accordance with the Schedule 1 of S.I. No. 435/2004 - European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004.

The screening process is the first stage of the Strategic Environmental Assessment process and the purpose of this screening report is to determine whether the draft Kilcarbery Grange Masterplan will or will not, lead to significant environmental effects for the Plan area and if it will require a full Strategic Environment Assessment. The following Regulations transpose this Directive into Irish law:

- The European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004),
- The Planning and Development (Strategic Environmental Assessment) Regulations 2004 (S.I. 436 of 2004) and further amended by
- S.I. No. 200 of 2011 (European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011) and S.I. No. 201 of 2011 (Planning and Development (Strategic Environmental Assessment) (Amendment) Regulations 2011).

In deciding whether a particular plan is likely to have significant environmental effects, regard must be had to the criteria set out in Annex II of the SEA Directive and listed in Schedule 1 of S.I. 435/2004. The approach to this screening assessment is to assess the contents of the plan against these criteria and determine if the Kilcarbery Grange Masterplan currently being prepared by South Dublin County Council (SDCC), requires a Strategic Environmental Assessment (SEA).

1.2 BACKGROUND AND UPDATES TO THE GRANGE MASTERPLAN

The Preliminary Master plan was previously screened for SEA in December 2016. The SEA Screening of December 2016 was also accompanied by an Appropriate Assessment screening report (prepared by Scott Cawley 2016). This preliminary masterplan formed the basis of discussions through a

tendering process to inform and guide potential developers. This tendering process is now at preferred bidder stage and therefore the updated Masterplan will provide the framework for development activities on these lands.

Comments received from statutory environmental authorities in relation to the Preliminary Masterplan have informed a suite of additional surveys and studies, which in turn, have contributed to an updated Masterplan, which now forms the basis of this SEA Screening report. An overview of the key issues raised by these environmental authorities and the response to same is provided below in Table 1.

TABLE 1 KEY ISSUES RAISED DURING SEA SCREENING IN DECEMBER 2016 AND RESPONSE TO SAME.

Submission	Addressed in Masterplan
Environmental Protection Agency	
Adequate and appropriate infrastructure including drinking water and waste water infrastructure, should be in place, or required to be put in place to service any development proposed and authorised during the lifetime of the plan.	Section 6 of the plan refers to relevant guidelines developed for the plan as well as requirements of the South Dublin CDP 2016-2022 that provides for appropriate infrastructure in this regard.
The specific measures to avoid or reduce potential environmental impacts, as outlined in Section 7.1 of the Appropriate Assessment Screening Report should be implemented in full.	These measures form part of the Construction Environmental Management Plan.
Works within the Plan area will be undertaken on a phased basis.	Section 5.3 Parcelling and Delivery of the Masterplan address this point.
Construction works will follow best practice with regards to working in or near watercourse as per IFI, 2016	These measures form part of the Construction Environmental Management Plan.
Surface water and SUDs measures are noted.	Noted.
The findings and recommendations in the Strategic Flood Risk Assessment –Stage 1 should be taken into account.	The findings and recommendations included as an Appendix to the Masterplan and form part of the overall documentation. Section 7.1 presents the SUDs approach including SUDs- sub catchments for the lands. All storm drainage design and construction is subject to agreement with South Dublin CC.
The plan should comply with the relevant environmental policies contained in the South Dublin County Development Plan 2016-2022 and the Regional Planning Guidelines for the Greater Dublin Area 2010-2022	Relevant environmental policies will be applied as part of any development application process. A list of the principle environmental protection measures included in the South Dublin CDP 2016-2022 is included in Section 7.7 Community and Environmental Measures of the Masterplan.
Where additional amendments to the Plan are proposed, in preparing the masterplan, these should also take into account the potential for likely significant effects on the environment.	Any changes and amendments are subject to SEA Screening.
Department of Arts, heritage and the Gaeltacht.	

Submission	Addressed in Masterplan
The Department cannot be certain whether or not at this stage there would be any significant effects on the Camac River and on populations of protected species such as badgers, bats, otters, nesting or roosting birds.	Noted. In response to this recommendation a baseline ecological survey of the lands have been undertaken in 2017. This includes habitat surveys, water quality, bird, bat and other mammal surveys. An ecological impact assessment has been carried out as well as preparation of a Biodiversity Management Plan and Construction Environmental Management Plan (key principles)-these are now included under new Guidelines: Green Infrastructure Guidelines.
The Camac River would be considered as an ecological corridor, as referenced in Article 10 of the Habitats Directive.	Noted, additional survey work has been undertaken on the Camac River and is assessed through the ecological impact assessment.
Further, ecological surveys should be undertaken (in the correct season).	Additional surveys as detailed above were carried out in the correct season.
A construction management plan will be required at project stage to allow comprehensive AA Screening.	An outline Construction Environmental Management Plan has been prepared to inform project stage elements.

This Screening report is structured as follows:

Section Two provides an overview of the draft Kilcarbery Grange Masterplan and of the existing known environmental baseline in and around the plan area. Section Three of this report assesses these against the criteria contained in Schedule 2a of the Regulations.

This SEA screening report has been prepared in conjunction with a screening under Article 6 (3) of the EU Habitats Directive prepared by Scott Cawley and and has informed the preparation of this screening report. This report has been prepared by Ruth Minogue, MCIEEM.

2 KILCARBERY GRANGE MASTERPLAN

2.1 INTRODUCTION

SDCC is preparing a masterplan for the lands at Grange, South Dublin County. The plan will be non-statutory master plan and will be situated under the existing landuse plan for the area, the South Dublin County Development Plan 2016-2022.

Following the preparation of a preliminary masterplan which functioned as a working document to guide a tendering process, this updated masterplan will now guide the selected developer coming on board with SDCC.

2.2 OUTLINE OF THE FRAMEWORK MASTER PLAN

The plan provides the design concept for the lands and describes an overall and coherent approach to important master plan elements. Since the preparation of the Preliminary masterplan, a number of additional studies and surveys have been undertaken and now inform the updated masterplan.

Key elements of these are:

Through additional ecological surveys undertaken over 2017, some amendments to the Masterplan layout and content have been recommended, these are as follows:

- Additional measures to enhance biodiversity as outlined in the Green Infrastructure Guidelines
- Additional environmental protection measures for a number of environmental themes as outlined in the Construction Environmental Management Plan; these may be added to and will be subject to agreement with South Dublin County Council.
- Re-orientation of green area to the southern part of the lands to increase buffer areas between new development and Corkagh Park. Details of these are now included in the Green Infrastructure Guidelines
- Arising from ecological surveys additional measures in relation to lighting, hedgerow retention and buffers particularly for protection of bat species are now included.
- As part of the Green Infrastructure Guidelines, measures are identified for the numbered hedgerows and treelines to be retained within the masterplan; these include wider grassy meadow verges, retention of drainage ditches as swales and management of existing hedgerows (Section 2 of the Green Infrastructure Guidelines)
- SUDs measures, and in particular planting and design guidance for Integrated Constructed Wetlands are also now included in the masterplan (Section 3 of the Green Infrastructure Guidelines).

The area comprises a greenfield site of approximately 35 hectares, located between the Nangor Road to the north and the Outer ring road to the west. Corkagh park provides the southern boundary and the eastern boundary comprises established residential development. Within the

masterplan boundary there is also an area being developed for housing under a Public Private Partnership, this is the south-eastern part of the site. The key aim is to provide residential development of around 940-980 units, this would give an estimated population equivalent of between 2,400 and 2,500 persons. In addition, there will be lands reserved for educational, and community use as well as retail opportunities.

Figure 1 below shows the location of the Grange plan area.

FIGURE 1 MASTERPLAN BOUNDARY



The aim of the framework master plan is as follows:

- To provide clear analysis of the lands to establish local constraints and opportunities;
- To set out a clear vision for the development of the lands in the short to medium term;
- To provide a robust framework for development of the lands;
- To provide a basis for later planning and design stages, and
- To facilitate phased and parcelled delivery of key infrastructure and development.

2.3 VISION AND PRINCIPLES OF THE PRELIMINARY MASTERPLAN

The following vision and principles have been developed for the plan:

Vision: to realise a distinct high quality sustainable place with a local sense of character and community, which is closely connected to own and it's surrounding landscape and provides for a range of community needs, within an attractive, permeable and connected urban structure.

Key principles are:

- To harness the existing positive aspects of character of the lands and the surrounding and larger landscape;
- To ensure a permeable and legible network of streets and spaces, with strong connections with surrounding areas and developments;
- To achieve an appropriate level of continuity and enclosure of streets and spaces;
- To develop a high quality network of green and urban spaces, which are connected to surround green spaces and features;
- To ensure the physical adaptability of the layout by providing a range of flexible and appropriately shaped and sized urban blocks;
- To ensure that opportunities for local business and services are accommodated in a new local centre;
- To provide for new educational uses in conjunction with existing and planned community and leisure facilities;
- To require a high quality of design and finish in all commercial and residential buildings.

The framework of the plan shows the spatial arrangement between key elements of the preliminary masterplan. These include the following:

- Function: Land use/place;
- Public domain: routes/spaces/landscape, and
- Built form: urban blocks and buildings.

All aspects of detail will be required to comply with the South Dublin CDP 2016-2022 standards and current national planning guidelines. In addition, guidelines are also part of the preliminary masterplan and are intended to form the basis upon which the detailed masterplan will be developed. Particular guidelines in preparation include the following:

- Streets and Spaces
- Urban Blocks
- Infrastructure –SUDs
- Infrastructure –Foul Water
- Infrastructure –Water

- Infrastructure – Utilities
- Infrastructure – Typical service Sections, and
- Green Infrastructure Guidelines including hedgerows, treelines, ICW and SUDs, and lighting.

Figures 2 below show examples of the maps and layouts being developed for the Kilcarbery Grange Masterplan.

FIGURE 2 KILCARBERY GRANGE PRELIMINARY MASTERPLAN –ISSUES FOR CONSIDERATION IN PLAN PREPARATION

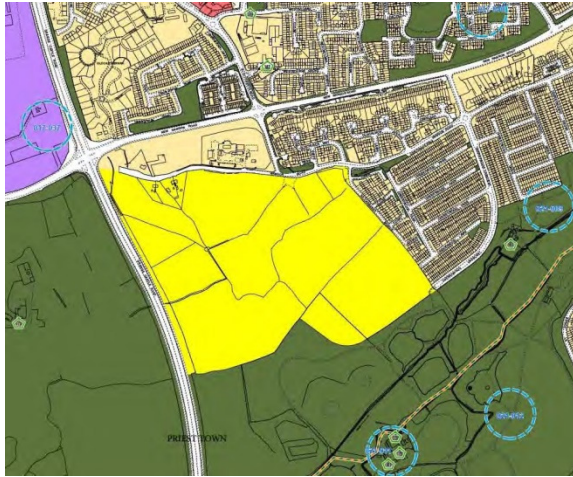


2.4 POLICY AND LANDUSE FRAMEWORK

As stated above the masterplan will function as a non-statutory plan and will provide the design concept for the lands. It is considered likely that the plan area may be developed in phased development phases, these may be the already identified three distinct residential areas. The lands are already zoned as Res-N under the existing South Dublin County Development Plan 2016-2022, and defined as follows:

Land use zoning: Res-N: *To provide for new residential communities in accordance with approved area plans.*

FIGURE 3 LANDUSE ZONINGS IN SOUTH DUBLIN CDP 2016-2020. YELLOW RELATES TO THE PRELIMINARY MASTERPLAN ZONING AS RES-N.



Section 11.2.2.of the above CDP states that

“The Planning Authority may also prepare Masterplans, or request them for areas that are considered to require an integrated design approach. The key considerations and outcomes to be addressed by Masterplans are listed in Table 11.17.”

Table 11.17 from the South Dublin CDP 2016-2020 is presented below:

KEY CONSIDERATIONS	KEY OUTCOMES
Access and Movement	Identification of the major strategic links throughout the area for different modes, showing key points of access and links between key destinations. Identification of a street hierarchy showing the function of streets and the appropriate design responses. Creation of a highly walkable and cycleable environment that offers pedestrian and bicycle users direct access and route choice throughout.
Open Space and Landscape	Creation of an open space network with a hierarchy of spaces suited to a variety of functions and activities. Retention of significant natural features and Green Infrastructure links, such as trees, hedgerows and watercourses and their integration within the open space network. Careful placement of major parks and squares so that they function as focal points and central features within neighbourhoods and centres
Land Use and Density.	Distribution of land uses to create a sustainable and efficient urban structure by directing more intensive uses and higher densities towards centres, transport nodes and along key movement corridors. Facilitation of a range of uses to promote integrated and active places. Provision of a range of dwellings and/or commercial unit types and sizes to support a balanced mix of household types and market choice
Built Form	Clear definition of streets and spaces (public, semi-private and private) to create a legible and secure environment. Distribution of heights to reinforce the urban structure with taller buildings located along key movement corridors and within centres and nodes. Use of landmarks, gateways and other changes in built form and landscaping to promote a legible structure.
Phasing	Division of the site/development into manageable sections for detailed design and assessment. A logical programme for development that ensures

the coordinated and incremental development of the lands. Identification of critical infrastructure (such as streets, parks, schools and community facilities) with delivery linked to the completion of individual phases.

The preliminary masterplan has already developed outline schematics based on the above themes and made a decision as regards densities. These will be developed further through the subsequent detailed masterplan process.

2.4 EXISTING ENVIRONMENTAL BASELINE

The following presents a summary of the current understanding of the environmental baseline. As stated previously, an ecological survey and impact assessment was undertaken from May to September 2017 to present a more comprehensive baseline of the ecological resources on the lands. This report accompanies the masterplan and is titled: Ecology Baselines (Doherty Environmental 2017). An overview of the findings are presented below.

2.5 BIODIVERSITY, FLORA AND FAUNA.

2.5.1 DESIGNATED CONSERVATION AREAS

The lands occurring within and immediately adjacent to the study site are not subject to any statutory nature conservation designations. The nearest European Sites to the study area is over 5km away. There are five SACs and two SPAs occurring in the wider vicinity.

With the exception of the European Sites at Dublin Bay, namely South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA, none of these European Sites are hydrologically connected to the study site. The River Camac, in whose catchment the study site is located, drains to the River Liffey, which in turn drains into Dublin Bay. As such there is a hydrological connection between the study area and these two European Sites. See Figure 4.1 below.

In addition to potential surface water discharges, other potential pressures identified in terms of water quality and hydrological links between the plan area and European Sites relates to foul water. Section 7.1 and 7.2 of the Screening for appropriate assessment presents reasons as to the determination of no likely significant effects in relation to the preliminary masterplan and hydrological linkages to Dublin Bay in particular. These are replicated below (see Section 7.1 to 7.3 of the screening for appropriate assessment for additional information, Scott Cawley 2016).

Under the Draft Masterplan, surface waters will continue to discharge to Dublin Bay via the local surface water network. However no significant effects are predicted on downstream European Sites for the following reasons:

- The significant distance between the proposed development and downstream European Sites in Dublin Bay (>20km by watercourse) is considered to reduce the risk of any potential contaminants from the construction phase of the development reaching European Sites to unlikely;*
- Works within the Plan Area will be undertaken on a phased basis;*

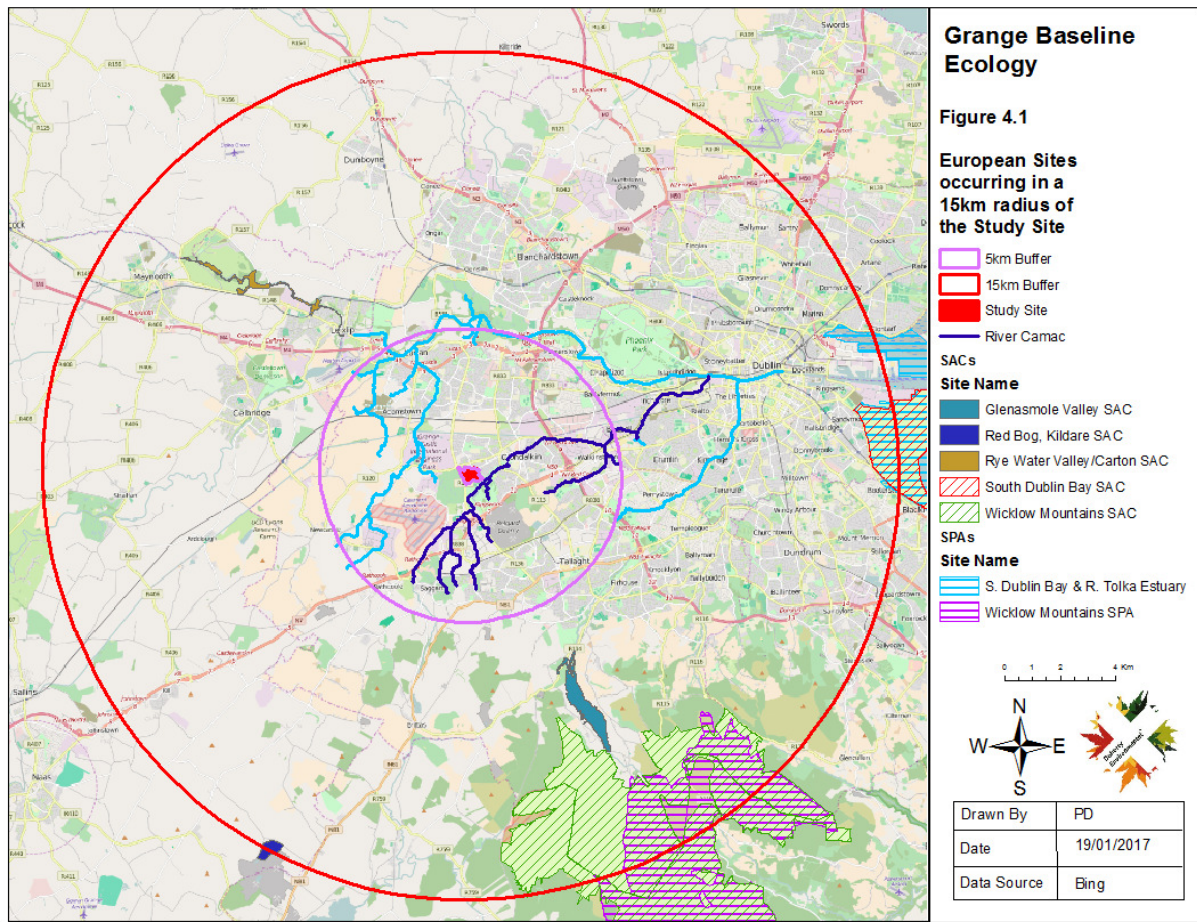
- Construction works will follow best practice with regards to working in or near watercourses as per IFI, 2016;

- Surface waters from the proposed development will pass through a number of SUDs systems prior to discharges including flow control devices, attenuation tanks, petrol interceptors, swales etc., thus reducing the likelihood of suspended solids or pollutants travelling further downstream.

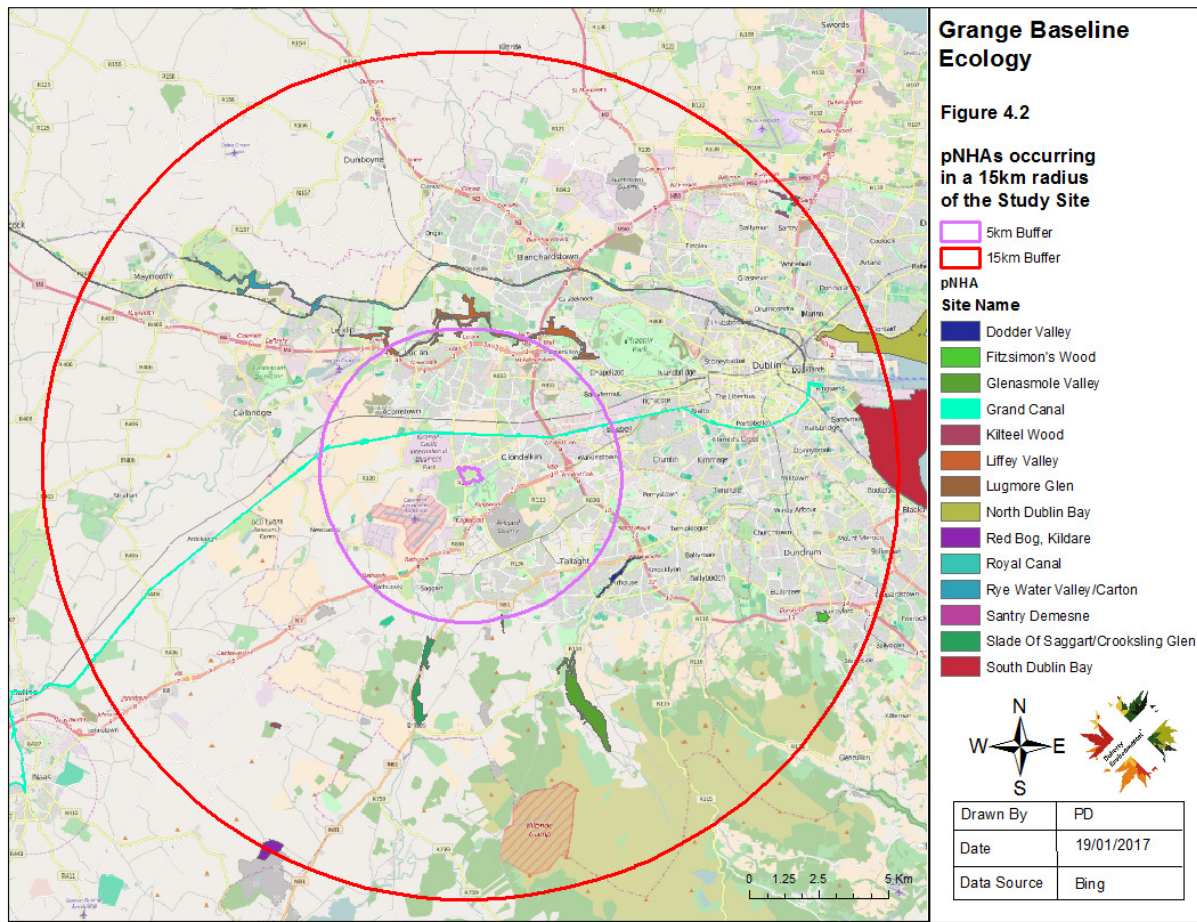
Despite Ringsend WWTP historically operating at or above capacity and the Draft Masterplan adding to the loading of the plant, no significant effects from discharge arising from the Draft Masterplan are predicted due to the following:

- There was no proven link between WWTP discharges and nutrient enrichment of sediments in Dublin Bay based on analyses of dissolved and particulate Nitrogen signatures (Wilson and Jackson, 2011);
- Enriched water entering Dublin Bay has been shown to rapidly mix and become diluted such that the plume is often indistinguishable from the rest of bay water (O'Higgins and Wilson, 2005);
- Marine modelling for Ringsend WWTP indicates that discharged effluent is rapidly mixed and dispersed to low levels via tidal mixing within a short distance of the outfall pipe (Dowly & Bedri 2007).
- The NPWS standard data form for North Dublin Bay SAC states that there had been no apparent impacts to the associated flora and fauna from polluted water ; and,
- A commitment by Irish Water to upgrade the plant from its current capacity of 1.64 million P.E. to meet EU standards and expand the facility to deal with the equivalent expansion as previously planned by Dublin City Council.

(Source: Scott Cawley, Screening for appropriate assessment, Kilcarbery Grange Preliminary Masterplan 2016).

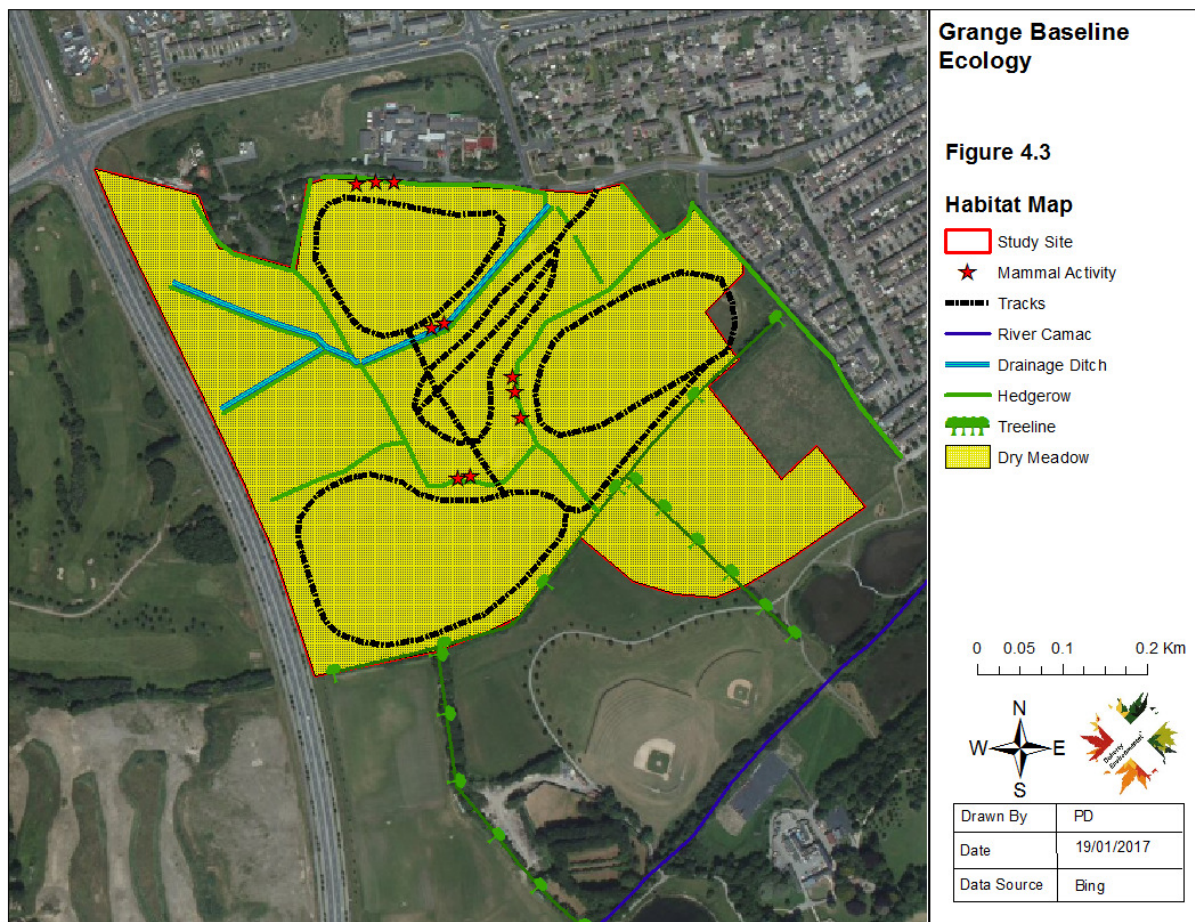


No Natural Heritage Areas (NHAs) and 14 proposed NHAs (pNHAs) are located in the wider area surrounding area. The location of these pNHAs are shown on Figure 4.2. The nearest pNHA to the study site is the Grand Canal pNHA, located approximately 1.2km to the north of the study area.



2.5.2 CURRENT HABITAT DESCRIPTION FOR THE STUDY AREA

The following Sub-Sections describe the habitats occurring within and immediately adjacent to the survey site. Each habitat described below has been identified to Level 3 of Fossit's *Guide to Habitats in Ireland*. The alpha-numeric code for each habitat is also provided alongside the habitat name (e.g. wet grassland GS4). The locations and extent of each habitat described below are illustrated on Habitat Map: Figures 4.3. Appendix 1 of the Ecology Baseline Report provides plates detailing a photographic record of the survey site and surrounding area.



The nature conservation value of each of the habitats occurring within the project site is also outlined in the following sub-sections.

LOWLAND DEPOSITING RIVER FW2

The Camac River is located approximately 115m to the south of the study area. The dominant instream habitat along the section of the river adjacent to the study area is glide and the river substrated is dominated by a mixture cobble, gravel and sand.

BIOLOGICAL WATER QUALITY

According to the EPA Envision Map Viewer, the water quality of the River Camac in South Dublin is classified as Q3, indicating “Poor” status and moderate pollution. The Camac has been classified as being of Bad Status with a conservation objective to restore it to Good Status by 2027. It is currently classified as At Risk of not achieving this objective. The main risk factors identified in the Water Framework Directive report include Combined Sewer Overflows (CSOs) and Discharge Licenses.

The results of the freshwater macroinvertebrate survey at SW1 are outlined in below. SW1 is located immediately downstream of a pedestrian bridge to the south of the study area. The channel width at this location is approximately 2m. Water depth during the survey was 0.25m. Flow conditions were characterised by a riffle. The substrate was dominated by cobbles, stones, gravel and sand. Instream vegetation was dominated by *Apium nodiflorum* and *Lemna* species were also noted.

TABLE 2: SW1 MACROINVERTEBRATES

Indicator Group	Pollution Sensitivity/tolerance	Taxon	No. Recorded
A	Pollution Sensitive	None Recorded	1
B	Less Pollution Sensitive	Cased Trichoptera	19
		Baetidae	4
C	Pollution Tolerant	Gammurus Sp.	23
		Baetis rhodani	3
		Caenidae	8
		Coleoptera	10
		Hydropsychidae	2
		Simuliidae	2
		Hydrobiidae	2
		Hydracarina	2
		Ancylus fluviatilis	2
		Chironmid sp.	2
Assellus sp.	13		
D	Very Pollution tolerant	Glossiphoniidae	2
E	Most Pollution Tolerant	None Recorded	1
Taxa not assigned to indicator group		Lumbricidae	2

The assemblage of macroinvertebrates at SW1 was mainly composed of Group C taxa, which were recorded in dominant numbers. Group B taxa were recorded in numerous numbers while group D taxa were recorded in common numbers. No Group A or Group E species present. The macroinvertebrate community at this sampling location is indicative of a biological water quality rating of **Q3**, indicating **moderate pollution**.

The results of the freshwater macroinvertebrate survey at WS2 are outlined in Table 3 below. SW2 is located immediately downstream of a pedestrian bridge to the southeast of the study area. The channel width at this location is approximately 2m. Water depth during the survey was 0.25m. Flow conditions were characterised by a riffle. The substrate was dominated by cobbles, stones, gravel and sand. Instream vegetation was dominated by *Apium nodiflorum* and *Fontanalis antipyretica*.. Sheltering riparian vegetation in the form of treelines occur along the river corridor in the vicinity of SW2 resulting in high levels of shading.

TABLE 3: SW2 MACROINVERTEBRATES

Indicator Group	Pollution Sensitivity/tolerance	Taxon	No. Recorded
A	Pollution Sensitive	Heptageniidae	1
B	Less Pollution Sensitive	Cased Trichoptera	11
		Baetidae	2
C	Pollution Tolerant	Gammurus Sp.	208
		Baetis rhodani	3
		Caenidae	4
		Coleoptera	5
		Simuliidae	2
		Hydracarina	2
		Chironmid sp.	3
D	Very Pollution tolerant	Hirundinae	7
		Asellus sp.	19
E	Most Pollution Tolerant	None Recorded	1

The assemblage of macroinvertebrates at SW2 was mainly composed of Group C taxa, which were recorded in excessive numbers. Group D taxa were recorded in common numbers, while Group B taxa were recorded in fair numbers. Group A taxa were present in scarce number and no Group E taxa were recorded. Macrophyte growth was not luxuriant or excessive at SW2 (see Plates 3 & 4) and no Cladophora was noted. The macroinvertebrate community at this sampling location is indicative of a biological water quality rating of **Q3**, indicating **moderate pollution**.

FISHERIES

No dedicated fishery survey was completed during the current baseline ecology assessment. However electrofishing surveys have recently been completed along the River Camac (IFI, 2011). Surveying was undertaken from two sampling points, one downstream (Moneenalion and one upstream (Riverside Estate) of the study area location (see Figure 4.3 for location). Brown trout and three-spined stickleback were recorded from both sampling points. Eel and minnow were also recorded from the Riverside sampling point. Minnow was the most abundant species recorded at Riverside, while three-spined stickle-back was the most abundant recorded from Monennialion.

NATURE CONSERVATION VALUE

The stretch of the River Camac to the south of the study area supports a population of brown trout, indicating its potential to support Atlantic Salmon (should an improvement in water quality along the river be achieved). The river is also known to support foraging otters. Due to its role in supporting a population of brown trout, as well as providing habitat for a range of species including a variety of birds, mammals (including otters and several bats species) this watercourse in the vicinity of the site is representative of a habitat of high local importance (Rating D).

IMPROVED AGRICULTURAL GRASSLAND (GA1) & AMENITY GRASSLAND (GA2)

Improved agricultural grassland and amenity grassland occur to the south of the study area. These are managed grasslands supporting a range of commonly occurring and nutrient loving species. Grasses associated with this habitat included *Lolium perenne*, *Agrostis stolonifera*, *Festuca rubra*, *Poa species*, *Alopecurus pratensis* and *Phleum pratense*. Herbs include *Trifolium pratense*, *Trifolium repens*, *Ranunculus repens*, *Bellis perennis*, *Taraxacum officinale agg*, *Cerastium fontanum* and *Urtica dioica*.

NATURE CONSERVATION VALUE

The grassland habitat occurring within the site is representative of semi-improved grassland. It supports a range of commonly occurring species with some areas of the site dominated by species indicative of previous enrichment. The nature conservation value of this habitat is of local importance (lower value) (Rating E).

DRY MEADOW GRASSLAND GS2

The majority of the land cover in the study is now representative of semi-improved dry meadow grassland. This grassland has been subject to a relaxed management regime over recent years, with little evidence of regular nutrient application or high levels of grazing. The only grazing apparent on site during field surveys undertaken between May and October 2017 was associated with a small number of horses grazing in fields throughout the study site. The dominant grass species occurring in this habitat include *Arrhenatherum elatius*, *Festuca rubra* and *Lolium perenne*. Other grass species occurring occasionally to frequently include *Dactylis glomerata*, *Holcus lanatus*, *Anthoxanthum odoratum*, *Poa species*, *Agrostis stolonifera*, *Elytrigia repens* and *Alopecurus pratensis*. Herbs include *Trifolium repens*, *Trifolium pratense*, *Ranunculus repens*, *Ranunculus acris*, *Sonchus arvensis*, *Centaurea nigra*, *Rumex acetosa*, *Cerastium fontanum*, *Stellaria media*, *Bellis perennis*, *Stachys sylvatica*, *Chamerion angustifolium*, *Heracleum sphondylium*, *Filipendula ulmaria*, *Plantago lanceolata*, *Plantago major*, *Urtica dioica*, *Dactylorhiza fuchsia*, *Cirsium arvense* and *Cirsium vulgare*.

A medium to high sward has developed in the dry meadow grassland.

NATURE CONSERVATION VALUE

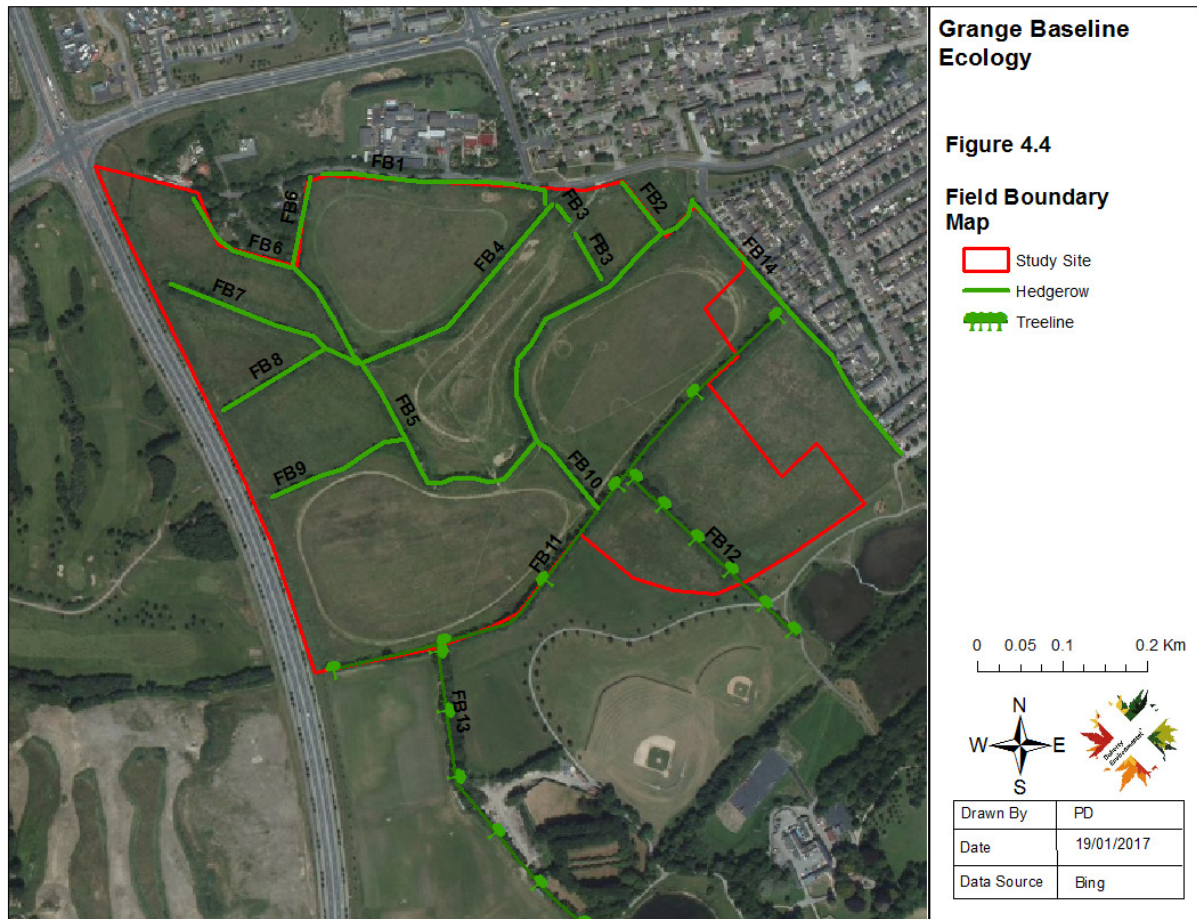
The dry meadow grassland and its current relaxed management regime provide foraging and cover for a range of small mammal and bird species. The absence of other examples of semi-improved grassland in the surrounding area also increases the value of this habitat in the local context. This habitat is representative of local conservation importance (Rating D).

HEDGEROWS WL1/TREELINES WL2

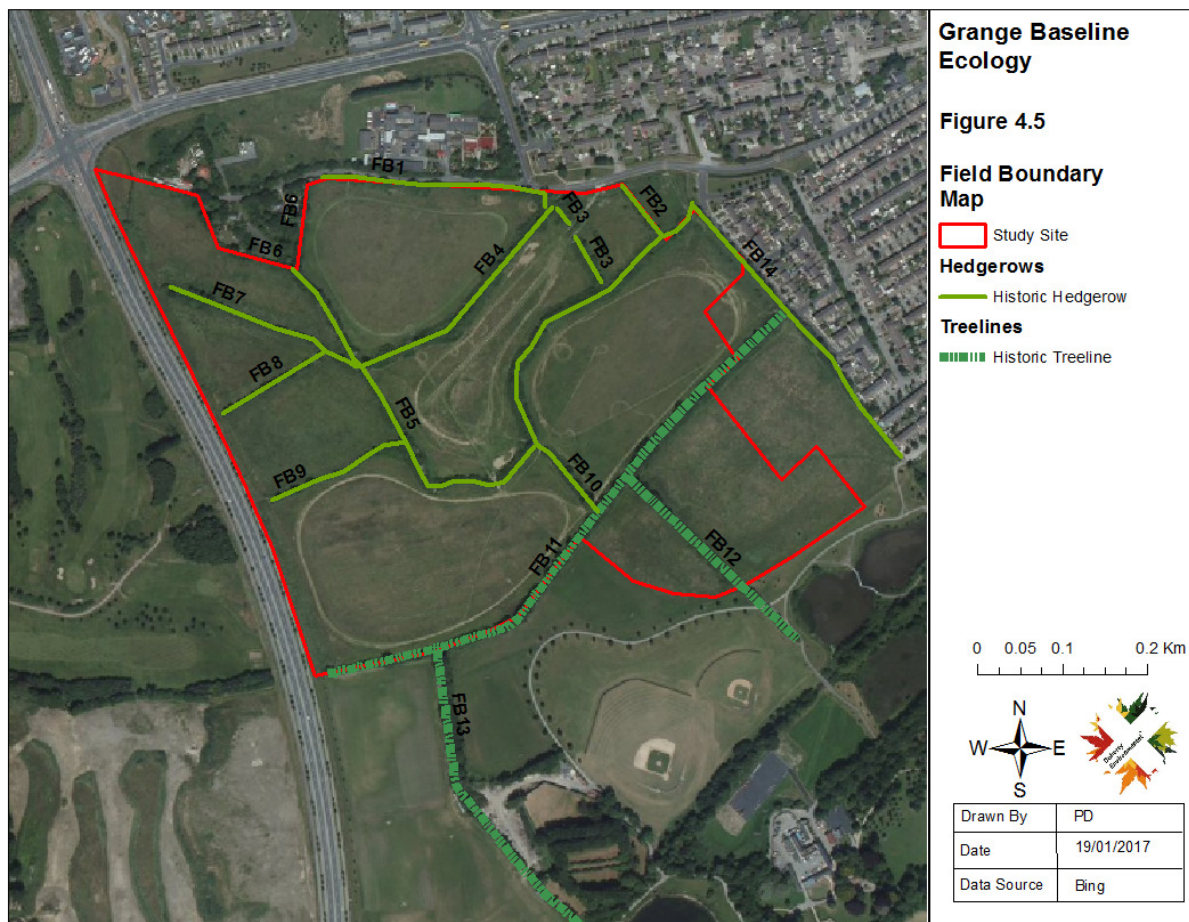
All fields within the study area are enclosed by hedgerows and treelines. A total of 11 hedgerows and 3 treelines have been identified within the study area. The extent of these linear habitats have not changed from that identified during the previous 2008 survey. The hedgerows and treeline field boundaries are numbered in Figure 4.4. The study area supports approximately 4.3km of linear hedgerow and treelines.

The dominant species in hedgerows are *Prunus spinosa*, *Fraxinus excelsior*, *Crataegus monogyna* and *Salix* species. Conifers in the form of *Cupressocyparis leylandii* and *Pinus* species also occur in the field boundaries. The treelines to the south are dominated by *Fagus sylvatica* and are associated with pre-1900 landscaping. All hedgerows are associated with spreading scrub on either side. The

scrub is spreading outwards from the field boundaries is almost entirely dominated by *Prunus spinosa*. Other shrub species noted along hedgerows include *Ilex aquifolium*, *Corylus avellana*, *Euonymus europaeus* and *Rosa canina*. The occasional mature broadleaved *Quercus petraea* also occurs along hedgerows. A range of common herb species occur along the hedgerows.



The historic hedgerows and treelines occurring within the site are shown on Figure 4.5. Each of these field boundaries are indicated on the 1838 6-inch maps and a number of them, as indicated on Figure 4.5 represent townland boundaries. The only field boundary not indicated on the 6-inch is FB6. Some of the historic field boundaries within the study area may be representative of ancient hedgerows. The unmanaged nature of these field boundaries has also facilitated their spread into adjoining grassland habitat, resulting in wide field boundary corridors. The width of some of these are in excess of 20m, resulting in the development of features more representative of linear woodland.

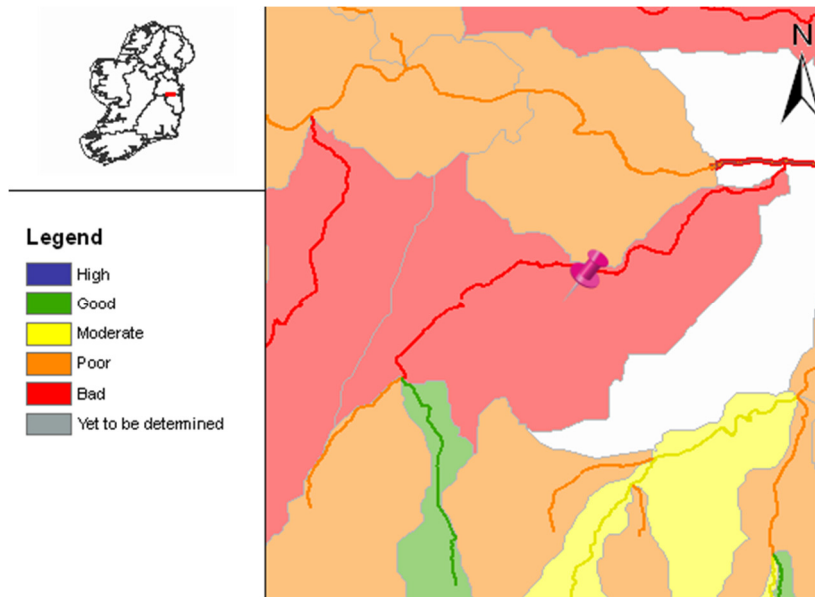


NATURE CONSERVATION VALUE

The hedgerows occurring within the study site represent a long-term habitat feature within the area. The majority of them are representative of species-rich hedgerows, are of historic value and are of high local conservation value with respect to the species potentially dependent upon them for shelter and food. These hedgerows may function as important commuting and foraging corridors for bats and non-volant terrestrial mammals as well as nesting habitat for a variety of bird species. The native flora supported by the hedgerows are also likely to support a diverse community of invertebrates. The nature conservation value of this habitat is of high local conservation importance (Rating D).

2.6 WATER RESOURCES INCLUDING FLOODING

The plan area lies within the Camac Lower Water Management Unit and the overall status according to the Water Framework Directive River Basin Management 2009-2015 data is of 'bad status'. Overall ecological status is also bad.



The overall objective for this unit is to restore to Good status by 2027 and a number of risks and pressures are identified for this unit; these are listed as follows:

The status of the waterbody is at risk from both point and diffuse sources, in particular Combined Source Overflows (any intermittent discharge from a foul sewer network is considered as a combined storm overflow CSO; this includes discharges to surface waters resulting from foul flooding as well as from designed CSOs). The groundwater status for the plan area is classified as 'good' .

The EPA Catchment maps shows the River Camac as unit 030 Camac, which ultimately drains into Dublin Bay, some 15km further east. Surface waters will continue to discharge to Dublin Bay via the local surface water network but the appropriate assessment screening has predicted no significant effects on European Sites downstream of the plan area citing a number of reasons (see preceding section 2.4.1)

FLOODING AND FLOOD RISK

A Stage 1 Strategic Flood risk assessment report has been prepared in accordance with the requirements of the Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). The Stage 1 SFRA has provided an assessment of all types of flood risk within the Grange development site to assist SDCC to make informed strategic land use planning decisions.

The stage 1 SFRA has concluded that the site does not appear to be susceptible to fluvial flooding however the current site is poorly drained and potentially susceptible to pluvial flooding. Areas downstream of the development may also be at risk of flooding due to pipes being undersized to accommodate the discharge from the development. The stage 1 makes a series of recommendations as regards addressing this issue in the form of investigations at planning application stages.

2.7 POPULATION AND HUMAN HEALTH

South Dublin County has seen a population increase of 5.1 % between the 2011 and 2016 census. The lands to the east of the plan area are residential development. Grange plan area lies within the

Clondalkin Village Electoral Division. Preliminary census data for 2016 presents the following information:

- Total population 9153. This ED has seen a greater overall population increase than the county average, recording an increase of 7.8%.

Corkagh Park to the southern boundary is an important amenity and green space area of 120 hectares and includes a playground, Pet farm, Corkagh Park Fisheries, Rose garden, Cycle track, Allotments, Sports & playing pitches, walking and Camac Valley Caravan park.

2.8 SOIL AND GEOLOGY

The general area is underlain by limestone bedrock, the Calp formation. In turn the soils present on site are fine loamy drift with limestones. Alluvium soils are associated with the Camac River. This means the lands are relatively well draining and productive.

2.9 MATERIAL ASSETS

Critical infrastructure to be in place to accommodate and serve development is identified in the masterplan, and includes the following:

- Foul water drainage system and water supply.
- It is understood that the southern part of the lands will allow for gravity flow as regards foul drainage, given the topography of the northern part of the lands, these may require pumping.

Almost all of the waste water in South Dublin is currently treated in Ringsend Wastewater Treatment Works which discharges into Dublin Bay. The treated waters are treated to a Tertiary standard, which is in compliance with the Urban Wastewater Treatment Directive. The quality of the discharged waters is within the requirements of the Urban Waste Water Treatment Directive. However, the Ringsend Wastewater Treatment Works were designed for a 1.4 million population equivalent and are currently operating at 1.9 million population equivalent. It is understood that a planning application is due in the short term to upgrade the treatment facilities at the plant and allow for increased treatment capacity..

2.10 LANDSCAPE

The plan area is primarily agricultural land with a hedgerow network, however the area has a more suburban character given the surrounding land uses and busy road network particularly to the west and north.

As part of the masterplan, the existing key hedgerows, specimen trees and field drainage systems will be protected, and there will be a new internal green loop connecting areas in the plan area with the surrounding landscape. A Sustainable urban drainage system, using the landscape network has been identified at principle level and includes integrated constructed wetlands as well as retention of drainage ditches.

2.11 CULTURAL HERITAGE

A cultural heritage reportⁱ was commissioned in 2008 for the plan area and comprised a paper survey and field inspection. 300m outside the plan area was also included within this study.

ARCHAEOLOGY

In summary, although no previously recorded archaeological sites are noted within this plan area, there are located within the 300m study area, as follows:

- Castle, Nangor Townland, Mill;
- Fairview Townland and Castle and
- Corkagh Demense.

The report states that the general landscape of the proposed area offers a potential setting for the discovery of the following types of sites and remains:

- Fluachta fiadh (prehistoric cooking sites);
- Prehistoric burial sites, ringfords and enclosures sites, and
- The subject lands formed part of the medieval manor of Clondalkin and are close to two former castles (Nangor and Corkagh), there is an increased possibility for the recovery of artefacts, especially pottery sherds, dating to this period.

An updated archaeological (geophysical) report has been commissioned as part of the masterplan preparation and has provided additional information on potential archaeological resources.

ARCHITECTURAL HERITAGE

There are no protected structures within the boundaries of the lands. Three structures are located within 300m of the plan area, as follows;

- Fairview Oil Mills, Fairview townland;
- Corkagh Demesnes complex (section of watercourse with bridge; three bay single storey former houses, and two storey former stables), and
- Mill pond, Corkagh.

2.12 AIR QUALITY AND NOISE

The Air Quality Index for health (EPA) provides air quality information with health advice for both the general public and people sensitive to air pollution. The index is displayed on a colour-coded map, updated hourly. The index is based on information from monitoring instruments at representative locations in each region. South Dublin located with the 'Dublin City' region and is currently achieving an air quality rating of '3 - Good' respectively'.

Strategic Noise Mapping is required for the four Local authorities within the agglomeration of Dublin. The noise mapping indicated that traffic congestion and movement were the issues of concern regarding noise pollution and that the majority of noise occurs along the national, regional and distributor road network.

3 SEA SCREENING ASSESSMENT

3.1 INTRODUCTION

The following section presents the SEA screening assessment of the **Kilcarbery Grange Masterplan** against the criteria provided in Schedule 2a of the Planning and Development (Strategic Environmental Assessment) Regulations 2001-2011 which details the criteria for determining whether a plan or programme is likely to have significant effects on the environment. The Screening assessment should be read in conjunction with the Habitats Directive Screening report.

TABLE 4 SCHEDULE 2 A SCREENING ASSESSMENT

Criteria for determining whether the Kilcarbery Grange Preliminary Masterplan is likely to have significant effects on the environment
<p>1. The characteristics of the plan having regard, in particular, to:</p> <p><i>the degree to which the plan sets a framework for projects and other activities, either with regard to the location, nature, size and operating conditions or by allocating resources,</i></p>
<p>This is a non statutory plan that has as its primary aim the provision of residential and mixed use in line with the landuse zoning of Res-N, in the South Dublin CDP 2016-2022. The CDP has also been subject to SEA and screening under the Habitats Directive.</p> <p>The masterplan has been expanded upon and a series of additional guidelines pertaining to ecology, surface water and SUDs and green infrastructure have been developed to provide greater overall environmental protection and integration of environmental issues into the masterplan.</p> <p>The framework plan states in Section 6 that all aspects of detail in the preliminary masterplan and masterplan itself will be required to comply with Development Plan standards, current national planning guidelines and the detailed guidelines that have been developed at Masterplan Stage.</p> <p>At this juncture, masterplan will sets an overall framework for projects but will sit beneath the existing statutory landuse planning framework of which the South Dublin CDP 2016-2022 is of particular relevance.</p>
<p><i>the degree to which the plan influences other plans, including those in a hierarchy,</i></p>
<p>As stated previously, this masterplan is non-statutory and now functions as a masterplan for development within this lands; it has been developed in line with the South Dublin CDP 2016-2022 and sits within a hierarchy of national, regional and county planning considerations. Additional surveys and guidelines have been developed that now form part of the updated masterplan and these provide greater environmental protection of existing resources and aim to reduce potential adverse environmental effects associated with the development activities.</p>
<p><i>the relevance of the plan in the integration of environmental considerations in particular with a view to promoting sustainable development,</i></p>
<p>The preparation of the masterplan is underpinned by the above CDP as well as national planning guidelines. Additional surveys including ecological surveys have also assisted in refining and influencing the masterplan as it has been prepared.</p>

The masterplan recognises and has allowed for the protection of the historic landscape and water management features such as hedgerows and drainage ditches which have been retained as part of the overall Green Infrastructure proposals.

As part of the Masterplan existing green corridors in the form of hedgerows and drainage ditches will be maintained within the Masterplan Area. In addition new green corridors will be provided within the Masterplan Area that will partially offset the loss of some hedgerows within the area. The existing hedgerows and drainage ditch to be retained and the new green corridors will provide linkage to the parkland setting of Corkagh Park to the south of the project site. The retention of these features will also provide natural green corridors moving north from Corkagh Park in the direction of the Grand Canal.

Other elements of the framework plan of environmental relevance include

- permeability to allow for pedestrian and cycling permeability and comfort and a new green loop for dedicated local pedestrian and cycle connections linking the local green spaces at the three residential area.
- A new integrated SUDs using the landscape network that now includes Integrated Constructed Wetlands to be developed in line with guidance contained in the Green Infrastructure Guidelines.
- Urban blocks including appropriately sized blocks to maximize permeability and shorten pedestrian and cyclist travel distances.
- Design for the different frontages of the plan area
- Lower level, energy efficient street lighting
- Identified treelines/hedgerows to be retained as Dark Corridors to protect key commuting routes for bats between Corkagh Park (see Section 5 of the Green Infrastructure Guidelines and the Figure below)



In addition to the Green Infrastructure Guidelines which incorporate the Biodiversity Management plan and SUDs proposals, an outline Construction Environmental Management Plan has also been prepared. All development proposals will be subject to statutory development management processes.

Environmental problems relevant to the plan

In terms of environmental problems relevant to the plan area, key issues include traffic and transport, facilitating the development of residential and mixed use on the plan area whilst protecting where possible the environmental resources.

The masterplan recognises the role of hedgerows particularly in relation to the Corkagh park area and potential ecological connectivity. Leislars Bats are the most common species present in and around the plan area and measures are now included within the masterplan through the Green Infrastructure Guidelines to mitigate adverse effects on these and other bat species.

At a broader level, the surface water is bad within the area so ensuring there is no further deterioration to the Lower Camac in terms of potential surface water run off or excessive soil sealing associated with the masterplan is important. Ensuring that the lands are serviced in advance of development including water and wastewater services is another important issue and is reflected in a range of policies and objectives in the South Dublin CDP 2016-2022 such as IE Objective 02 and Policy IE2.

The census data has shown the population in the area to have increased by 7.8% between 2011 and 2016

and the provision of this preliminary masterplan and subsequent Masterplan aims to provide much needed housing development within South Dublin.

the relevance of the plan in the implementation of European Union legislation on the environment (e.g. plans linked to waste-management or water protection).

The masterplan has been developed to be consistent with existing national and regional policy documents which includes policies relating to environmental protection, water supply, water quality, ground water, waste management, landscape and cultural heritage in compliance with EU legislation. These include the *Water Framework Directive, Groundwater Directive, Habitats Directive* and *Birds Directive*.

2. Characteristics of the effects and of the area likely to be affected, having regard, in particular, to:

the probability, duration, frequency and reversibility of the effects,

It is understood that the development on the lands may be undertaken in distinct phases, and the application of relevant policies and objectives of the South Dublin CDP 2016-2022 will be required.

The development of the masterplan to date has been informed by an understanding of existing environmental issues and has sought to enhance green corridors by retaining important hedgerows as well as integration of SUDs and plan for phased deliver of key infrastructure.

Bat activity recorded within the Masterplan Area during monitoring in 2017 was dominated by Leisler's bat. This species of bat is less reliant on structured linear vegetation and habitat features such as hedgerows and prefers open habitats, such as parkland as well as rivers and lakes.

While much of the open habitats occurring within the Masterplan Area will provide the lands necessary for future housing development the provision of open pond habitats, parklands and green corridors connecting these features to Corkagh Park to the south will be retained.

Aside from Leisler's bat the other species regularly occurring within the Masterplan Area were Common pipistrelle followed by Soprano pipistrelle. Overall, during monitoring Common pipistrelle activity was recorded at moderate levels along hedgerows, while Soprano pipistrelle activity was recorded at low to moderate levels. Both pipistrelle species tend to avoid open habitats and are more closely associated with structured habitats such as woodland, treelines, hedgerows and riparian corridors. The retention of field boundaries and the provision of treelines along green corridor will provide linkage between the Masterplan Area and Corkagh Park to the south. These linear features will also provide linkage to SuDS areas that will have the potential to provide high quality foraging habitat for these bat species.

More generally the conversion of largely greenfield, formerly agricultural lands to residential development represents a considerable landuse change and gives rise to potential increased surface run off and soil sealing. However, the surface water management is informed by the retention of existing drainage ditches as swales, and integrated constructed wetlands as detailed in the Green Infrastructure Guidelines.

the cumulative nature of the effects,

At this juncture potential cumulative effects are considered in terms of increased landuse impacts

associated with the intensification of development within the plan area. The lands themselves are bounded by existing urban land uses with a regional road to the west, and existing residential development to the north and east. **The potential fragmentation of habitats and ecological corridors associated with the masterplan and its association with the functions of Corkagh Park represent a potential cumulative effect and a series of measures are included to minimise such effects.**

the transboundary nature of the effects

It is considered that with proper regard and consistency with the environmental protection policies and objectives contained in South Dublin County Development Plan 2016-2022 and the completion of appropriate environmental assessments and planning process for any proposed development arising from the Masterplan, no negative transboundary environmental effects are predicted.

the risks to human health or the environment (e.g. due to accidents),

Given the proactive approach to sustainable management incorporated into the masterplan and protective policies and objectives contained in the South Dublin CDP 2016-2022 it is not identified at this stage as giving rise to effects that would present as risks to human health or the environment.

the magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected).

The preliminary masterplan relates to the 35 hectares as outlined and have been zoned for new residential development under the CDP 2016-2022. As the plan area is bounded to the north and west by roads, the south by Corkagh park and the east by existing residential development, the extent of effects is considered to be limited.

the value and vulnerability of the area likely to be affected due to:

(a) special natural characteristics or cultural heritage

the plan area is not subject to any particular natural or cultural heritage designations; notwithstanding that there is a responsibility to sustainably manage this plan area. The masterplan has integrated key known environmental features including important trees, links with Corkagh park, open and green space and it is considered that application of relevant natural or cultural heritage policies would apply through subsequent development applications.

(b) exceeded environmental quality standards or limit values,

Any landuse activities will be required to be compliant with relevant standards, policies and objectives of the current South Dublin CDP 2016-2022. The status of the surface water of the Lower Camac Water Unit is a key consideration as well as capacity issues around water supply and wastewater treatment.

(c) intensive land-use,

The lands have been zoned as Res-N under the South Dublin CDP 2016-2022 which was also subject to SEA; whilst the masterplan aims to facilitate this landuse zoning so there will be an intensification of land use ultimately at these lands associated with the zoning to provide for residential development.

(d) the effects on areas or landscapes which have a recognised national, European Union or international protection status.

A Habitats Directive Screening Statement has been prepared in tandem with this SEA Screening to assess if likely significant effects arise in relation to conservation management objectives of European Sites and the Kilcarbery Grange Masterplan.

It is not considered that any significant effects will arise in relation to landscapes of national, EU or International protection status.

3.2 SCREENING DECISION

Section 9 (1) of the (2004) Regulations (S.I. No. 435) states “*subject to sub-article (2), an environmental assessment shall be carried out for all plans and programmes*

(a) which are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications and tourism, and which set the framework for future development consent of projects listed in Annexes I and II to the Environmental Impact Assessment Directive, or

(b) which are not directly connected with or necessary to the management of a European site but, either individually or in combination with other plans, are likely to have a significant effect on any such site.”.

The Kilcarbery Grange Masterplan itself functions as a guidance document that will require compliance for development activities as planned by the approved developer in conjunction with South Dublin County Council. Such development proposals will also be required to be consistent with the South Dublin County Development Plan 2016-2022 or any higher level plans. Projects that may arise in the future associated with the masterplan will be subject to the requirements of the relevant national planning procedures and be consistent with existing frameworks and South Dublin Development Plan 2016-2022 as appropriate all of which have been subject to SEA and developed in accordance with the principles of sustainability.

The concluding statement of the screening under Habitats Directives states that:

*‘Following an examination, analysis and evaluation of the relevant information, including in particular, the nature of the Draft Preliminary masterplan and their potential relationship with European sites, as well as considering other plans and projects, and applying the precautionary principle, it is the professional opinion of the authors of this report (Scott Cawley) that **it is possible to rule out likely significant effects on all European sites and it is the professional opinion of the authors of this report that the Draft Kilcarbery Grange Preliminary Masterplan does not require an Appropriate Assessment**’.*

Therefore, on the basis of the above assessment and consideration of the criteria as set out in Schedule 1 of the SI 435/2004 it is considered the Kilcarbery Grange Preliminary Masterplan is unlikely to give rise to significant environmental effects and does not require full SEA.

A final determination however will not be made until the specified environmental authorities have been consulted.

ⁱ The Grange Development, Clondalkin, Co Dublin. Cultural Heritage: local history, archaeology and architectural heritage. Baseline/Constraints Report. Martin E Byrne. 2008.

ⁱⁱ APPROPRIATE ASSESSMENT SCREENING REPORT DRAFT KILCARBERY GRANGE PRELIMINARY MASTERPLAN, Scott Cawley 2016.



UPDATED
APPROPRIATE ASSESSMENT
SCREENING REPORT
KILCARBERY GRANGE UPDATED MASTERPLAN
08/12/2017

SOUTH DUBLIN COUNTY COUNCIL
NOTE UPDATED SECTIONS HIGHLIGHTED IN YELLOW

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1. INTRODUCTION

1.1. Appropriate Assessment Screening Report: Purpose and Process

South Dublin County Council **has prepared** the Kilcarbery Grange Preliminary Masterplan (hereafter referred to as the “Preliminary Masterplan”). The objectives of the Preliminary Masterplan are as follows:

- To provide clear analysis of the lands in respect of local, constraints and opportunities
- To set out a clear vision for the development of the lands in the short to medium;
- To provide a robust framework for development of the lands;
- to provide a basis for later planning and design stages; and,
- To facilitate phased and parcelled delivery of key infrastructure and development.

Proposed land use plans and proposed variations must undergo a formal “test” or “screening” to ascertain whether they are likely to result in any significant adverse effects on specific sites designated for their nature conservation importance. These sites are those designated under the European Commission’s Natura 2000 network of sites (hereafter “European sites”¹). These sites are designated on the basis of the presence of certain habitats and species that are deemed to be of international importance. The Irish Government and local planning authorities have a legal obligation to protect these sites.

The EC Habitats and Birds Directives are the framework for the designation of these sites. The EC Habitats Directive requires the “screening” of plans and projects under Article 6(3). If the screening process results in a judgement that likely significant effects may occur or cannot be ruled out, then a more detailed ‘appropriate assessment’ (AA) is required.

Scott Cawley Ltd. was appointed by South Dublin County Council to analyse the Kilcarbery Grange Preliminary Masterplan during early stages of preparation and prepare an AA Screening Report to inform the Council’s own AA Screening Determination.

This Preliminary Masterplan formed the basis of discussions through a tendering process to inform and guide potential developers. This tendering process is now at preferred bidder stage and therefore the updated Masterplan will provide the framework for development activities on these lands.

Comments received from statutory environmental authorities in relation to the Preliminary Masterplan have informed a suite of additional surveys and studies, which in turn, have contributed to an updated Masterplan, which now forms the basis of this SEA Screening report. An overview of the key issues raised by these environmental authorities and the response to same is provided Table 1 in the SEA Screening Report which also accompanies the Preliminary Masterplan. The masterplan has been expanded upon and a series of additional guidelines pertaining to ecology, surface water and SUDs and green infrastructure have been developed to provide greater overall environmental protection and integration of environmental issues into the masterplan.

¹ Natura 2000 sites are defined under the Habitats Directive (Article 3) as a European ecological network of special areas of conservation composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II. The aim of the network is to aid the long-term survival of Europe’s most valuable and threatened species and habitats. In Ireland these sites are designed as *European sites* - defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

2. IDENTIFICATION OF EUROPEAN SITES, GENERIC THREATS AND PRESSURES

As part of the analysis of the Preliminary Masterplan, all European sites (SACs and SPAs) within the zone of influence of the Preliminary Masterplan boundary were identified. Similarly, all Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) within the zone of influence of the Preliminary Masterplan were identified. NHAs, pNHAs and other designated sites such as Nature Reserves, Wildfowl Sanctuaries and Ramsar sites do not form part of the European site network, however they often provide an important supporting role to the network, particularly when it comes to fauna species which often do not obey site boundaries. A list of all European sites, NHAs and pNHAs located within the Plan Area and Zone of Influence can be found in Section 3.

Threats and pressures to the integrity of the European sites and hence the sensitivities of the Qualifying Interests (QI) and Special Conservation Interests (SCI) of the European sites within the zone of influence of the Preliminary Masterplan have been identified. Threats and pressures for QIs were extracted from the Status of EU Protected Habitats and Species in Ireland, Volume 2 & 3 (NPWS, 2013a & 2013b). Information on the parameters contributing to achieving and/or maintaining favourable conservation condition were largely compiled from a range of Site Specific Conservation Objectives (SSCOs) downloaded from the NPWS website, but is also based on professional judgement.

2.1. Defining the Zone of Influence of the Preliminary Masterplan

The Zone of Influence (Zoi) is a distance within which the Preliminary Masterplan could affect the conservation condition of QI habitats or species. There is no set recommended distance for which European sites are considered as being relevant (*i.e.* within the Zoi of proposed works) for AA. Available guidance (NPWS, 2010) recommends that *“the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects”*. As a general rule of thumb, it is often considered appropriate to examine all European sites within 15km as a starting point. In some instances where there are far reaching hydrological/hydrogeological connections, a whole river catchment or a groundwater aquifer may need to be included in determining the Zoi. All European sites within 15km of the proposed works are listed in **Error! Reference source not found.** and illustrated in Figure 1. In this instance, there is a potential connection between the subject lands and European Sites in the River Liffey and Dublin Bay via the existing surface water network and the proposed foul and surface water networks within the Preliminary Masterplan. The water networks currently and will continue to discharge to Dublin Bay via the River Liffey and Ringsend Wastewater Treatment Plant (WWTP).

3. EUROPEAN SITES

The analyses identified a four European Sites that will fall within the zone of influence of the Preliminary Masterplan:

- 000210 South Dublin Bay SAC;
- 000206 North Dublin Bay SAC;
- 004024 South Dublin Bay and the River Tolka Estuary SPA; and,
- 004006 North Bull Island SPA.

The Qualifying Interests of the European Sites within the zone of influence of the Preliminary Masterplan are presented in Table 1.

Table 1 - Qualifying Interests of European sites within the ZoI of the Preliminary Masterplan

Qualifying Interests of European sites within the Preliminary Masterplan Boundary	
Site Name:	South Dublin Bay SAC
Site Code:	000210
Qualifying Interests:	<p>Annex I Habitats:</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p><i>Salicornia</i> and other annuals colonising mud and sand [1310]</p> <p>Embryonic shifting dunes [2110]</p>
Source: (NPWS, 2013) <i>Conservation Objectives for South Dublin Bay SAC [000210]</i> . Version 1 (22/08/2013)	
Site Name:	North Dublin Bay SAC
Site Code:	000206
Qualifying Interests:	<p>Annex I Habitats:</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p><i>Salicornia</i> and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritima</i>) [1410]</p> <p>Embryonic shifting dunes [2110]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>Humid dune slacks [2190]</p> <p>Annex II Species:</p> <p>Petalwort <i>Petalophyllum ralfsii</i> [1395]</p>
Source: (NPWS, 2013) <i>Conservation Objectives for North Dublin Bay SAC [000206]</i> . Version 1 (06/11/2013)	
Site Name:	South Dublin Bay and River Tolka Estuary SPA
Site Code:	004024

Qualifying Interests:	<p>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 tetanus</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 paradise</i> [A194] Wetlands [A999]</p>
Source: (NPWS, 2015) <i>Conservation Objectives for South Dublin Bay and River Tolka Estuary SPA [004024]</i> (09/03/2015)	
Site Name:	North Bull Island SPA
Site Code:	004006
Qualifying Interests:	<p>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] 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 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 tetanus</i> [A162] Turnstone <i>Arenaria interpres</i> [A169] Black-headed Gull <i>Chroicocephalus ridibundus</i> [A179] Wetlands [A999]</p>
Source: (NPWS, 2015) <i>Generic Conservation Objectives for Rye Water Valley/Cartron SAC [001398]</i> (13/02/2015)	

Four SACs and one SPAs were “scoped out” entirely as a result of an analysis against impact categories identified. These European sites are displayed in Table 2.

Table 2 - “Scoped out” European Sites

Site Code	Special Areas of Conservation	Site Code	Special Protection Areas
001398	Rye Water Valley/Carton SAC	004040	Wicklow Mountains SPA
001209	Glenasmole Valley SAC		
002122	Wicklow Mountains SAC		
000397	Red Bog Kildare SAC		

These European sites were regarded to not have any source-pathway-receptor relationships with the plan area, and therefore any likelihood of significant impacts either in isolation or combination with elements of the Preliminary Masterplan or other plans and projects, could be ruled out.

Sites of national importance were also considered throughout this scoping exercise, however no NHAs or pNHAs are located within the boundaries of the Preliminary Masterplan and therefore it does not have the potential to affect their conservation objectives. The locations of Nationally Designated Sites in relation to the Plan Area is illustrated in Figure 2.

Figure 1 – European Sites within 15km of the Preliminary Masterplan

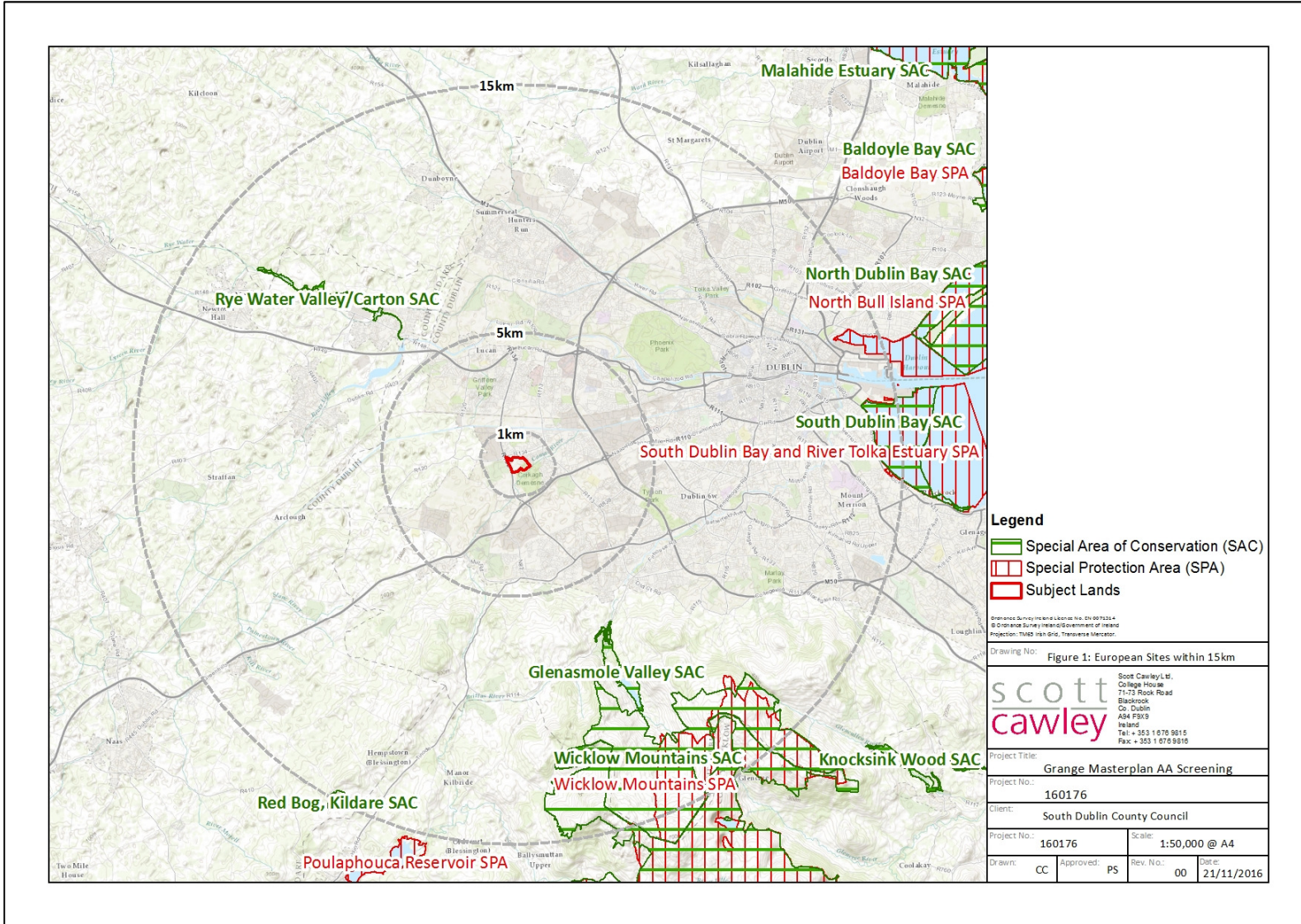
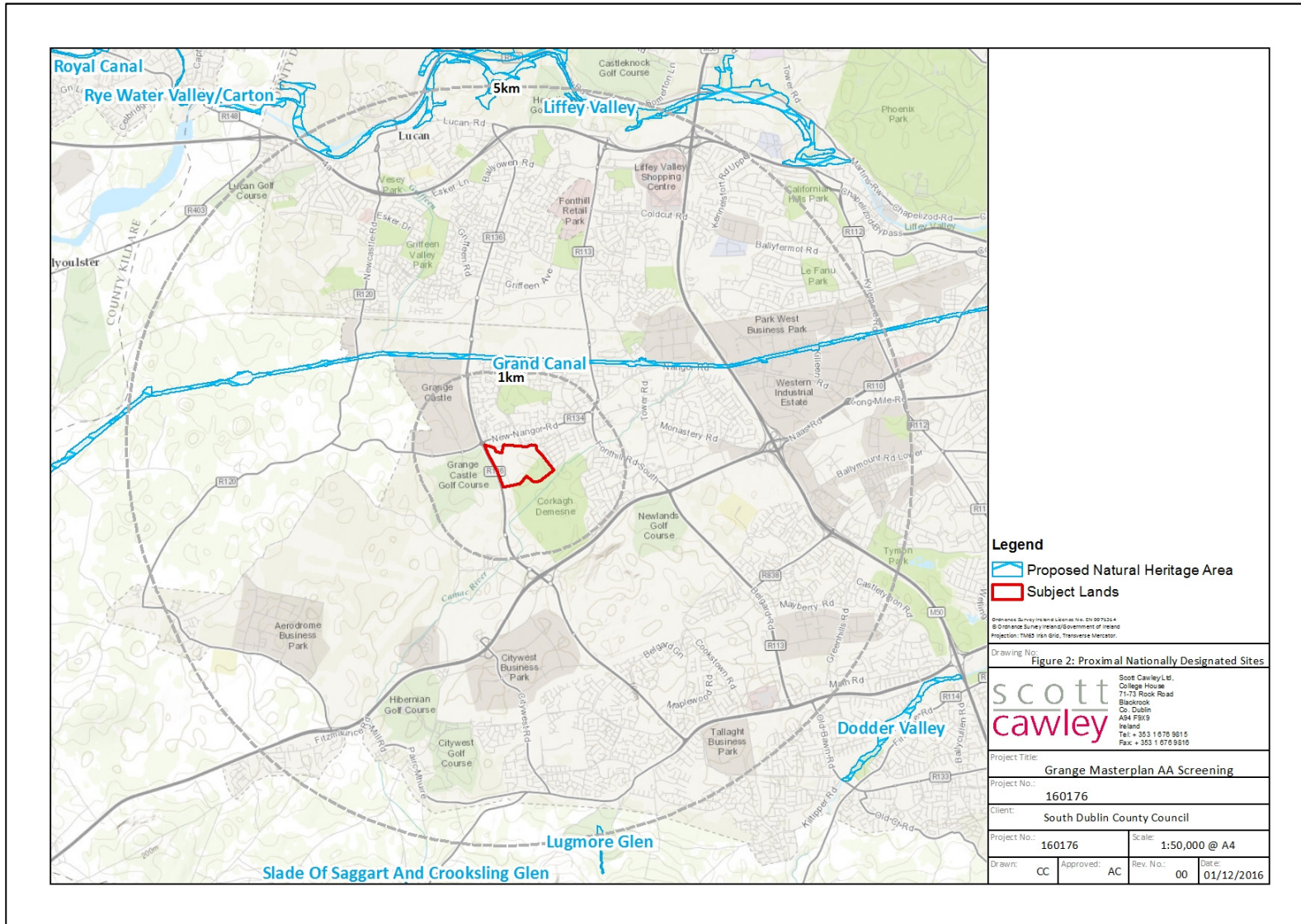


Figure 2 - Proposed Natural Heritage Areas (pNHAs) within the Masterplan Boundary and surrounding environs



4. EXISTING THREATS AND PRESSURES TO EUROPEAN SITES WITHIN THE ZOI

The threats to, and pressures on, the Qualifying Interest features of European Sites, as obtained from relevant published NPWS materials are displayed in **Error! Reference source not found.** These threats and pressure relate specifically to the European Sites located within the Zoi of the Preliminary Masterplan. Those in bold are regarded to be potential consequences of implementing a land-use plan. The threats and pressures were grouped into impact types, which were determined by the nature of activities which could potentially result in such impacts occurring.

The threats/pressures of relevance in this instance, are those that have the potential to affect the receiving downstream waters within Dublin Bay. In the case of the Preliminary Masterplan, this is most likely to be through silt and other pollutants entering the surface water network and increased loading to the foul water network.

Table 3 - Summary of Pressures and Threats on QIs/SCIs in the zone of influence of the Preliminary Masterplan

Summary of Pressures and Threats on QIs/SCIs in the zone of influence of the Preliminary Masterplan	
Agricultural and Rural activities	
<ul style="list-style-type: none"> • Intensive cattle grazing • Intensive sheep grazing • Other agricultural activities • Abandonment of pastoral systems, lack of grazing • Forest and plantation management and use • Agricultural intensification 	<ul style="list-style-type: none"> • Infilling of ditches, dykes, ponds, pools, marshes or pits • Pollution to surface waters • Fishing and harvesting aquatic resources • Fences, Fencing
Economic and Infrastructure Development, Communications and Energy Network Development	
<ul style="list-style-type: none"> • Pollution to surface waters • Sea defence of coast protection works, tidal barrages • Garbage and solid waste • Diffuse pollution to surface waters due to household sewage and waste waters • Reclamation of land from sea, estuary or marsh • Dykes, embankments, artificial beaches, general • Paths, tracks, cycling tracks 	<ul style="list-style-type: none"> • Disposal of household/recreational facility waste • Other industrial/commercial area • Polderisation • Sand and gravel extraction • Discontinuous urbanisation
Tourism, Recreation and Leisure	
<ul style="list-style-type: none"> • Paths, tracks, cycling tracks • Walking, horse-riding and non-motorised vehicles 	<ul style="list-style-type: none"> • Intensive maintenance of public parks/cleaning of beaches • Trampling, overuse

<ul style="list-style-type: none"> • Off-road motorised driving • Other human intrusions and disturbances 	<ul style="list-style-type: none"> • Outdoor sports and leisure activities; • Other sport/leisure complexes
Other	
<ul style="list-style-type: none"> • Sand and gravel extraction • Modification of hydrographic functioning • Estuarine and coastal dredging • Erosion • Polderisation • Bottom culture • Suspension culture 	<ul style="list-style-type: none"> • Silting up • Species-composition change (Succession) • Invasive non-native species • Changes in abiotic conditions • Reduction or loss of specific habitat features • Removal of beach materials

5. CHARACTERISTICS OF THE PRELIMINARY MASTERPLAN

The Preliminary Masterplan sets out the design of the plan area and includes details on foul water and surface water infrastructure, which are relevant to downstream European Sites within Dublin Bay. The plan includes the development of lands within the plan area over three phases.

In relation to foul water, it is anticipated that the Masterplan area will accommodate a maximum population equivalent (P.E.) of between 2,400 and 2,500. The foul water network will be designed to follow the urban structure set out in the Plan. Foul waters from the north and north-western sections of the plan area will be pumped to the south where it will fall by gravity to the existing foul drainage network. Foul waters will be treated at the existing Ringsend WWTP.

The overall approach to water management on the lands will be based on the principles of Sustainable Urban Drainage Systems (SUDS) with the aim of mimicking natural or existing water drainage processes on the lands. SUDS measures to be incorporated within the plan include the following:

- Subdivision of the plan area into sub-catchments;
- Green roofs (sedum roof) to apartment blocks and shopping centres in accordance with CIRIA SUDs Manual C753;
- Soakaways to the rear of each of the housing units allowing for infiltration to ground designed in accordance with BRE digest 365;
- Permeable paving in residential, on street and retail parking zones to be designed in accordance with CIRIA SUDs Manual C753;
- **Integrated Constructed Wetlands (ICW) with features designed to maximise biodiversity value will receive and treat all surface water prior to discharge to the existing surface water network;**
- The use of swales / ditches (existing and proposed) as conveyance systems to be designed in accordance with CIRIA SUDs Manual C753; and,
- Storm Water Attenuation SUDs system / Pond with the capacity to store 1 in 100-year storm event including 10% for climate change. Discharge from the Storm Water Attenuation to be limited to 2 l/s/ha or Qbar.

Storm Drainage will be designed to comply with the Greater Dublin Strategic Drainage Study Regional Drainage Policies.

6. POTENTIAL PRESSURES FROM THE PRELIMINARY MASTERPLAN

It was identified within Section 4 of this report that the main threats and pressures of relevance to European Sites within the Zol of the Preliminary Masterplan relate to inputs to the surface and foul water networks. These are examined in detail below.

6.1. Potential Pressures from Surface Water Runoff

The Plan Area is connected to European Sites in Dublin Bay via the surface drainage network. According to the EPA², the plan area lies within the *Liffey SC 090* sub-catchment. Surface waters from the plan area ultimately drain to Dublin Bay 15km to the east via the Camac River and River Liffey. Two EPA recording stations downstream of the Plan Area have recorded surface waters of 'Poor' status in 2010-2012, while the Liffey Estuary Upper is recorded as having 'Eutrophic' surface waters over the same period. Nonetheless, waters within the Liffey Estuary Lower and Dublin are recorded as being 'Unpolluted'.

Under the Preliminary Masterplan, surface waters will continue to discharge to Dublin Bay via the local surface water network. However no significant effects are predicted on downstream European Sites for the following reasons:

- The significant distance between the Plan Area and downstream European Sites in Dublin Bay (>20km by watercourse) is considered to reduce the risk of any potential contaminants from the construction phase of any development reaching European Sites to unlikely;
- Works within the Plan Area will be undertaken on a phased basis;
- Construction works will follow best practice with regards to working in or near watercourses as per IFI, 2016;
- Surface waters from the proposed development will pass through a number of SUDs systems prior to discharges including **integrated constructed wetlands**, flow control devices, attenuation tanks, petrol interceptors, swales etc., thus reducing the likelihood of suspended solids or pollutants travelling further downstream.

6.2. Potential Pressures from Foul Waters

The plan area will be connected to European Sites in Dublin Bay via the foul drainage network. All foul waters will be transferred by pump and gravity to the Ringsend WWTP, with treated waters discharged to the Liffey Estuary Lower/Dublin Bay at Poolbeg.

Ringsend WWTP has historically operated at or above capacity, with a contributing residential population in the order of 1.1 million P.E. and a total load (including non-domestic load) of 1.7 million P.E. on average, with significant fluctuations from day to day in 2014. Loading has increased in recent years with the rise in population recorded in the Dublin local authorities between 2011 and 2016 of approximately 4-6%. The latest information from Irish Water indicates that the plant has operated above its capacity of 1.64 million P.E. as of March 2016 (Irish Water, 2016), with a current operational loading of 1.9 million P.E.

² Based on examination of the EPA Envision Mapviewer service available online at www.epa.ie/mapviewer (Accessed 01/12/2016)

In 2013 the plant was non-compliant with several parameters as set under the EPA discharge licence. Despite Ringsend WWTP historically operating at or above capacity and the Preliminary Masterplan adding to the loading of the plant, no significant effects from discharge arising from the Preliminary Masterplan are predicted due to the following:

- There was no proven link between WWTP discharges and nutrient enrichment of sediments in Dublin Bay based on analyses of dissolved and particulate Nitrogen signatures (Wilson and Jackson, 2011);
- Enriched water entering Dublin Bay has been shown to rapidly mix and become diluted such that the plume is often indistinguishable from the rest of bay water (O'Higgins and Wilson, 2005);
- Marine modelling for Ringsend WWTP indicates that discharged effluent is rapidly mixed and dispersed to low levels via tidal mixing within a short distance of the outfall pipe (Dowly & Bedri 2007).
- A commitment by Irish Water to upgrade the plant from its current capacity of 1.64 million P.E. to meet EU standards and expand the facility to deal with the equivalent expansion as previously planned by Dublin City Council.

6.3. Potential Cumulative Pressures on Water Quality in Dublin Bay

There is potential for '*in-combination*' effects of proposed plans and projects within the South Dublin County Council Development Plan 2016-2022, Dublin City Development Plan 2016 - 2022, Dún Laoghaire-Rathdown County Development Plan 2016 - 2022, Fingal Development Plan 2011-2017 and other county level land use plans which can influence conditions in Dublin Bay via rivers and other surface water features. Dublin Bay is of '*Unpolluted*' water quality status and the pollutant content of future surface water discharges to the Bay is considered likely to be decreased in the long-term. This is because it is an objective of the Greater Dublin Strategic Drainage Study, and all development plans within the catchment of Ringsend WWTP to include Sustainable Urban Drainage Systems in new development. Together these objectives are considered likely to reduce pressures on designated marine and intertidal species and habitats in Dublin Bay.

There are a number of existing and proposed plans within the vicinity of the plan area which have the potential to produce '*in-combination*' effects to water quality in Dublin Bay. However, the potential for cumulative pressures on surface waters is considered to be limited to short duration impacts resulting from construction activities which could result in elevated levels of hydrocarbons or silts entering the surface water network. These are not considered to be significant given the large (>20km) downstream distance to European Sites.

Additionally, given the commitment by Irish Water to upgrade the Ringsend WWTP to cope with an additional 400,000 P.E. in the short to medium term, and capacity of waters in Dublin Bay to disperse and mix enriched waters, there is not considered to be potential for cumulative foul water pressures on downstream European Sites.

7. CONCLUSION

Following an examination, analysis and evaluation of the relevant information, including in particular, the nature of the Preliminary Masterplan and their potential relationship with European sites, as well as considering other plans and projects, and applying the precautionary principle, it is the professional opinion of the authors of this report that **it is possible to rule out likely significant effects on all European sites and** it is the professional opinion of the authors of this report that the Kilcarbery Grange Preliminary Masterplan does not require an Appropriate Assessment.

However, the authors of this report acknowledge that it is for South Dublin County Council, as the competent authority, to carry out a screening for AA and to reach one of the following determinations:

- a) AA of the Preliminary Masterplan is required if it cannot be excluded, on the basis of objective information, that the Preliminary Masterplan, individually or in combination with other plans or projects, will have a significant effect on any European sites;
- b) AA of the Preliminary Masterplan is not required if it can be excluded, on the basis of objective information, that the Preliminary Masterplan, individually or in combination with other plans or projects, will have a significant effect on any European sites.

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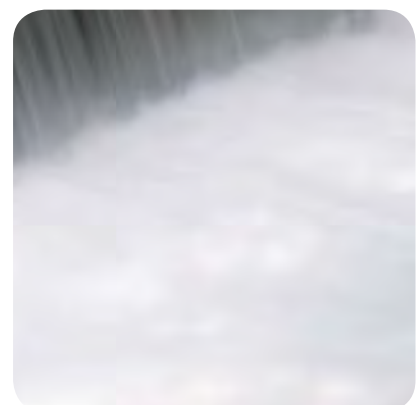
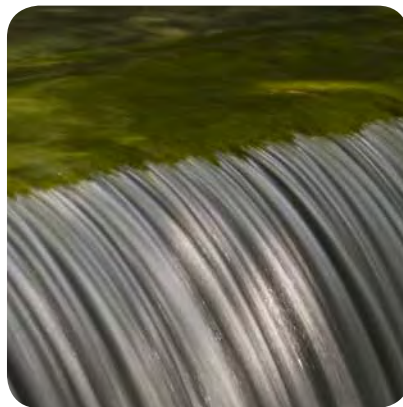
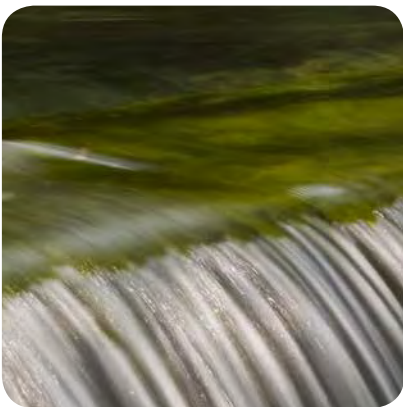
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Strategic Flood Risk Assessment of the Kilcarbery Grange Preliminary Masterplan

Stage 1 - Flood Risk Identification Report

December 2016





Strategic Flood Risk Assessment of the Kilcarbery Grange Preliminary Masterplan Stage 1 – Flood Risk Identification Report

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1 INTRODUCTION

1.1 BACKGROUND

South Dublin County Council (SDCC) is preparing a Preliminary Masterplan for a housing development at Kilcarbery, Grange, Nangor Road, Clondalkin, Dublin 22. SDCC intends to develop the 85 acre site in phases to create a living and working neighbourhood.

SDCC commissioned RPS Consulting Engineers to carry out a Stage 1 Strategic Flood Risk Assessment (SFRA) to support the preparation of the Kilcarbery Grange Preliminary Masterplan. The Stage 1 SFRA is prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014) referred to hereafter as 'The Guidelines'.

1.2 REPORT OBJECTIVES

The objective of this report is to prepare a Stage 1 SFRA for Kilcarbery Grange Preliminary Masterplan in accordance with The Guidelines. The Stage 1 SFRA provides an assessment of all types of flood risk within the 85 hectare boundary. A review of available flood risk information was undertaken to identify any flooding or surface water management issues related to the site that may warrant further investigation. Recommendations for addressing identified flood risk have been made which will enable SDCC to make informed strategic land-use planning decisions and to formulate flood risk policies for the Masterplan

1.3 DISCLAIMER

The Stage 1 SFRA has been prepared in compliance with the Guidelines but the SFRA remains a living document and is based on the best available data at the time of preparation. It is subject to change based on more up to date and relevant flood risk information becoming available during the lifetime of the Masterplan. All information in relation to flood risk is provided for general policy guidance only. All landowners and developers are instructed that South Dublin County Council and their consultants can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Furthermore owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands in which they have an interest prior to making planning or development decisions.

It should be noted that the Eastern CFRAM mapping used to define the flood zones for this SFRA are at Draft Final stage and are subject to change following a stakeholder and public consultation process. However the CFRAM mapping is the most comprehensive flood zone mapping available for the county and is considered appropriate for use as a strategic overview of flood risk within the county. Further information on the Eastern CFRAM study is available at www.cfram.ie. The flood maps are 'predictive' flood maps, as they provide predicted flood extent and other information for a flood event that has an estimated probability of occurrence (the 1% AEP and 0.1% AEP events – see section 3.2.3 below), rather than information for floods that have occurred in the past.

South Dublin County Council makes no representations, warranties or undertakings about any of the information provided on these draft maps including, without limitation, their accuracy, their

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1.4 REPORT STRUCTURE

The site and primary watercourses are identified in **Section 2**.

A summary of the Planning System and Flood Risk Management Guidelines and the procedure for undertaking a SFRA is presented in **Section 3**.

The available flood risk information used to identify the flood risk zones is discussed in **Section 4**.

Section 5 provides a summary and recommendations.

2 STUDY AREA

2.1 INTRODUCTION

The extents for the site are shown in Figure 2.1. It is located in South County Dublin and lies immediately North of the Camac River. It is approximately 12km west from Dublin City Centre situated adjacent to the R136 Regional Road. There is currently a school located to the North of Site, residential areas to the North East and East of the Site as well as a park to the South of the site (Corkagh Park.)

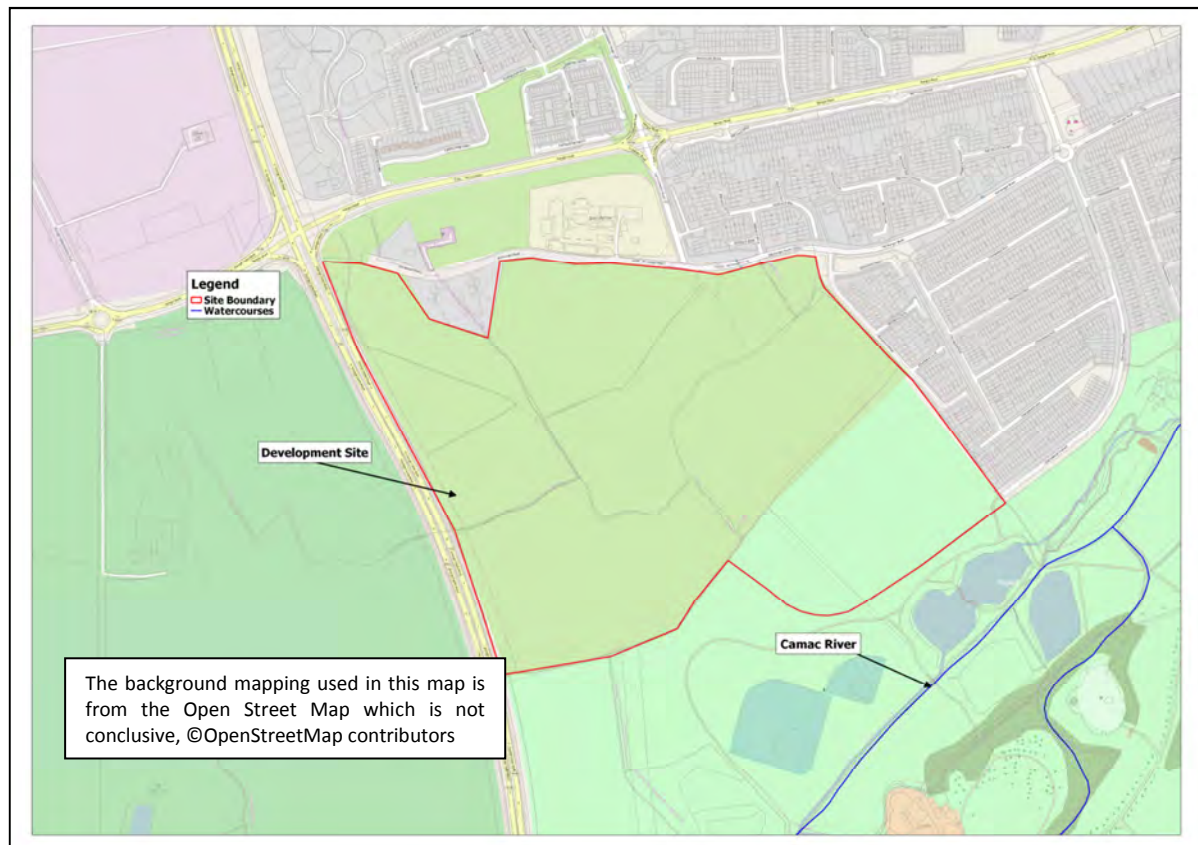


Figure 2.1 Site Boundary and Watercourses

2.2 WATERCOURSES

The Camac River runs in an easterly direction adjacent to the Southern side of the site. It is a significant tributary of the River Liffey which emanates in the foothills of the Wicklow Mountains to the south of Dublin City. The catchment area is 58 km² and is highly urbanised in the lower reaches (50% total of the total catchment). The catchment is also characterised by many sub-catchments or branches many of which represent urban drainage networks. However no significant watercourses have been identified within the extents of the site.

2.3 SITE DRAINAGE

A series of drainage ditches have been identified across the site as shown in Figure 2.2 below. There is also an attenuation pond in the north west of the site for the R136 which appears to discharge into the drainage network of the site.

The contours of a topographical survey undertaken as part of the Masterplan indicate that the natural discharge point is located in the north east of the site as shown in Figure 2.2. However invert levels on the drainage ditches do not support drainage from the site at low flows. During a site visit on the 11th November the majority of the drainage ditches were found to be dry and a series of stagnant ponds were located throughout the site. No easily identifiable discharge point from the site was found for the natural drainage.

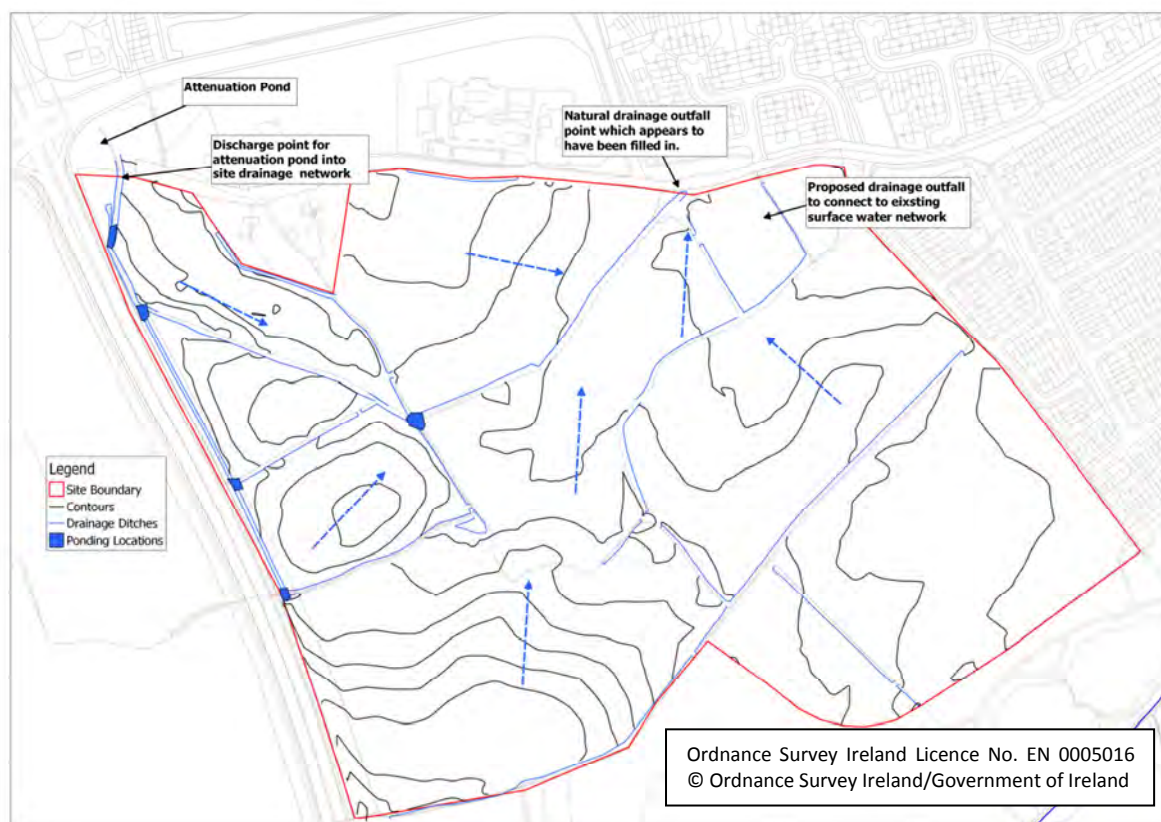


Figure 2.2 Existing drainage on the development site

Historical OSi mapping shows the drainage network flowing to the north east corner of the site but this old drainage now appears to have been filled in as part of urban development and a surface water pipe put in its place. Figure 2.3 shows part of the existing surface water network which has pipework on the Old Nangor Road but does not indicate that the drainage from the proposed development site connects into the existing network. However a connection manhole for future development has been built but it does not lie within the existing drainage ditches and does not appear to facilitate current drainage from the site.

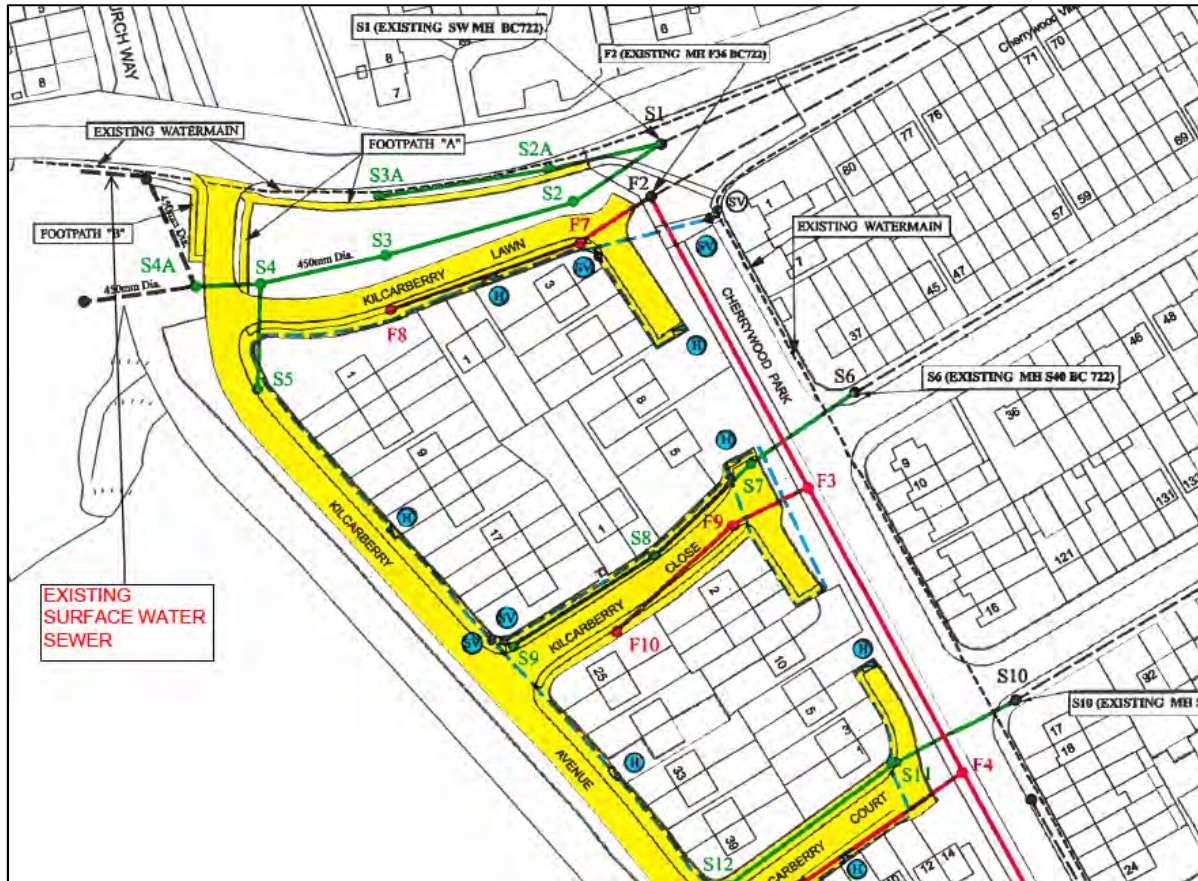


Figure 2.3 Existing drainage pipe network in the vicinity of the development site

Historical OSi mapping also indicates that the development site drains land to the east of the R136 where the Grange Castle Golf course is located. However the site visit showed stagnant ponds surrounding the culverts connecting the golf course to the development site indicating that there is limited drainage from the golf course into the proposed development site. The greenkeeping department of the golf course indicated that the main drainage from the golf course is directed away from this area.

3 THE PLANNING SYSTEM AND FLOOD RISK MANAGEMENT GUIDELINES FOR PLANNING AUTHORITIES

3.1 INTRODUCTION

In 2009 the Department of Environment, Heritage and Local Government in conjunction with the Office of Public Works published The Planning System and Flood Risk Management: Guidelines for Planning Authorities. The Guidelines recommend that Flood Risk Assessments (FRA) be carried out to identify the risk of flooding to land, property and people. FRAs should be carried out at different scales by government organisations, local authorities and for proposed developments appropriate to the level of information required. The applicable scale of FRA for this project is a **Strategic Flood Risk Assessment (SFRA)**.

3.2 FLOOD RISK ASSESSMENT

3.2.1 Flood Risk Assessment Approach

FRAs should be carried out using the following staged approach;

- **Stage 1 Flood Risk Identification** – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels.
- **Stage 2 Initial Flood Risk Assessment** – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped.
- **Stage 3 Detailed Flood Risk Assessment** – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

3.2.2 Types of Flooding

There are two main sources of flooding: inland and coastal. Inland flooding is caused by prolonged and/or intense rainfall. This results in fluvial, pluvial or ground water flooding acting independently or in combination. Coastal flooding is not a concern for SDCC as it is a landlocked county however a combination of high flow in rivers and a high tide may prevent the river from discharging into the sea thus increasing water levels inland causing rivers to overtop their banks.

- Fluvial flooding occurs when a river overtops its banks due to a blockage in the channel or the channel capacity is exceeded.

- Pluvial flooding occurs when overland flow cannot infiltrate into the ground, when drainage systems exceed their capacity or are blocked and when and when the water cannot discharge due to a high water level in the receiving watercourse.
- Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it.

3.3 FLOOD ZONES

The Guidelines recommend identifying flood zones which show the extent of flooding for a range of flood event probabilities. The Guidelines identify three levels of flood zones:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

The flood zones are generated without the inclusion of climate change factors. The flood zones only account for inland and coastal flooding. They should not be used to suggest that any areas are free from flood risk as they do not account for potential flooding from pluvial and groundwater flooding. Similarly flood defences should be ignored in determining flood zones as defended areas are still carry a residual risk of flooding from overtopping, failure of the defences and deterioration due to lack of maintenance.

3.4 STRATEGIC FLOOD RISK ASSESSMENT

The purpose of this report is to carry out a SFRA at development scale for the Kilcarbery Grange Preliminary Masterplan. The Guidelines recommend a series of outputs for a SFRA. These outputs in board terms include:

- Identify principal rivers, sources of flooding and produce flood zone maps for across the local authority area and in key development areas.
- An appraisal of the availability and adequacy of the existing information.
- Assess potential impacts of climate change to demonstrate the sensitivity of an area to increased flows or sea levels. Where mathematical models are not available climate change flood extents can be assessed by using the Flood Zone B outline as a surrogate for Flood Zone A with allowance for the possible impacts of climate change.
- Identify the location of any flood risk management infrastructure and the areas protected by it and the coverage of flood-warning systems.
- Consider, where additional development in Flood Zone A and B is planned within or adjacent to an existing community at risk, the implications of flood risk on critical infrastructure and services across a wider community-based area and how the emergency planning needs of existing and new development will be managed.

- Identify areas of natural floodplain, which could merit protection to maintain their flood risk management function as well as for reasons of amenity and biodiversity.
- Assess the current condition of flood-defence infrastructure and of likely future policy with regard to its maintenance and upgrade.
- Assess the probability and consequences of overtopping or failure of flood risk management infrastructure, including an appropriate allowance for climate change.
- Assess, in broad terms, the potential impact of additional development on flood risk elsewhere and how any loss of floodplain could be compensated for.
- Assess the risks to the proposed development and its occupants using a range of extreme flood or tidal events.
- Identify areas where site-specific FRA will be required for new development or redevelopment.
- Identify drainage catchments where surface water or pluvial flooding could be exacerbated by new development and develop strategies for its management in areas of significant change.
- Identify where integrated and area based provision of SUDS and green infrastructure are appropriate in order to avoid reliance on individual site by site solutions; and,
- Provide guidance on appropriate development management criteria for zones and sites.

3.5 SEQUENTIAL APPROACH AND JUSTIFICATION TEST

3.5.1 Overview

The Guidelines recommend using a sequential approach to planning to ensure the core objectives (as described in Section 3.1) are implemented. Development should be avoided in areas at risk of flooding, where this is not possible, a land use that is less vulnerable to flooding should be considered. If the proposed land use cannot be avoided or substituted a Justification Test must be applied and appropriate sustainable flood risk management proposals should be incorporated into the development proposal. Figure 3.1 shows the sequential approach principles in flood risk management. Table 3.2 outlines recommendations from the Guidelines for the types of development that would be appropriate to each flood zone and those that would be required to meet the Justification Test.

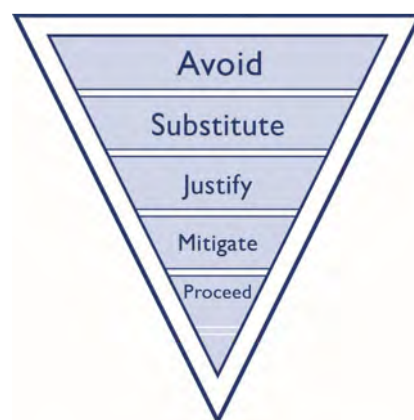


Figure 3.1 Sequential approach principles in Flood Risk Management

Table 3.1 Matrix of Vulnerability versus Flood Zone to illustrate appropriate development and that required to meet the Justification Test

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water compatible development	Appropriate	Appropriate	Appropriate

The Justification Test is used to assess the appropriateness of developments in flood risk areas. The test is comprised of two processes. The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding. The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

3.5.2 Strategic Flood Risk Assessment for South Dublin County Council Development Plan 2016- 2022

SDCC carried out a Strategic Flood Risk Assessment for the South Dublin County Council Development Plan 2016- 2022. The site was identified as being in Flood Zone C and following the sequential approach the site was deemed suitable for highly vulnerable development. The site was subsequently zoned for residential development. As it is not in a Flood Zone A or Flood Zone B the zoning therefore did not require a Development Plan Justification Test and subsequently a Development Management Justification Test. The SFRA did identify that the site is potentially susceptible to pluvial flooding which is discussed in greater detail in section 4.

4 STAGE 1 INITIAL FLOOD RISK ASSESSMENT

4.1 HISTORICAL FLOODING

A review of floodmaps.ie in the vicinity of the site does not show any historical flooding within the Masterplan boundary but it does show flooding downstream along the Camac in Cherrywood and Clondalkin most notable in June 1993. The River Camac burst its banks at a number of locations causing flooding in the Clondalkin area at Leinster Terrace, Old Nangor Road and Cherrywood Estate but did not impact on the development Site. Consultation with the drainage department for SDCC did not indicate any flooding on the site or in the immediate surrounding areas.

4.2 EXISTING FLOOD STUDIES – FLUIVAL FLOOD RISK

4.2.1 Eastern CFRAM Study

The OPW is currently leading the development of Catchment Flood Risk Assessment and Management (CFRAM) Studies. The aim of these studies is to assess flood risk, through the identification of flood hazard areas and associated impacts of flooding. The studies will establish long-term Flood Risk Management Plans (FRMP) to manage flood risk within the relevant river catchments. Flood maps are one of the key outputs of the studies. They indicate modelled extents for flood events of a range of annual exceedance probability (AEP). The development falls within the Eastern CFRAM Study. The CFRAM Study identified areas for further assessment (AFAs), including Dublin City.

4.2.2 Flood Risk Management Plans

The Eastern CFRAM Flood Risk Management Plans (FRMP) is ongoing and if it is deemed necessary, flood risk management objectives, options and plans will be adopted for the Masterplan. SDCC have committed to implementing any recommendations from the FRMPs and will work in conjunction with the OPW to deliver any proposed flood alleviation schemes that are deemed appropriate and viable.

The draft Eastern CFRAM FRMP was published in September 2016 and outlined a series of proposed flood risk policy measures for the local authorities but also specific measures for the South Dublin Area. These include regional measures, but also identify further flood defence works nearby to the development site in Baldonnel and along the Camac River. However these measures will not have a direct impact on the development site.

4.2.3 CFRAM Fluvial Flood Zone Mapping

The CFRAM studies are currently ongoing and at the time of compiling this SFRA the outputs remain as Draft Final status. They have been released as part of a statutory consultation process for the National CFRAM Programme. The draft CFRAM flood maps may be amended following the consultation process due to observations, technical objections and appeals from the local authorities and the public. It should be acknowledged however, that the CFRAM mapping is the most comprehensive flood zone mapping available for the country and is considered appropriate for use as a strategic overview of flood risk within the county. The draft flood zone mapping has been used

to enable SDCC to apply 'The Guidelines' sequential approach to appraise the development site for suitable land zonings and identify how flood risk can be managed as part of the development plan.

Figure 4.1 below and the map in Appendix A show the flood zone map for the River Camac as it flows through Corkagh Park. The boundary of the development site has been marked on Figure 4.1 it can be shown that the development site is located in Flood Zone C.

It should be noted that the CFRAM mapping used to define the flood zones for this SFRA are at Draft Final stage and are subject to change following a stakeholder and public consultation process. However the CFRAM mapping is the most comprehensive flood zone mapping available for the county and is considered appropriate for use as a strategic overview of flood risk within the county. Further information on the CFRAM studies is available at www.cfram.ie.

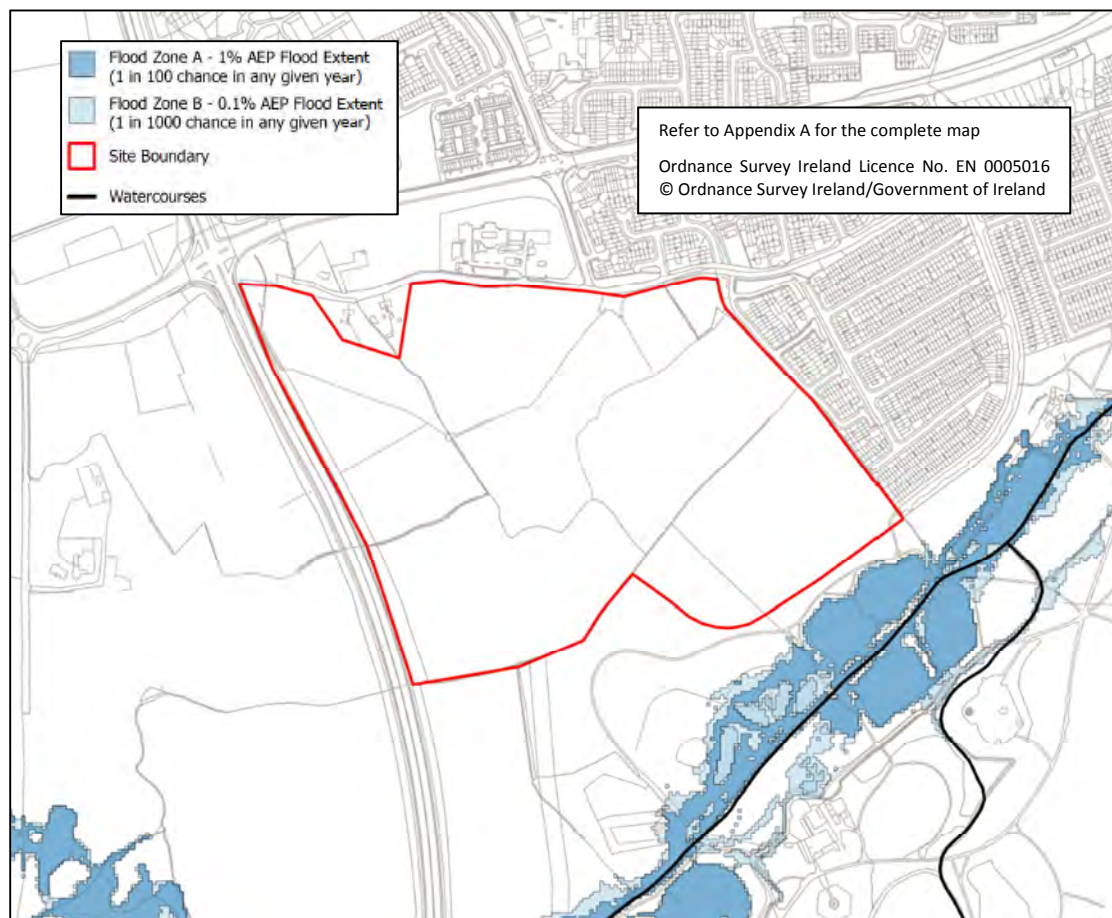


Figure 4.1 ECFRAM fluvial flooding extent map for the Camac River adjacent to the site

4.3 CLIMATE CHANGE – FLUVIAL FLOODING

As recommended by the Guidelines when hydraulic models are not available which include the effects of climate change the current scenario flood extents can be assessed by using the Flood Zone B outline as a surrogate for Flood Zone A with allowance for the possible impacts of climate change. Hence the draft CFRAM current scenario flood extents were reviewed as part of the SFRA to establish an indication of future risk in areas using the difference between the Flood Zones A and B. It can be seen in Figure 4.1 that Flood Zone B does not encroach on the development site.

4.4 OTHER SOURCES OF FLOODING

4.4.1 Overview

The flood zones only account for inland flooding. However they should not be used to suggest that any areas are free from flood risk as they do not account for potential flooding from other sources. Hence a review of other sources of flooding was carried out to identify potential areas of risk.

4.4.2 Groundwater Flooding

The OPW Preliminary Flood Risk Assessment (PFRA) carried out a national scale Groundwater Flooding Report which concludes that ground water flooding is largely confined to the West Coast of Ireland due to the hydrogeology of the area. Therefore ground water flooding is not a significant risk for South County Dublin.

A review of information on the Geological Survey of Ireland website also indicates that the site is not vulnerable from groundwater flooding but potentially from water logging due to low permeability. Groundwater flooding is most commonly associated with Karst areas which are not in the vicinity of the site. The site does lie on bedrock classified as LI (Locally Important Aquifer which is Moderately Productive only in Local Zones) which generally has limited ability to recharge groundwater. Therefore the site could be vulnerable to waterlogging during high rainfall events particularly in the winter as it has limited ability to drain into the local aquifer.

4.4.3 Pluvial Flooding

The OPW Preliminary Flood Risk Assessment (PFRA) also provides a national level pluvial screening of areas that are at potential risk of pluvial flooding. For a thorough assessment of pluvial risk for the site a more detailed assessment (taking into consideration of local factors and parameters) would need to be carried out. Nonetheless, the national PFRA maps can be used to identify areas that may be at risk. Figure 4.2 and the map in Appendix A show the indicative pluvial extents within the site. It can be shown that some of the identified ponding locations correlate with the PFRA extents.

As stated above in section 4.4.2 the site lies on a LI bedrock which has low permeability. Figure 4.3 shows that the site lies on limestone till but this is subdivided into BminDW (deep well drained material) and BminPD (mineral poorly drained) indicating that part of the site could have drainage issues. A previous geotechnical report and tests identified stiff clays in part of the site also indicating potential poor permeability.

As discussed in Section 2 the drainage ditches on the site have no identifiable discharge point and the site appears to be poorly drained due to invert levels on the ditches, this in conjunction with the evidence presented above on the subsoils indicates that the site is poorly drained and susceptible to water logging and pluvial flooding. The golf course drainage also appears to redirect away the natural drainage from the site hence it appears to be a self-enclosed drainage catchment apart from the attenuation pond which discharges into the North West corner of the site.

4.4.4 Coastal Flooding

Coastal flooding is not a concern for SDCC as it is a landlocked county however a combination of high flow in rivers and a high tide may prevent the river from discharging into the sea thus increasing water levels inland causing rivers to overtop their banks. This has been incorporated in the CFRAM mapping using joint probability analysis, hence any impact coastal influences may have upstream along the Liffey (and by extension the Camac River) are accounted for in the mapping. A review of existing indicative coastal flooding mapping from the Irish Coastal Protection Strategy Study (ICPSS) also shows that coastal flooding does not extend upstream as far as the South Dublin County boundary on the Liffey.

4.5 PROPOSED SURFACE WATER DRAINAGE

The Masterplan outline drainage is shown in Figure 4.4 below. It includes a combination of above ground /below ground drainage channels and attenuation ponds. The outline drainage in principle follows the natural drainage path to outfalls in the north east and south east of the development site. The existing drainage ditches will need to be regraded in places to ensure the surface water runoff can discharge to the proposed outfall points.



Figure 4.4 Proposed surface water drainage layout

4.6 GSDS – SURFACE WATER AND FOUL NETWORKS

Surface Water

The Greater Dublin Strategic Drainage Study (GSDS) did not identify any surface water network problematic areas for the existing scenario in the immediate area of the proposed development.

However for future scenarios they did identify potential flooding along the Old Nangor Road adjacent to the Cherrywood Villas downstream of the proposed surface connection for the development. A combination of throttles along the network causes surcharging and flooding. The GSDS recommended upsizing the pipe network adjacent to the Cherrywood Villas and in nearby areas (Oldchurch Crescent, Cherrywood Crescent) to remove the choke point. Figure 4.5 shows predicted future flooding downstream of the surface water outfall for the development along the Old Nangor Road.

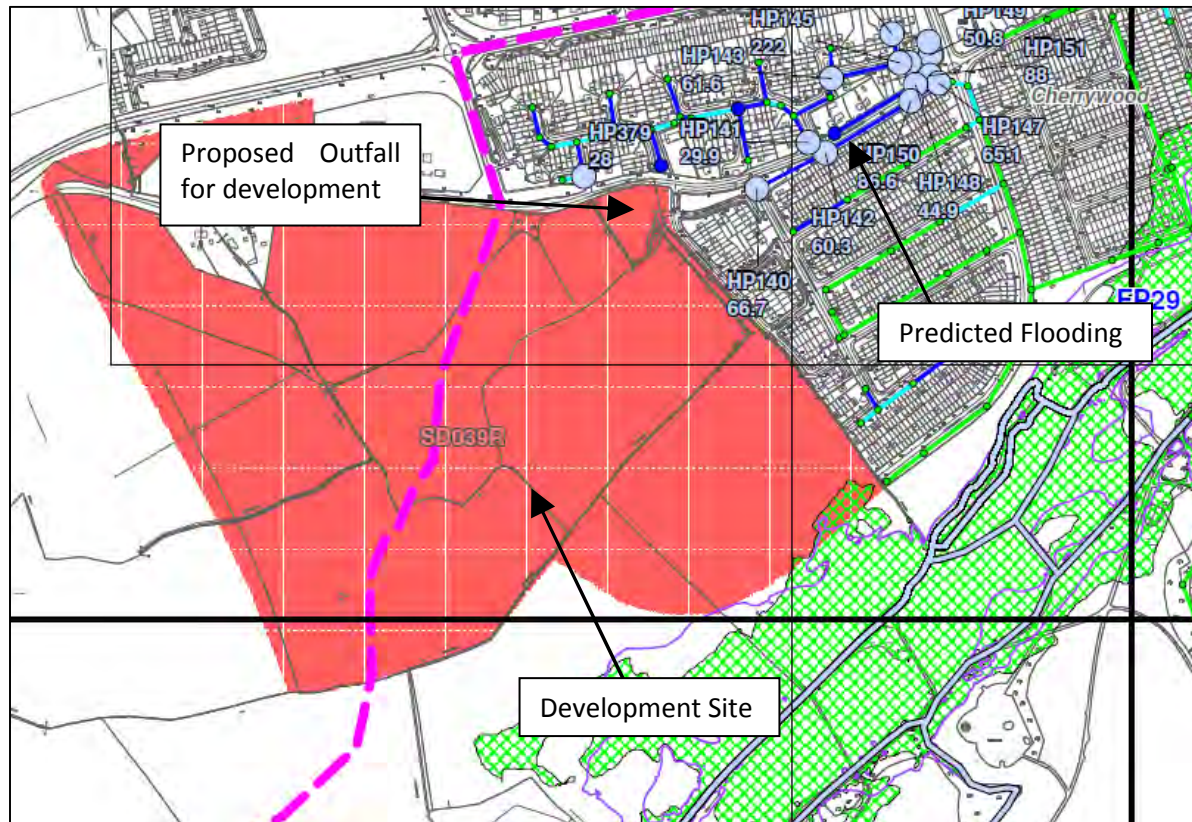


Figure 4.5 GSDS future scenario (2031) for the surface water network downstream of the site

Foul

The GSDS also did not identify any foul network problematic areas for the existing scenario in the immediate area of the proposed development. However for future scenarios they did identify potential flooding at Cherrywood Avenue downstream of the proposed foul connection point for the development. A throttling effect occurs downstream of Cherrywood Avenue, hence a backup of flows occurs and causes flooding at low-lying areas. The GSDS recommended that the pipe network in this area be upgraded to provide suitable capacity to alleviate the predicted flooding. Figure 4.6 shows predicted future flooding downstream of the development.

4.7 LAND USES

As discussed in section 3.5.2 the SDCC SFRA for the County Development Plan 2016-2022 found it was appropriate to zone the land residential. The proposed development has been furthered sub divided into residential, commercial, educational and open space land use parcels as shown in Figure 4.7 below. As no fluvial flood zones have been defined for the site the current land uses are appropriate in accordance with the Guidelines.

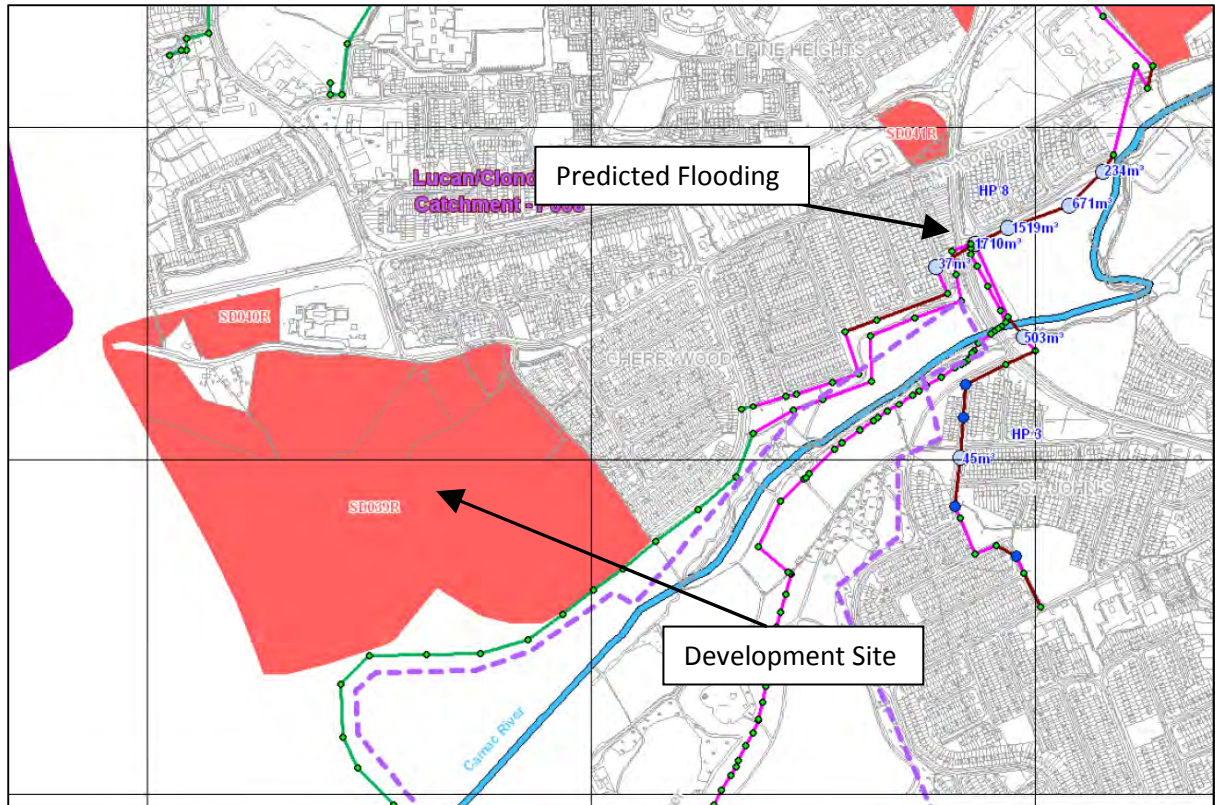


Figure 4.6 GSDS future scenario (2031) for the foul network downstream of the site



Figure 4.7 Proposed land uses within the development site

4.8 FLOOD RISK SUMMARY

Table 4.1 below outlines a flood risk summary for the development site. The site does not appear to be susceptible for fluvial flooding but is potentially susceptible to pluvial flooding due to existing poorly graded drainage ditches, the apparent absence of an outfall for the site and low permeable sub surface.

Table 4.1 Flood Risk Summary for the development site

Historical Flooding	No Historical Flooding identified within the site.
Fluvial Flooding	Draft ECFRAM maps do not show that the site is at risk from fluvial flooding.
Pluvial Flooding	The combination of low permeable soils, poorly graded drainage ditches, possible removal of the runoff from the golf course lands into the site and the apparent absence of a drainage outfall indicates that the site is poorly drained and susceptible to waterlogging and pluvial flooding. It appears to be a relatively self-enclosed catchment with the exception of the discharge from the R136 attenuation pond.
Ground Water Flooding	The site does not appear to be at risk from groundwater flooding. There is no identified karst within the area and the ground has limited groundwater recharge ability.
Foul & Surface Water Networks	Future scenarios for both the foul and surface water networks predicts flooding downstream of the development.

5 SUMMARY & RECOMMENDATIONS

5.1 FLOOD RISK OVERVIEW

The Stage 1 - SFRA Report has been prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). The Stage 1 - SFRA has provided an assessment of all types of flood risk within the development site to assist SDCC to make informed strategic land-use planning decisions.

The site does not appear to be susceptible to fluvial flooding however the current site is poorly drained and potentially susceptible to pluvial flooding. Areas downstream of the development may also be at risk of flooding due to pipes being undersized to accommodate the discharge from the development.

5.2 RECOMMENDATIONS

It is recommended that, as part of the planning application, the drainage assessment of the site should investigate and confirm the following:

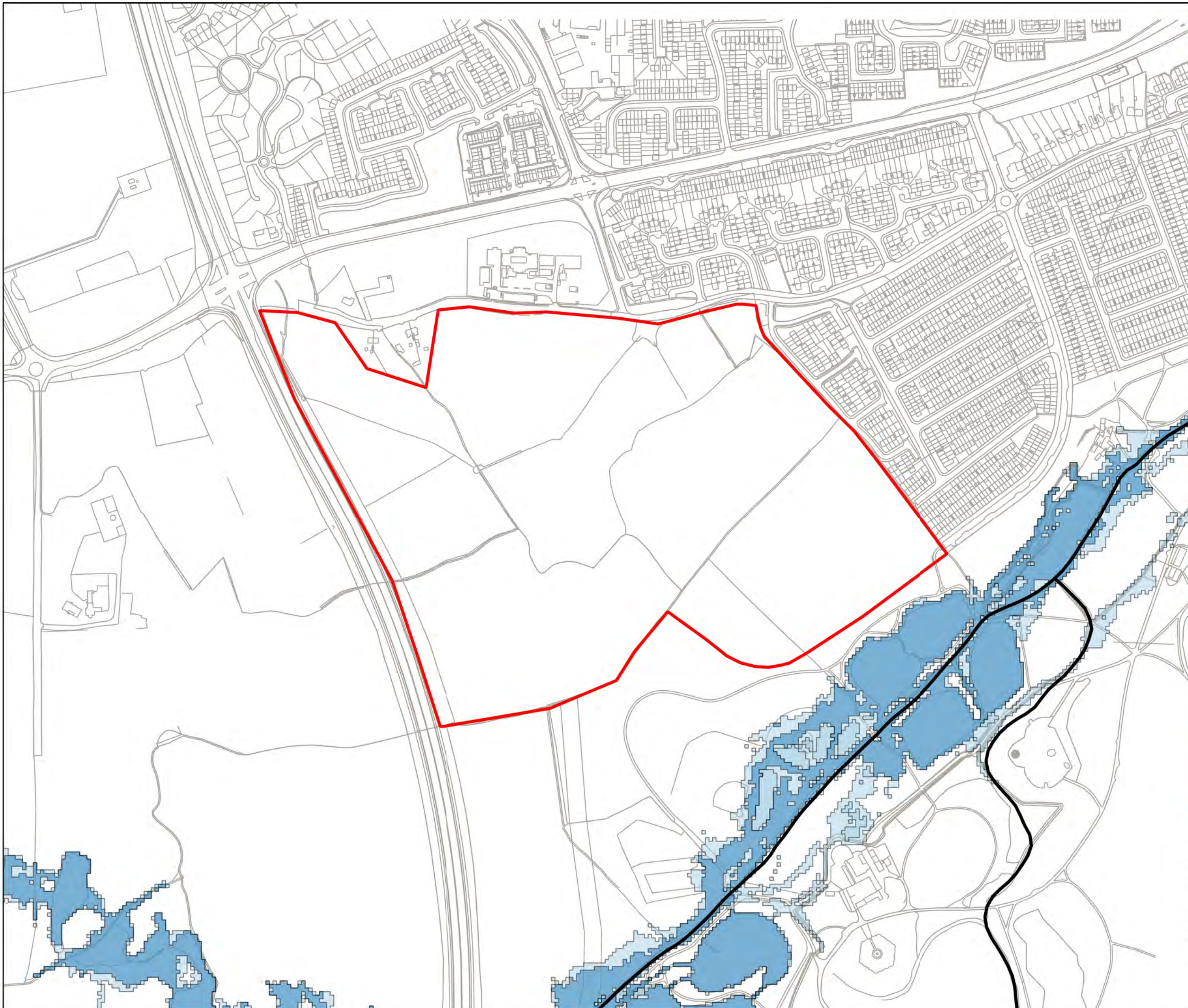
- Potential flooding due to the existing drainage / runoff from the Grange Castle Golf Course and the R136 attenuation pond
- The location of a possible drainage outfall along the Old Nangor Road
- Potential flooding due to the proposed drainage measures
- Potential impacts downstream of the development at Cherrywood Villas
- The drainage assessment should be carried out in line with SDCC requirements for surface water and foul networks and also comply with recommendations in the Greater Dublin Strategic Drainage Study (GSDSDS) (2005) and the Greater Dublin Regional Code of Practice for Drainage Works (2012) to ensure that drainage from the site is managed sustainably.

5.3 SFRA NEXT STEPS

It is recommended that the results and impacts of the drainage assessment be reviewed and incorporated into a final SFRA for the site as part of the planning application. This shall ensure that flood risk has been properly considered to avoid inappropriate development in areas at risk of flooding within the site and to avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off.

APPENDIX A

**FLUVIAL FLOOD ZONE AND INDICATIVE PLUVIAL FLOODING
MAPPING**



Legend

- Flood Zone A - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Flood Zone B - 0.1% AEP Flood Extent (1 in 1000 chance in any given year)
- Site Boundary
- Watercourses



**Comhairle Contae
Átha Cliath Theas
South Dublin County Council**

Project
Strategic Flood Risk Assessment of the
Kilcarbery Grange Preliminary Masterplan

Title
Fluvial Flood Zone Mapping

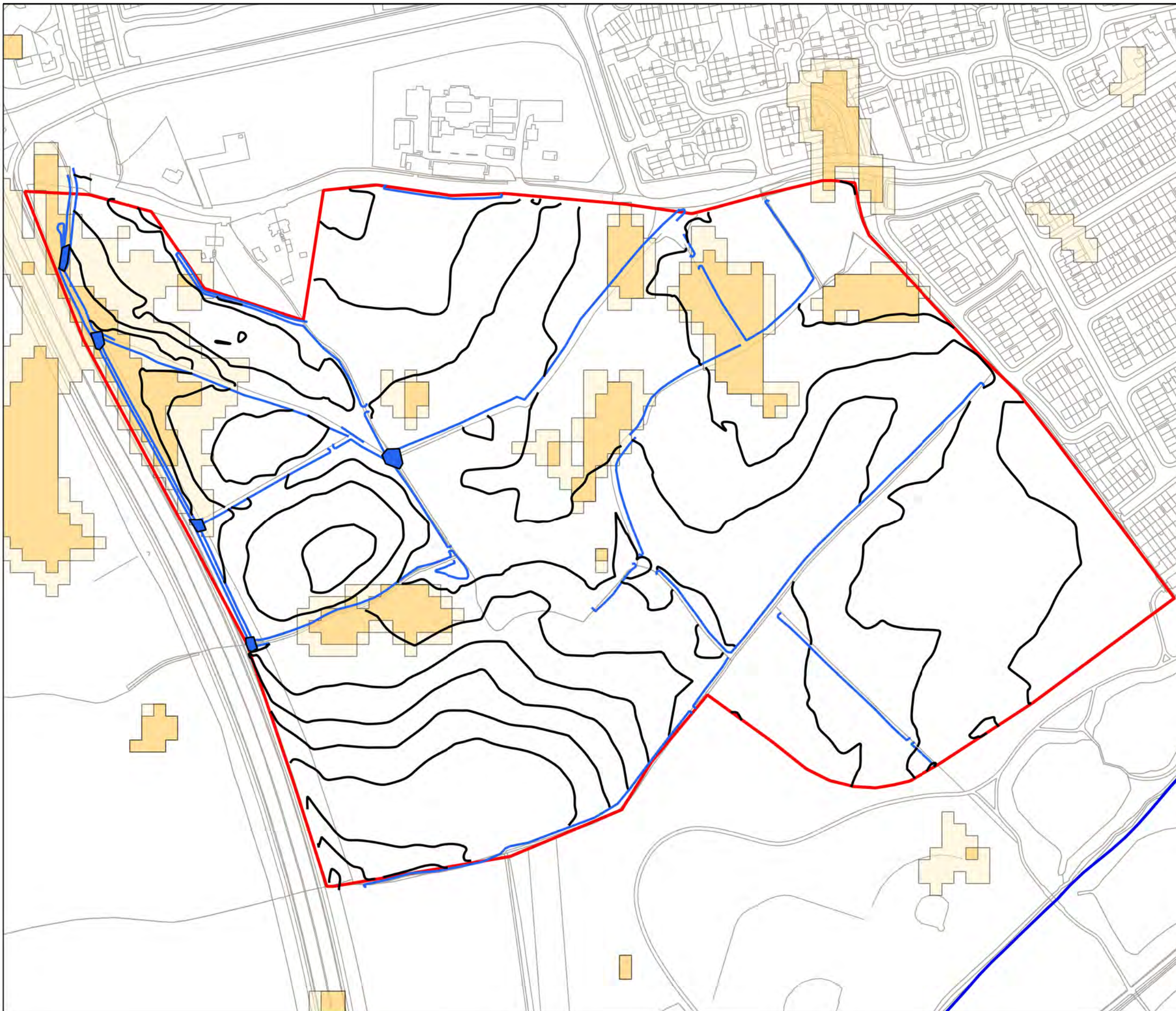
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	1:2,500 @ A1		
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Legend

- Site Boundary
- Drainage Ditches
- Ponding Locations
- Pluvial Indicative - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Pluvial Extreme - 0.1% AEP Flood Extent (1 in 1000 chance in any given year)

The flood extents shown on these maps were developed for the purposes of consultation on the Preliminary Flood Risk Assessment. They are only in draft form and are based on broad-scale simple analysis and may not be accurate for a specific location. Information on the purpose, development and limitations of these maps is available in the relevant reports (see www.cfram.ie). Users should seek professional advice if they intend to rely on the maps in any way.



Project
Strategic Flood Risk Assessment of the Kilcarbery Grange Preliminary Masterplan

Title
PFRA Indicative Flood Zone Mapping



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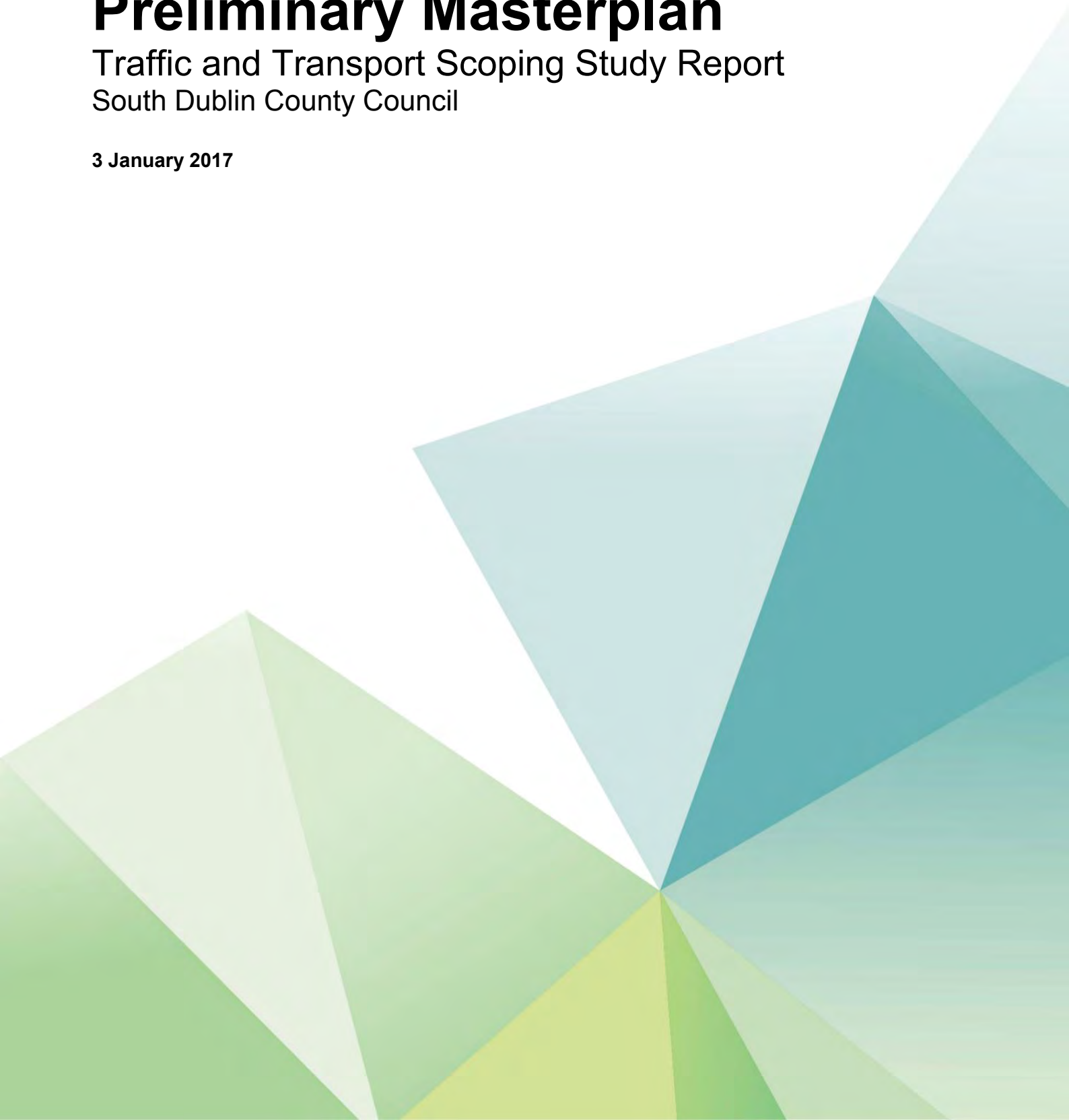
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Kilcarbery Grange Preliminary Masterplan

Traffic and Transport Scoping Study Report
South Dublin County Council

3 January 2017



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Report Body



1. Introduction

Purpose of Scoping Study

- 1.1. This scoping report has been prepared by Atkins on behalf of South Dublin County Council for a masterplan for the 35ha zoned residential site at Kilcarbery Grange.
- 1.2. The scoping report is part of the traffic and transport assessment process. It is precursor to the preparation of a Traffic and Transport Assessment (TTA). With this in mind, Atkins have designed this scoping study to:
 - Inform and guide the future planning documentation ;
 - To put into context the importance of traffic and transport implications as an integral element of the development proposal;
 - To emphasise the role of transport access to the development by all modes;
 - To facilitate the planning authority in its review process at an early stage of scheme development.

2. Transport Planning: Plans & Policy

South Dublin County Development Plan 2016 - 2022

- 2.1. The Council recognises that new development, both residential and commercial, permitted in line with this Plan will lead to additional trips being generated. The Council will work with the relevant agencies to seek to ensure that as high a proportion as possible would be conducted by sustainable means. However it is accepted that a residual proportion of the trips generated will be taken by private vehicle. This has the potential to add to existing levels of congestion or saturation on the road network.
- 2.2. The following are some of the relevant policies of the County Development Plan.
 - **TM Policy 1 Overarching:** It is the policy of the Council to promote the sustainable development of the County through the creation of an integrated transport network that services the needs of communities and businesses.
 - **TM Policy 2 Public Transport:** To promote the sustainable development of the County by supporting and guiding national agencies in delivering major improvements to the public transport network and to ensure existing and planned public transport services provide an attractive and convenient alternative to the car.
 - **TM Policy 3 Walking and Cycling:** To re-balance movement priorities towards more sustainable modes of transportation by prioritising the development of walking and cycling facilities within a safe and traffic calmed street environment.
 - **TM Policy 4 Strategic Road and Street Network:** To improve and expand the County-wide strategic road and street network to support economic development and provide access to new communities and development.
 - **TM Policy 5 Traffic and Transport Management:** To effectively manage and minimise the impacts of traffic within the County.
 - **TM Policy 6 Road and Street Design:** To ensure that streets and roads within the County are designed to balance the needs of place and movement, to provide a safe traffic-calmed street environment, particularly in sensitive areas and where vulnerable users are present.

- **TM Policy 7 Car Parking:** To take a balanced approach to the provision of car parking with the aim of meeting the needs of businesses and communities whilst promoting a transition towards more sustainable forms of transportation.

2.3. It is the policy of the Council to promote the sustainable development of the County by supporting and guiding national agencies in delivering major improvements to the public transport network and to ensure existing and planned public transport services provide an attractive and convenient alternative to the car.

3. Scoping Study

Site Location

3.1. The proposed development site is located to the south east of intersection of the R134 and the R136, north of Corkagh Park. The approximate site boundary is illustrated in Figure 3-1 below.

Figure 3-1 Site Location



Existing Land Use and Zoning

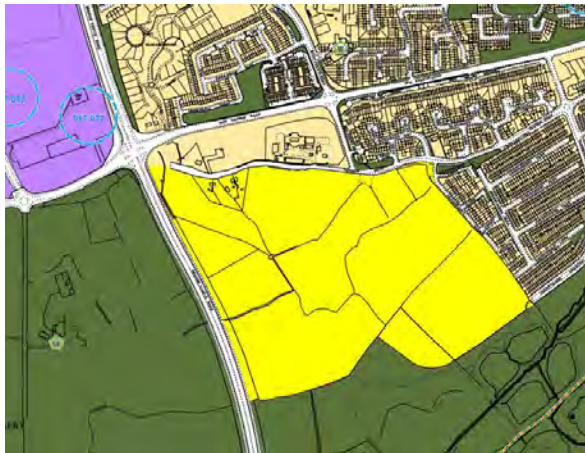
3.2. The site is currently a green field site. In terms of the South Dublin Development Plan, the site at the Grange shown in yellow in Figure 3-2 following is zoned as 'RES-N – New Residential'. The associated objective is to:

'To provide for new residential communities in accordance with approved area plans.'

3.3. Surrounding the site the land show is 'OS-Open Space', with the objective to preserve and provide for open space and recreational amenities, and Res-Existing Residential with the objective to

protect and/or improve residential amenity. EE-Enterprise and Employment' to provide for enterprise and employment related uses.

Figure 3-2 Existing Land Zoning



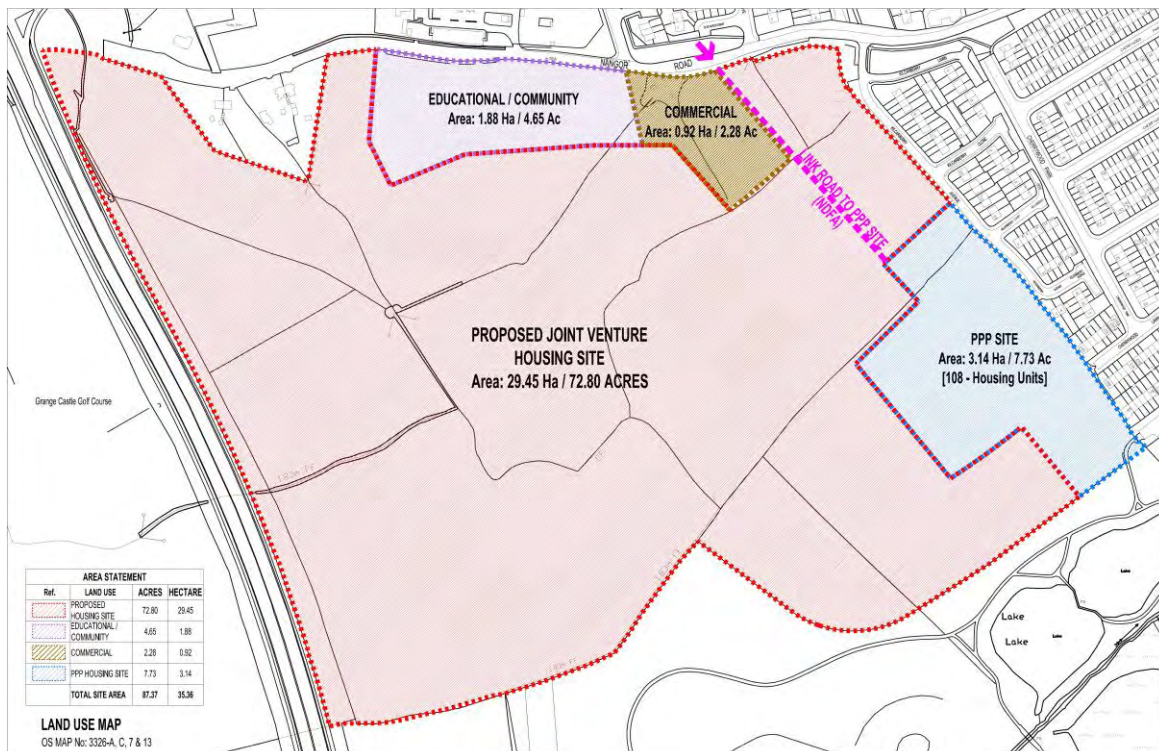
	RES-N – New Residential
	OS – Open Space
	RES – Existing Residential
	EE – Enterprise and Employment'

Proposed Development

3.4. The proposed development covers a total area of 35.36 hectares broken down as follows and illustrated the figure following:

- Educational/Community – 1.88 hectares
- Commercial – 0.92 hectares
- Housing – 32.56 hectares

Figure 3-3 Land Use Map



- 3.5. The proposed development will consist of circa 1000 residential units, 100 of which are accommodated in 3.14 hectare PPP site being developed by the NTMA. The remaining residential units are accommodated within 29.45 hectares.
- 3.6. The commercial space within the development will be a maximum of 2,000 sq.m GFA
- 3.7. The overall development is further broken down into 3 distinct development areas; Oak, Lime and Sycamore, as shown in the figure following.

Figure 3-4 Development Areas



Urban Context

- 3.8. In terms of the urban context of the site the following issues should be addressed:
- Connectivity between the Nangor Road, Old Nangor Road and The Outer Ring Road.
 - Important strategic green spaces and corridors, such as the Camac Valley and the Grand Canal should seamlessly connect.
 - Potential for future public transport, notably rail at Fonthill and local bus services that the development should maximise access to by foot and bicycle.

- 3.9. The overriding design aim of local streets will be to provide for low volume and speed of local vehicular traffic. Local streets should prioritise pedestrian activity and they should be safe for cyclists.
- 3.10. The vision for the masterplan is to realise a distinct high quality sustainable place with a local sense of character and community, which is closely connected to own and surrounding landscape and provides for a range of community needs, within an attractive, permeable and connected urban structure.
- 3.11. Some of the key master planning principles for Kilcarbery Grange are outlined below and highlighted in Figure 3-5 following:
- To harness the existing positive aspects of character of the lands and the surrounding and larger landscape.
 - To ensure a permeable and legible network of streets and spaces, with strong connections with surrounding areas and developments.
 - To achieve an appropriate level of continuity and enclosure of streets and spaces.
 - To develop a high quality network of green and urban spaces, which are connected to surrounding green spaces and features.

Figure 3-5 Site Access and Permeability



Surrounding Pedestrian and Cyclist Network

Pedestrian Network

- 3.12. The footpath network within the surrounding area is of good quality widths, gradients and surfacing. There are a number of crossings points located at key desire lines. See Pedestrian Access Map in Appendix A.
- 3.13. The Chartered Institute of Highways and Transportation (CIHT) document 'Providing for Journeys on Foot' which outlines that 6 minutes represents the desirable walking distance of 500m for commuters, whilst 12 minutes and 24 minutes represent the acceptable walking distance of 1km and maximum walking distance of 2km respectively. These times and distances equate to a walking speed of 1.4m/s. Walking distances are outlined in Pedestrian Access Map in Appendix A.

Cycle Network

- 3.14. In 2011, The National Transport Authority published the GDA Cycle Network Plan which identifies the Urban, Inter Urban and Greenway cycle networks within the GDA.
- 3.15. This network will comprise primary routes, which will cater for the highest demand, supported by secondary routes and feeder routes which are forecast to have lower levels of demand. Within the surrounding area the existing main cycle facilities are on the R136 and the R113. These are both designated as secondary routes in the Cycle Network Plan. See Existing and Proposed Cycle Network Map in Appendix B.

Surrounding Public Transport Network

- 3.16. The overall public transport network in the vicinity of the site is contained on a map within Appendix C of this report.

Bus

- 3.17. In terms of public transport the site is best served by Dublin Bus. The following table outlines frequent Dublin Bus Services that stop on the R134 Nangor Road which is designated as a Quality Bus Corridor.

Table 3-1 Surrounding Bus Services

Route No.	Areas Served	Frequency During Peaks
13	Grange Castle – Clondalkin Village – Naas Rd. – Tyrconnell Rd. – St. James's Hospital – O'Connell St. – Drumcondra Rail Station – Ballymun – Harristown	12 – 15 minutes
68	Newcastle / Greenogue Business Park – Cherrywood Villas – Clondalkin Village – Bulfin Rd – Camden St. – Fleet St.	60 minutes
151	Foxborough – Parkwest – Drimnagh Rd. – Dolphin's Barn – Dame St. / Ormond Quay – Docklands	20 minutes

Heavy Rail

- 3.18. The Clondalkin Fonthill Train Station is located 2.5km from the site, approximately 30 minutes walking distance or 10 minutes cycling. The Station is served by Dublin Heuston to Portlaoise services.
- 3.19. From Monday 21st November 2016, Clondalkin Fonthill is serviced by 7 new morning peak trains from Newbridge/Hazelhatch to Grand Canal Dock, and 8 new evening peak trains from Grand Canal Dock to Newbridge/Hazelhatch, via the Phoenix Park Tunnel. These services serve Park West; Drumcondra, Connolly, Tara Street, Pearse and Grand Canal Dock.

Core Orbital Bus Network

- 3.20. The Transport Strategy for the Greater Dublin Area 2016 – 2035 proposes a number of bus orbital routes which will comprise an important element of the Core Bus Network, ensuring that more trips within the Metropolitan Area can be undertaken by public transport in a convenient and efficient manner.
- 3.21. Clondalkin lies on the proposed Tallaght to Blanchardstown route which may be located on the R136.

Figure 3-6 2035 Core Bus Network - Orbital Corridors



Surrounding Road Network

- 3.22. The proposed development is located adjacent a comprehensive road network consisting of regional and local roads. The key roads within the network are described below. These roads have been classified using DMRB TA 77/79 – Traffic Capacity of Urban Roads. In general within an urban environment the capacity is defined by the junction rather than the link capacity.
- 3.23. Carrying capacities shown for the individual roads below are based upon a 60/40 directional split in the flow.

R134 – New Nangor Road

- 3.24. The R134 New Nangor Road stretches for approximately 8km from the R810 Naas Road to the east and the R120 to the west with an AADT in the order of 11,000. The corridor consists of a single traffic lane in each direction and also accommodates a dedicated bus lanes and adjacent footways in each direction. The R134 has a posted speed limit of 60km/h.
- 3.25. The R134 is classified as a UAP2 – Good standard single/dual carriageway road with frontage access and more than two side roads per km. Based on guidance in TA 77/99 it is estimated that the R134 has a carrying capacity of 1470 per hour in the highest directional flow.

R136 – Outer Ring Road

- 3.26. The R136 is an outer ring road from the N4 to the north and N81 Tallaght Bypass to the south with an AADT in the order of 25,000 and provides connection to the N7. Adjacent the site the corridor is dual carriageway in each direction with dedicated bus lanes in each direction and a posted speed limit of 80km/h. Traffic is divided by a concrete crash barrier in the central median. Pedestrians and cyclists are accommodated with a segregated path, adjacent the carriageway behind crash barriers.
- 3.27. The R136 is classified as a UAP1 – High standard dual carriageway carrying predominantly through traffic with limited access. Based on guidance in TA 77/99 it is estimated that the R136 has a carrying capacity of 3350 per hour in the highest directional flow based upon a 60/40 split.

R113

- 3.28. The R113 forms a semi-orbital route around the south of the city stretching from the N4 to the north and Blackrock in the south east. Locally the route provides access to Clondalkin Fonthill Train Station to the north and Newlands Cross to the south.
- 3.29. The corridor consists of a single traffic lane in each direction with adjacent footways and cycle provision. North of the R134 the R113 has a southbound bus lane and south of the R134 the R113 has bus lanes in each direction. The R113 has a posted speed limit of 50 or 60km/h depending on location.
- 3.30. The R113 is classified as a UAP2 – Good standard single/dual carriageway road with frontage access and more than two side roads per km. Based on guidance in TA 77/99 it is estimated that the R113 has a carrying capacity of 1260 per hour in the highest directional flow based upon a 60/40 split.

N7

- 3.31. The N7 is one of the most strategic road corridors in the country connecting Limerick and Dublin. Between Naas and Limerick the route is predominantly motorway. Upgrade works are currently taking place between Naas and Newbridge to relieve capacity issues. The N7 is accessed from the R136 via grade separated junction at Kingswood. At this location the N7 has an AADT in excess of 100,000.

Future Road Proposals

3.32. The table following is an extract from Table 6.5 of the SDCC development plan, Six Year Road Programme, which is subject to available funding. This road is currently under construction and should be completed prior to the opening of The Grange.

Table 3-2 SDCC Six Year Road Programme

Road	Description	Function
New Nangor Road/ R134 Upgrade	Upgrade/realignment of existing road between Nangor and Ballybane.	To provide improved access to the Grange Castle employment lands from Clondalkin and the R120 with further links to the proposed Western Orbital Route

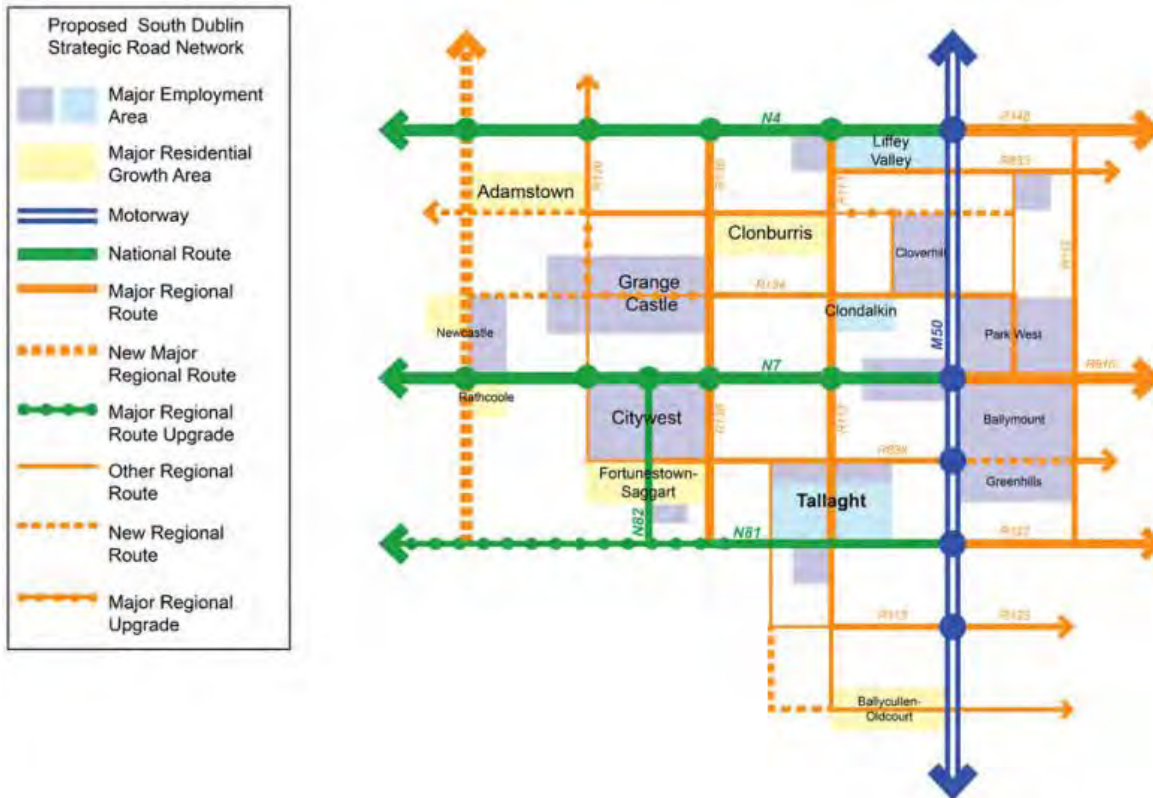
3.33. The table following is an extract from Table 6.6 of the SDCC development plan, Medium to Long Term Road Objectives, which outlines corridors that are essential to providing a long term road network and to provide access between major areas of economic activity and the national and regional road network.

Table 3-3 Medium to Long Term Road Objectives

Road	Description	Function
New Nangor Road Extension	New road between Ballybane and Brownstown	To provide access to employment lands within Grange Castle from the proposed Western Orbital Route

3.34. The development plan notes *'the strategic road network consists of national and regional routes that carry the bulk of traffic throughout and within the County. The expansion of the strategic road network is required to provide access to developing areas and to support the economic development of the County. This network expansion will also support the provision of infrastructure that supports more sustainable modes (i.e. buses, cyclists and pedestrians) by providing the necessary infrastructure for their movement.'*

Figure 3-7 South Dublin County Wide Strategic Road Network



Access to Development

- 3.35. Access to the proposed development will be achieved via the Old Nangor Road or via a new access onto the R136 outer ring road, which will accommodate left in / left out movements. There is the potential that an access onto the R134 may be delivered in the future when the lands to the immediate north of the masterplan lands is developed, but this is outside the masterplan lands.
- 3.36. A preliminary design layout of the left in / left out junction onto the R136 has been prepared along with a Stage 1 Road Safety Audit. These are included within Appendix D for further information.

Parking Provision

- 3.37. Car parking provision in the proposed development should comply with maximum parking rates set put in the SDCC Development Plan 2016 – 2022 or most recent plan.

Proposed Traffic Survey Scope

- 3.38. Atkins has undertaken a review of the local road network and proposed development plans and the scope of traffic impact assessments for previous planning applications on the site. Following this a number of links and junctions have been identified, as a minimum, for assessment within the TTA. As such traffic surveys are proposed for the following locations as illustrated in Figure 3-8 and listed in Table 3.4

Figure 3-8 Proposed Traffic Survey Locations



Table 3-4 Traffic Surveys

Junction Turning Counts (JTC)	Automatic Traffic Counts (ATC)
JTC 1: R136 / Ninth Lock Road	ATC 1: R136 (North)
JTC 2: R136 / Grange Castle Business Park	ATC: 2 R136 (South)
JTC 3: R136 / R134	ATC 3: R134
JTC 4: R136 / Kingswood Business Park	
JTC 5: R136 / N7 (North)	
JTC 6: R136 / N7 (South)	
JTC 7: R134 / Cherrywood Park	
JTC 8: Old Nangor Rd / Cherrywood Crescent	
JTC 9: R134 / R113	
JTC 10: R134 / R113	

3.39. The JTC surveys are to be undertaken during over a 12 hour period during a normal weekday (Tuesday, Wednesday or Thursday). The ATC surveys will be undertaken over a 7 day period. SDCC will be notified once a commencement date is agreed for the surveys.

Potential Trip Generation

3.40. The TRICs database was initially interrogated to predict vehicle trips generated by and attracted to the proposed residential development. The following tables describe the initial person trip generation estimated for the proposed residential development (1000 residents) during 08:00 – 09:00 and 17:00 – 18:00 period, assumed to be the network morning and evening peak respectively.

Table 3-5 AM Peak Trip Generation Rates

Use	Units	Arrival	Departure	2-way
Residential K – Mixed Private (Flats & Houses)	1 Dwelling	0.225	0.737	0.962

Table 3-6 PM Peak Trip Generation Rates

Use	Units	Arrival	Departure	2-way
Residential K – Mixed Private (Flats & Houses)	1 Dwelling	0.527	0.291	0.818

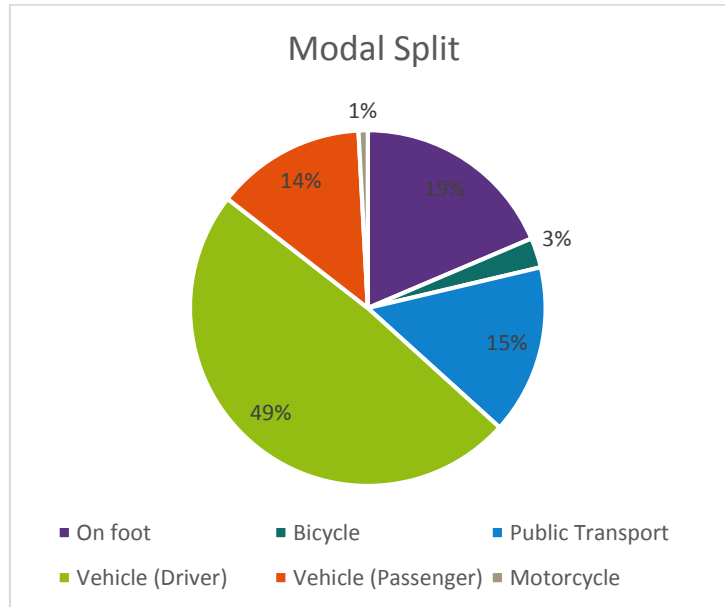
3.41. As shown in table following, the anticipated person trips generated by the proposed development during the assumed network peaks is estimated to be in the order of 962 person and 818 person two-way during the am and pm peak hours respectively.

Table 3-7 Development Trip Generation

Peak Hour	Dwellings	2-way Rate	2-way Flow (PCU)
AM	1000	0.962	962
PM	1000	0.818	818

- 3.42. In addition to the above there will be also be scope for trip generation from the commercial elements within the development.
- 3.43. Modal share for application to total person trips rates will be determined from the available CSO Census 2011 data.
- 3.44. The 2011 Census indicates the Electoral Division of Clondalkin Village, with a population of 8,500, has the following modal split.

Figure 3-9 Modal Split Clondalkin Village



- 3.45. With a modal split of 49% for vehicles it is anticipated the proposed development would generate in the order of 470 vehicles and 400 vehicle two-way during the am and pm peak hours respectively.

Adjacent Developments

- 3.46. In preparing the TTA, the applicant will need to take into account committed development, such as those with planning permission within the Grange Castle Business Park.

Future Modal Split Targets

- 3.47. It is envisaged that the future modal splits for the site would be similar to that used within the NTA regional model.
- 3.48. To support achieving these targets a Travel Statement will be prepared for the proposed development. This will support and encourage sustainable travel to/from the development.

Trip Distribution

- 3.49. Traffic will be assigned to the network in line with existing flow proportions recorded as part of the traffic turning counts. Traffic flows will be assigned to the junctions in the weekday and weekend day morning and evening peak hour.

Traffic Growth rates

- 3.50. 'Medium' growth rates from TII Project Appraisal Guidelines Unit 5.5 Link-Based Traffic Growth Forecasting will be applied to the current traffic flows.

Traffic Impact Assessment

- 3.51. The junction assessment will be undertaken in JCT LinSig and TRL Junctions 9 software or similar alternative where applicable. The following scenarios will be assessed for relevant junctions:

- baseline year;
- opening year without development;
- opening year with development;
- opening year +5 without development;
- opening year +5 with development;
- opening year +15 without development;
- opening year +15 with development;

- 3.52. At a minimum junction assessment to be undertaken at the following locations:

- R136 / Ninth Lock Road
- R136 / Grange Castle Business Park
- R136 / R134
- R136 / Site Access (Left in / left out junction)
- R136 / Kingswood Business Park
- R136 / N7 (North)
- R136 / N7 (South)
- R134 / Cherrywood Park
- R134 / R113
- R134 / R113

Construction Impacts

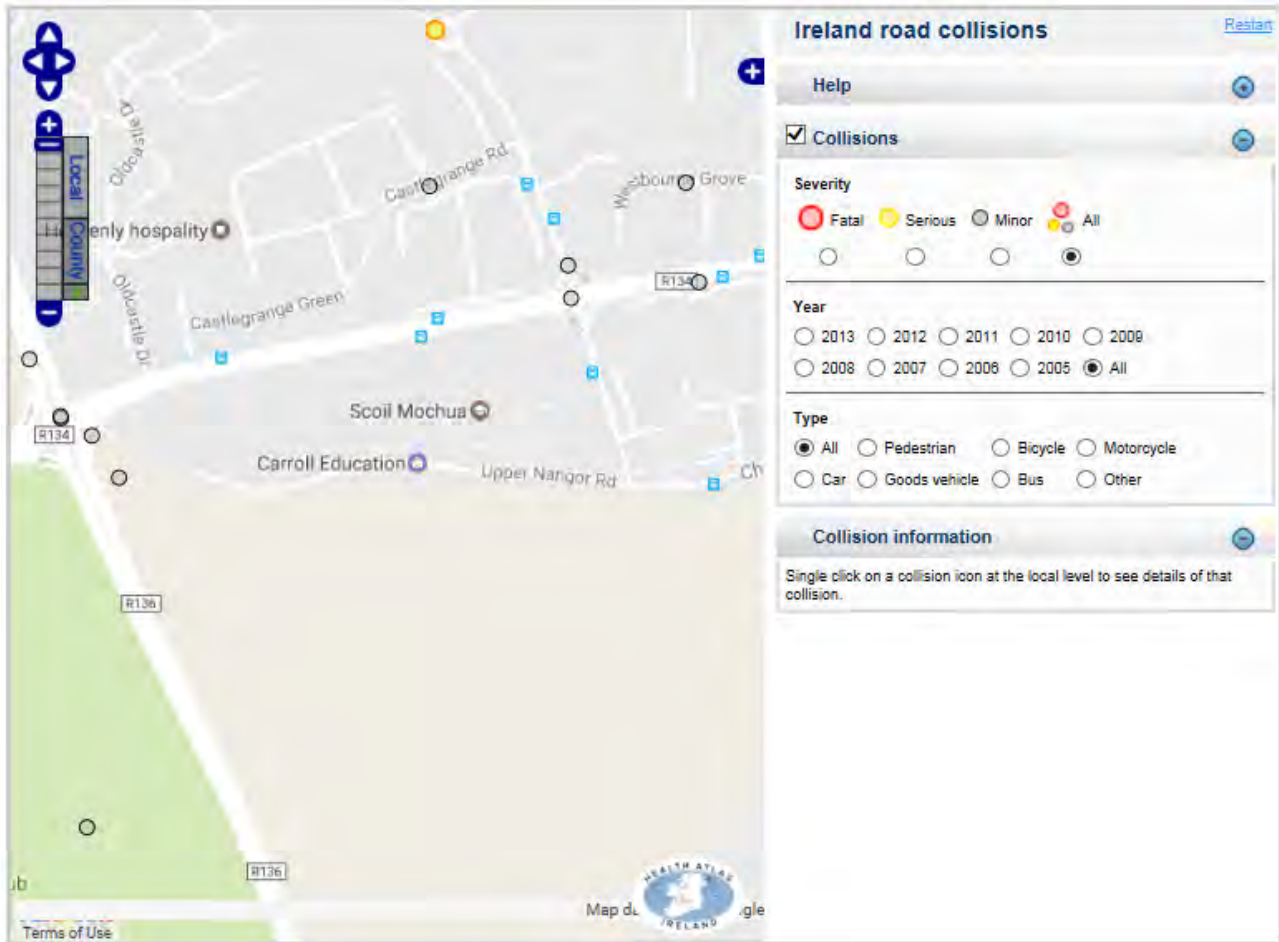
- 3.53. In order to mitigate the impacts of the construction works surrounding public roads, a Design Process Traffic Management Plan will be completed by the Applicant prior to the commencement of the works.

- 3.54. The Design Process Traffic Management Plan will be developed in consultation with South Dublin Council's Road Works Control Officer.

Local Collision History

- 3.55. The data below shows the collision history within a cordon of approximately 1.0km by 0.8km surrounding the site for a 9 year period between 2005 and 2013.

Figure 3-10 Collision History



- 3.56. Within the 9 year period between 2005 and 2013 there was a cluster of 5 incidents at the intersection of the R134 / R136 and 2 incidents at the R134 / Cherrywood Park junction. All of these collision have been classed as minor in severity. There were some further incidents recorded on the R134 and on the local roads. Road safety should be considered at all stages.

Travel Statement

- 3.57. A pre-occupation Travel Statement will be prepared supporting transport policy from SDCC Development Plan and setting out objectives that support sustainable travel to the site.
- 3.58. The Travel Statement will outline the current/future transport infrastructure for walking, cycling, and vehicular access to the site and set out an action plan of measures to minimise the dependence on travel by car to and from the site. The proposed measures will be practical and appropriate for residential and retail use. The objectives of the Travel Statement will be incorporated within the objectives of the Management Company.

Appendices



Appendix A. Pedestrian Access Map



LEGEND:

- WALKING DISTANCE: DESIREABLE 500m
- SITE BOUNDARY
- LOCAL SHOP
- LOCAL SCHOOL
- LEISURE CENTRE

LOCAL PEDESTRIAN ACCESS

WS Atkins Ireland Ltd. ©

Appendix B. Cycle Network Map



To Dublin

To LIFFEY VALLEY

To LUCAN

To KINGSWOOD

Cycle Network
ATKINS
 WS Atkins Ireland Ltd. ©



LEGEND:

- PRIMARY (Solid red line)
- PROPOSED PRIMARY (Dashed red line)
- SECONDARY (Solid blue line)
- PROPOSED SECONDARY (Dashed blue line)
- GREENWAY (Solid green line)
- PROPOSED GREENWAY (Dashed green line)
- INTER-URBAN (Solid light blue line)
- PROPOSED FEEDER (Dotted red line)

13

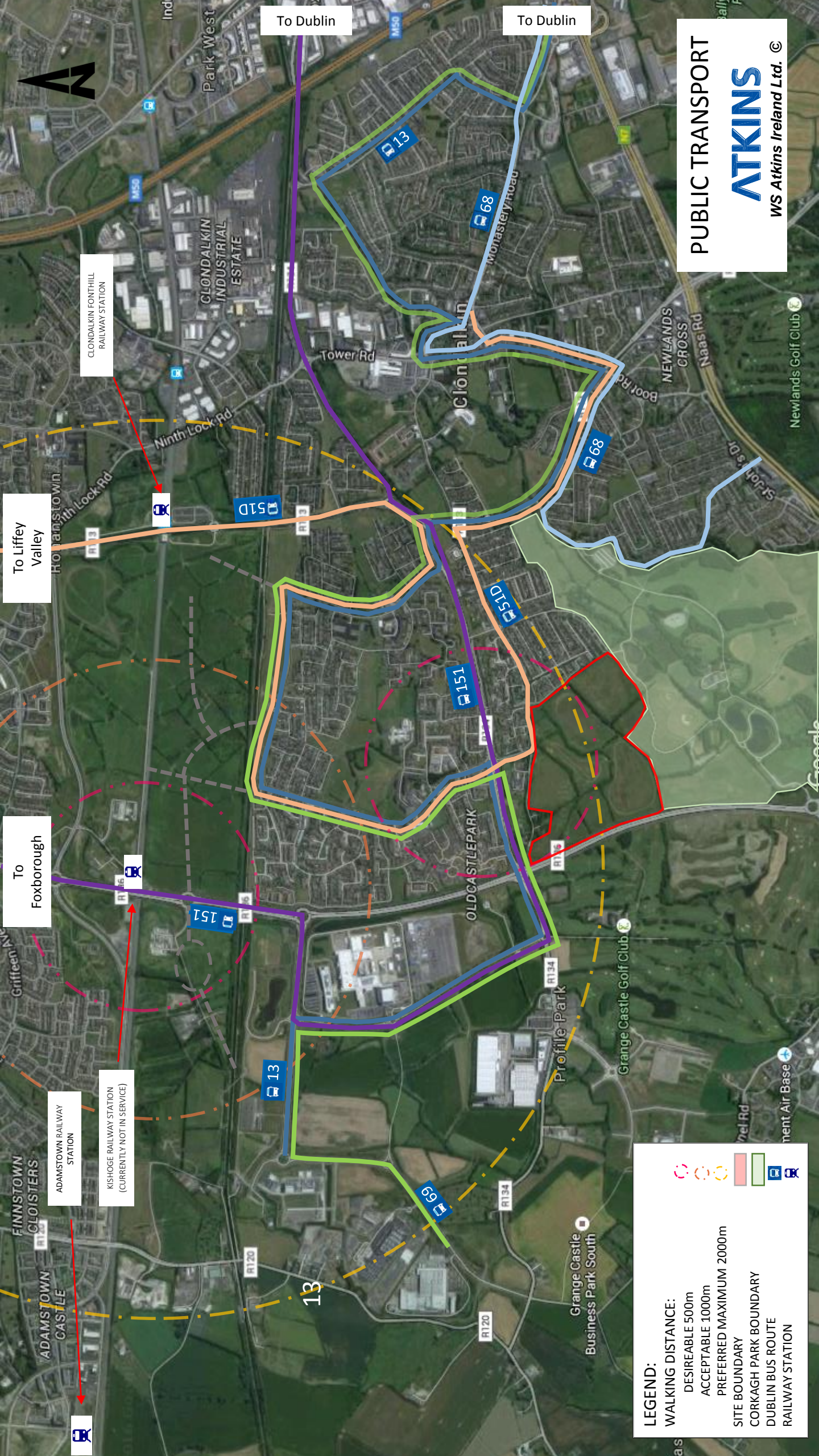
Appendix C. Public Transport Network Map



To Dublin

To Dublin

PUBLIC TRANSPORT
ATKINS
WS Atkins Ireland Ltd. ©



To Liffey Valley

To Foxborough

ADAMSTOWN RAILWAY STATION

KISHOGE RAILWAY STATION (CURRENTLY NOT IN SERVICE)

CLONDALKIN FONTHILL RAILWAY STATION

LEGEND:

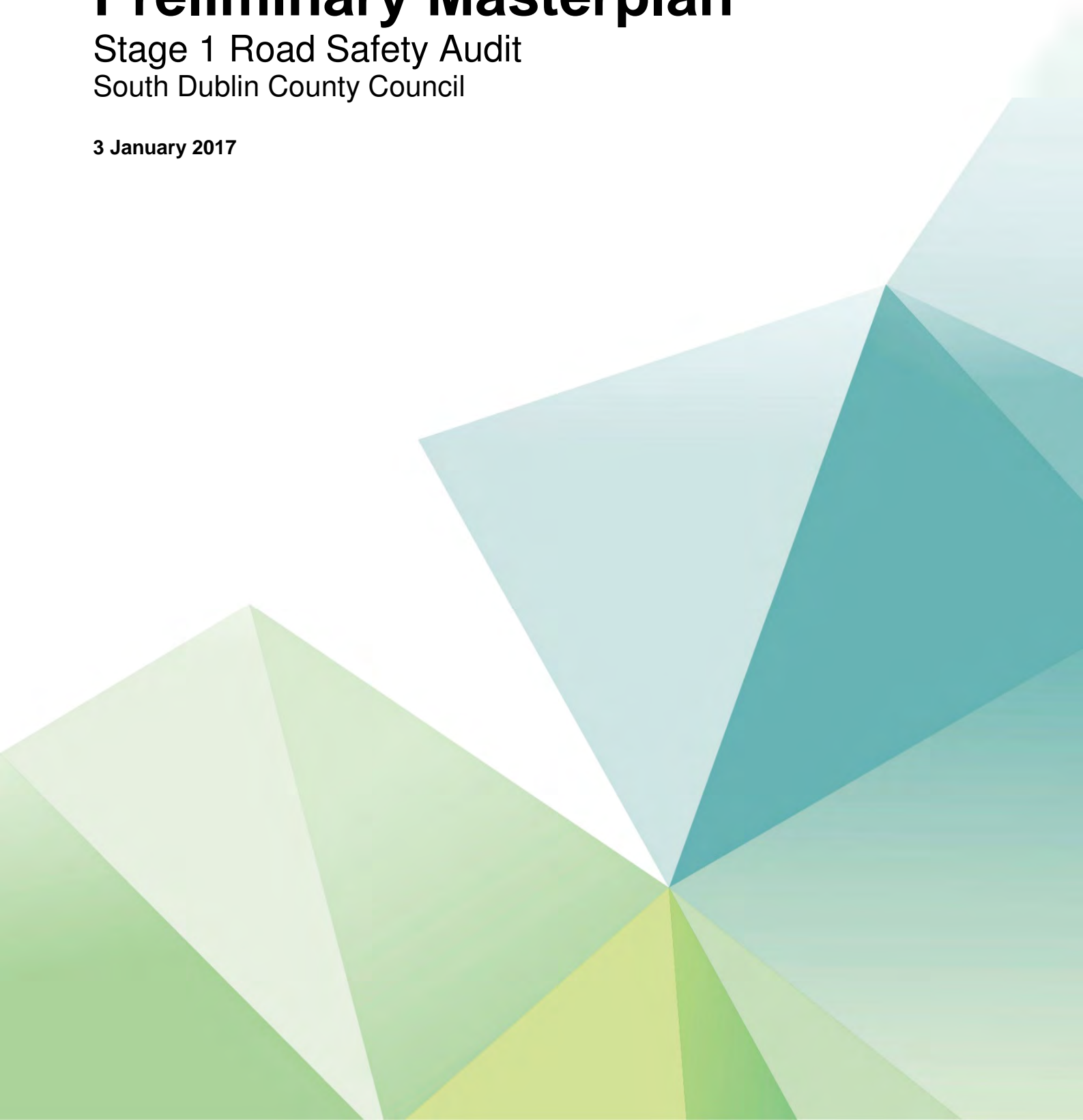
- WALKING DISTANCE:
 - DESIREABLE 500m
 - ACCEPTABLE 1000m
 - PREFERRED MAXIMUM 2000m
- SITE BOUNDARY
- CORKAGH PARK BOUNDARY
- DUBLIN BUS ROUTE
- RAILWAY STATION

Appendix D. Stage 1 Road Safety Audit

Kilcarbery Grange Preliminary Masterplan

Stage 1 Road Safety Audit
South Dublin County Council

3 January 2017



Notice

This document and its contents have been prepared and are intended solely for South Dublin County Council's information and use in relation to the Kilcarbery Grange Preliminary Masterplan.

ATKINS assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 10 pages including the cover.

Document history

Job number: 5150920			Document ref: 5150920DG002			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	DRAFT	D Crosbie	M Deegan	D Crosbie	M Deegan	Dec 2016
Rev 2.0	FINAL	D Crosbie	M Deegan	D Crosbie	M Deegan	Jan 2017

Client signoff

Client	South Dublin County Council
Project	Kilcarbery Grange Preliminary Masterplan
Document title	Stage 1 Road Safety Audit
Job no.	5150920
Copy no.	
Document reference	5150920DG002

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1. Introduction

- 1.1. This report describes the findings of a Stage 3 Road Safety Audit associated with the Kilcarbery Grange Preliminary Masterplan.
- 1.2. The Audit has been completed by Atkins on behalf of South Dublin County Council.
- 1.3. The site inspections were carried out on the 16th December 2016. Weather conditions were clear and road surfaces were wet.
- 1.4. The Audit Team members were as follows:
- Team Leader: Martin Deegan, BEng (Hons) MSc CEng MICE
 - Team Member: Dara Crosbie, BSc ME CEng MIEI.
- 1.5. The following drawings were examined as part of the Stage 1 Road Safety Audit process:

Table 1-1 Design Team Drawing List

Drawing Number	Drawing Title	Revision
5150920/SK/0000	Site Location Map	-
5150920/SK/0001	Preliminary Junction Design Left In / Left Out	-

- 1.6. This Road Safety Audit has been carried out in accordance with the procedures and scope set out in TII publication number GE-STY-01024 (formerly NRA DMRB, Volume 5, Section 2, Part 2 Standards HD 19).
- 1.7. As part of the road safety audit process, the Audit Team have examined only those issues within the design which relate directly to road safety.
- 1.8. The road safety audit process is not a design check, therefore verification or compliance with design standards or any other criteria have not formed part of the audit process.
- 1.9. All of the problems described in this report are considered by the Audit Team to require action in order to improve the safety of the scheme and minimise the risk of collision occurrence.

2. Road Safety Issues Identified

2.1. Problem: Pedestrian/Cyclist Route Convoluted

Location: Proposed left in / left out junction with R136

The pedestrian/cyclist route across the proposed junction appears convoluted in comparison to the pedestrian desire line. Pedestrians/cyclists may attempt to cross the junction via a more direct route instead of using the signalised crossings provided. This may lead to an increased risk of conflicts between vehicles and vulnerable road users.

Recommendation

The Design Team should review the layout of the proposed signalised crossings to establish the merit of making the crossing route more direct.

2.2. Problem: Visibility Splay at Junction

Location: Verge to north of proposed junction with R136

There are several trees and a hedge in the verge to the north of the proposed junction. Vehicles turning left out of the junction may have a constrained/restricted view of approaching traffic on the R136 southbound carriageway. Considering the high speed of traffic on the R136, this could lead to an increased risk of side swipe or rear end shunt type collisions.

Recommendation

The Design Team should ensure that adequate sightlines are provided at this location.

2.3. Problem: Location of Traffic Signals

Location: Pedestrian crossing facilities

The straight geometry and high speed R136 southbound approach could lead to motorists overshooting the traffic signals serving the pedestrian crossings. This may lead to an increased risk of conflicts between vehicles and vulnerable road users.

Recommendation

The Design Team should consider the use of a *flashing amber* traffic signal heads to instil a 'proceed with caution' ethos for motorists passing through the access. This should be supplemented with the addition of raised pedestrian crossing tables to throttle vehicle speeds at the point where vulnerable road users will be crossing the traffic lanes.

3. Audit Team Statement

- 3.1. We certify that we have examined the drawings and documents listed in Chapter 1 of this Report.
- 3.2. The Road Safety Audit has been carried out with the sole purpose of identifying any features of the design which could be removed or modified in order to improve the road safety aspects of the scheme.
- 3.3. The problems identified herein have been noted in the Report together with their associated recommendations for road safety improvements. We (the Audit Team) propose that these recommendations should be studied with a view to implementation.
- 3.4. No one on the Audit Team has been otherwise involved with the design of the measures audited.

Road Safety Audit Team

Martin Deegan

Audit Team Leader

Signed:



Road Safety Team

Atkins (Ireland) Ltd

Date:

20 Dec 2016

Dara Crosbie

Audit Team Member

Signed:



Road Safety Team

Atkins (Ireland) Ltd

Date:

20 Dec 2016

4. Designer's Response

- 4.1. The Designer should prepare an Audit Response for each of the recommendations using the Road Safety Audit Feedback Form attached in Appendix A. When completed, this form should be signed by the Designer and returned to the Audit Team.
- 4.2. Please return completed forms to:
- Road Safety Team,
Atkins,
Atkins House,
150 Airside Business Park,
Swords,
Co Dublin,
Ireland.
- Tel: 00 353 (0)1 810 8000
Email: dara.crosbie@atkinsglobal.com
- 4.3. The Audit Team will consider the Designers response and reply indicating acceptance or otherwise of the Designers response to each recommendation.
- 4.4. Where the Designer and the Audit Team cannot agree on an appropriate means of addressing an underlying safety issue identified as part of the audit process, an Exception Report must be prepared by the Designer on each disputed item in the audit report.
- 4.5. It will be Audit Team's preference to work closely with the Designer in order to agree on an appropriate means of addressing underlying safety issues.
- 4.6. If this approach is adopted openly by both the Designer and the Audit Team, then it should serve to negate the need for an Exception Report.

Appendices



Appendix A. Road Safety Audit Feedback Form

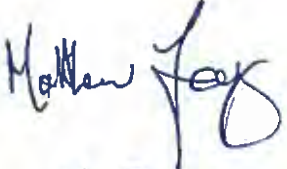
ROAD SAFETY AUDIT FEEDBACK FORM

Scheme: Kilcarbery Grange Preliminary Masterplan

Audit Stage: Stage 1 Road Safety Audit


Date Audit Completed: 16th December 2016

To be completed by the Designer				To be completed by the Audit Team
Paragraph No. in Safety Audit Report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Alternative measures (describe)	Alternative Measures accepted by Auditors (yes/no)
2.1	Y	Y	Will be reviewed during next design stage Given local on the provision of pedestrian guardrails may be used to guide pedestrians to the crossing points	
2.2	Y	Y	Visibility Splay will be kept clear of blockages – the vegetation to be removed will be identified in the next design stage	
2.3	y	Y	Will be reviewed and incorporated within the next design stage	

Signed: 

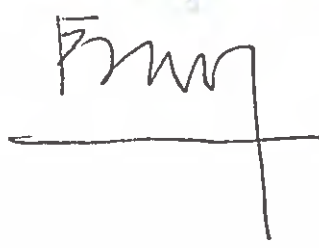
Designer

Date: 03/01/2017

Signed: 

Audit Team Leader

Date: 03/01/2017

Signed: 

Employer

Date: 03/01/2017

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Desk-Based Archaeological Impact Assessment

Kilcarbery Grange,
County Dublin

Prepared for:
South Dublin County Council

21st December 2016

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1 INTRODUCTION

1.1 General

This report has been prepared on behalf of South Dublin County Council to assess and define the impact on the archaeological resource, if any, associated with the construction of Kilcarbery Grange housing project, County Dublin (Ordnance Survey Sheet 021, figure 1). The report has been prepared by Dermot Nelis.

This desk-based study will determine, as far as is reasonably possible from existing records, the nature of the archaeological resource within the proposed development area using appropriate methods of study.

The study involved detailed interrogation of the archaeological and historical background of the wider development area. This included information from the Record of Monuments and Places (RMP) of County Dublin (figure 4), Topographical Files of the National Museum of Ireland, South Dublin County Council Development Plan (2016-2022), cartographic sources, documentary records and aerial photographs. A field inspection was carried out on 14th December 2016 in an attempt to identify any previously unrecorded features and/or portable finds within the development area. A 1km study area has been imposed around the area of proposed land take.

An impact assessment and mitigation strategy has been prepared. The impact assessment is undertaken to outline any adverse impacts the development may have on the archaeological resource, while a mitigation strategy is designed to avoid, reduce or offset any potential adverse impacts.

1.2 The Development

South Dublin County Council proposes to develop approximately 1,000 dwellings over a 5–7 year period on a site measuring 87.37 acres (35.36 hectares).

The following townlands are located within the proposed development area: Corkagh Demesne, Deansrath, Kilcarbery and Nangor.

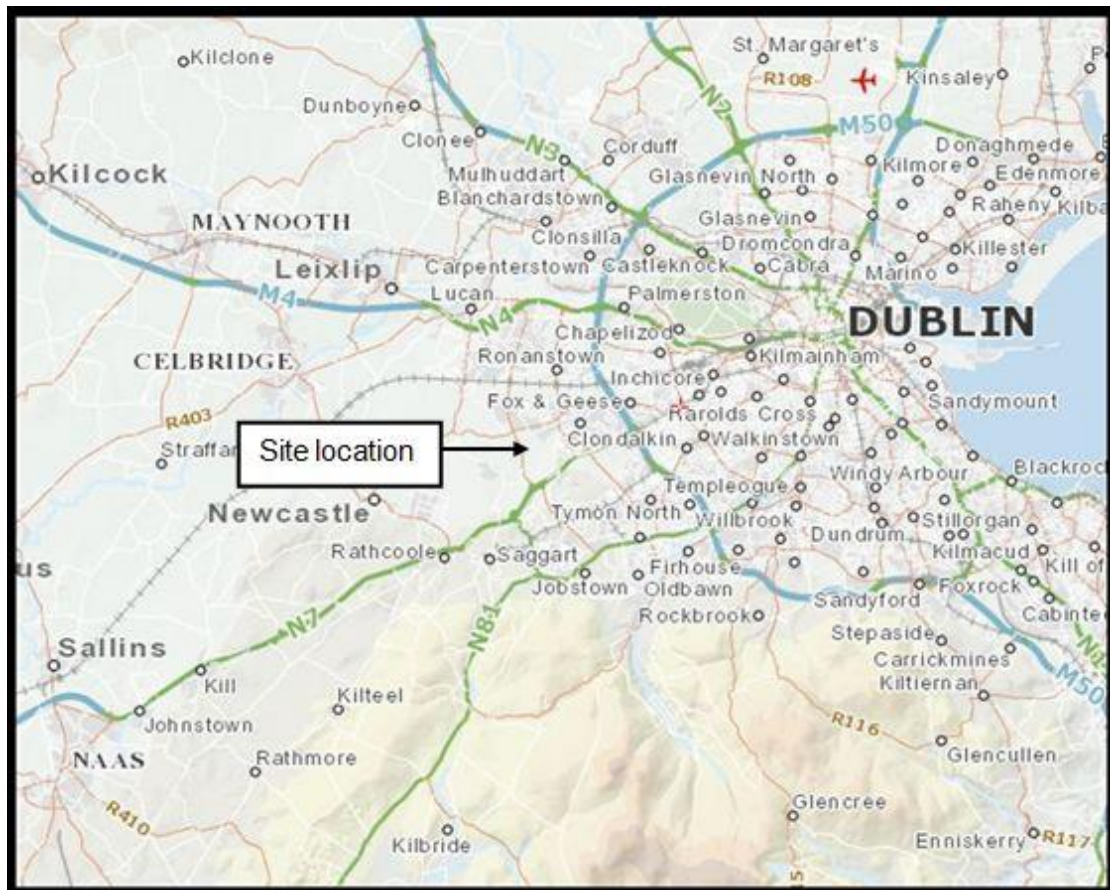


Figure 1: Site location

1.3 Project Team

Dermot Nelis BA ArchOxon AIFA MIAI

Dermot Nelis graduated from Queen's University Belfast, and after gaining extensive fieldwork experience undertook postgraduate studies at the University of Oxford in archaeological consultancy and project management.

Dermot has acted as Senior Archaeologist on several road schemes for various County Councils/National Roads Authority, and Directed large-scale multi-period excavations associated with those developments. He has completed over 125 Licensed fieldwork programmes and more than 250 archaeological, architectural and cultural heritage desk-based reports and Environmental Impact Assessments.

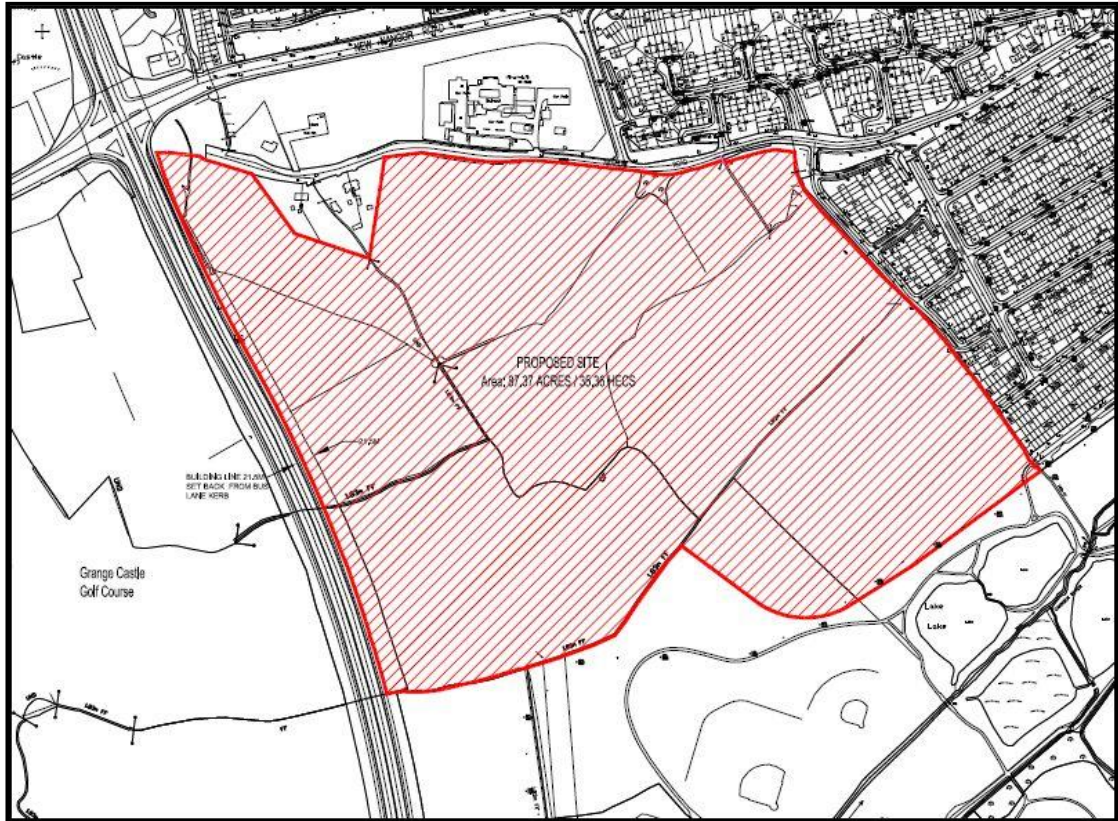


Figure 2: Proposed site layout

2 BASELINE ENVIRONMENTAL STUDY

2.1 Methodology

Research has been undertaken in two phases. The first phase consisted of a paper and digital survey of archaeological, historical and cartographic sources. The second phase involved a field inspection of the proposed development area.

2.2 Paper and Digital Survey

The following sources were examined, and a list of sites and areas of archaeological potential was compiled:

- Record of Monuments and Places of County Dublin;
- Cartographic and documentary sources relating to the study area;
- Aerial photographs of Ordnance Survey Ireland and Bing aerial photography;
- Topographical Files of the National Museum of Ireland;
- South Dublin County Council Development Plan (2016-2022).

Record of Monuments and Places is a list of archaeological sites known to the National Monuments Service. Back-up files of the Sites and Monuments Record (SMR) provide details of documentary sources and field inspections where these have taken place.

Cartographic sources are important in tracing land use development within an area of land take, as well as providing important topographical information on sites and areas of archaeological potential. Cartographic analysis of relevant maps has been made to identify any topographical anomalies that may no longer remain within the landscape. **Documentary sources** were consulted to gain background information on the historical and archaeological landscape of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its potential to contain previously unidentified archaeological remains.

Topographical Files of the National Museum of Ireland is the archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts, but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information in the discovery of sites of archaeological significance.

South Dublin County Council Development Plan (2016-2022) contains Objectives and Policies on the preservation and management of archaeological features. It was consulted to obtain information on sites (if any) within the proposed development area and the 1km study area.

2.3 Field Inspection

Field inspection is necessary to determine the extent, character and condition of archaeological remains, and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.



Figure 3: Aerial photograph, showing the proposed development area

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 General

During the Mesolithic period (c. 7,000-4,000 BC) people existed as hunters/gatherers, living on the coastline, along rivers and lakesides. They used flint and other stones to manufacture sharp tools, and locating scatters of discarded stone tools and debris from their manufacture can sometimes identify settlements. The native landscape consisted of woodland with hazel, oak, ash and Scot's pine as the primary species and Mesolithic hunting groups made no significant impact on the landscape.

Late Mesolithic and Neolithic fish traps were discovered during archaeological monitoring of development works on reclaimed land on the north bank of the River Liffey in 2004 (at depths of approximately -6m OD and -4m OD, respectively) (McQuade and O'Donnell 2007, 569-584). A Mesolithic shoreline was revealed and the remains of up to five wooden fish traps were excavated. The fish traps were constructed almost exclusively of hazel (*Corylus avellana*), and while fragmentary, were in a relatively good state of preservation, with tool marks in evidence. Radiocarbon determinations from five wood samples returned a date range of between 6,100 – 5,720 cal BC, suggesting that these are the earliest fish traps recorded in Ireland and the United Kingdom.

The population became more settled during the Neolithic period (c. 4,000-2,400 BC) with a subsistence economy based on crop growing and stock-raising. This period also saw changes in burial practices, and a tradition of burying the dead collectively and carrying out of cremations emerged. Neolithic monuments from County Dublin include portal, passage and wedge tombs.

The Bronze Age (c. 2,400-600 BC) is characterised by the introduction of metalworking technology to Ireland and coincides with many changes in the archaeological record, both in terms of material culture as well as the nature of the sites and monuments themselves. Though this activity has markedly different characteristics to that of the preceding Neolithic period, including new structural forms and new artefacts, it also reflects a degree of continuity. During this period knowledge of metalworking was acquired resulting in changes in material culture such as the introduction of metal tools and artefacts, as well as the introduction of a highly decorated pottery called Beaker pottery. In addition to changes in material

culture, there were changes in burial rite from communal megalithic tombs to single burial in cists.

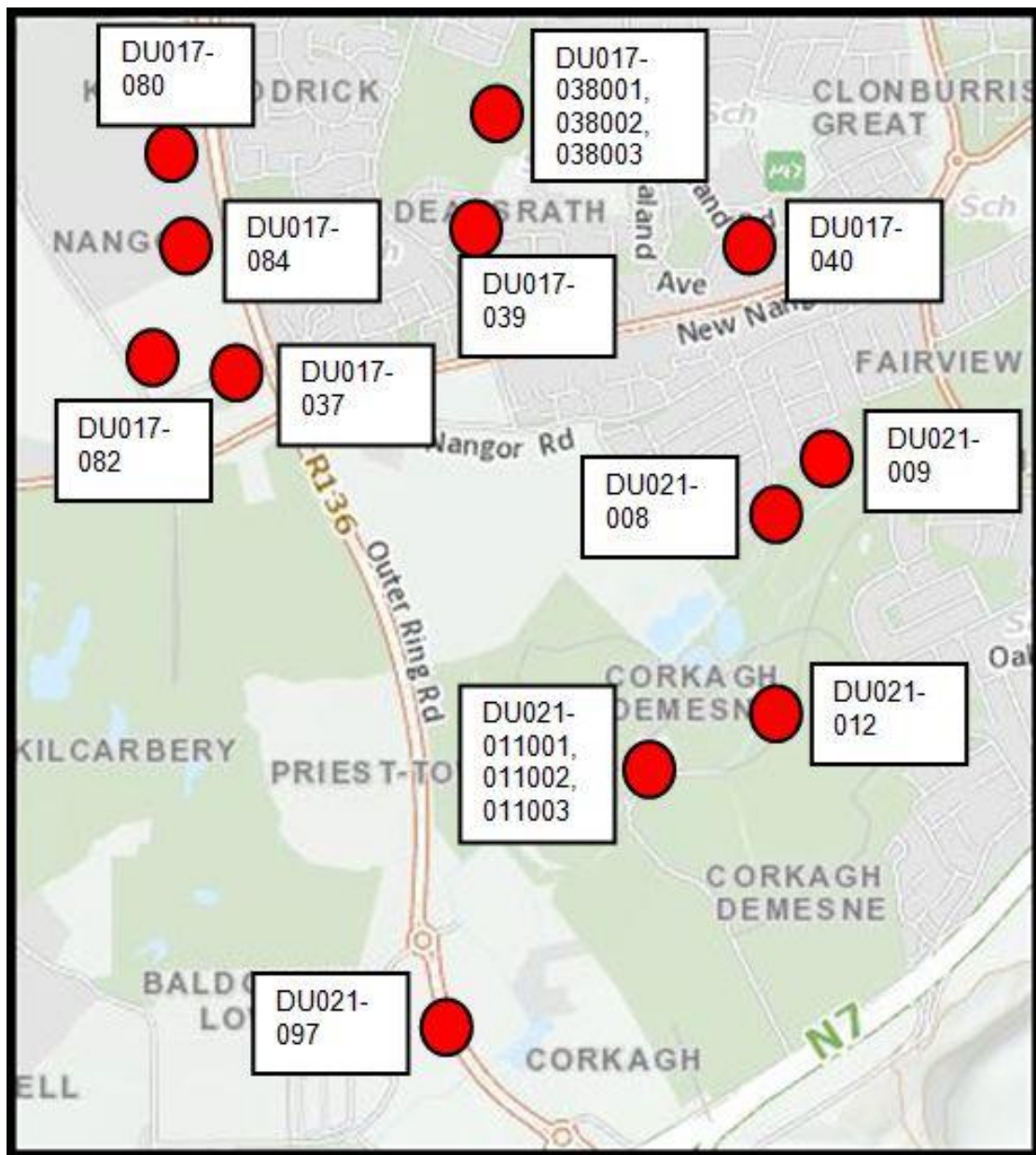


Figure 4: RMP sites within the 1km study area

By the 4th millennium BC, a farming economy was developing that involved forest clearance. Archaeological and pollen records show an increasingly settled landscape with some fixed field boundaries for livestock and cereal production. While farming did spread throughout the country, the preference was for light soils and upland margins with free draining soils and light woodland cover. Extensive use of the

productive though heavy soils of the poorly drained central lowlands was restricted by virtue of the limitations of available tools and technology.

Bronze Age monuments from County Dublin include standing stones, stone pairs, cairns, barrows and *fulachta fiadh*, which are one of the most numerous monument types in Ireland with over 4,500 examples recorded (Waddell 2005, 174).

A ring-barrow (DU017-080) is recorded in Kilmahuddrick townland, approximately 730m north west of the proposed development area (www.archaeology.ie). It was revealed through geophysical survey and test trenching, and consisted of a ditch (2.5m wide x 1.6m deep) which enclosed a maximum area of 13m. Fragments of a human skull were found in the upper fill of the ditch, while a cist-like structure was exposed in the northern quadrant of the ditch. Cremated bone associated with Early Bronze Age pottery and a bead were found within the interior of the enclosing ditch. Soil samples from the ditch contained remains of barley, wheat, oats and evidence for hazel, haw and sloe.

Ring-barrows are circular mounds of earth surrounded by a ditch with an external bank. The mounds were usually quite low and were often no higher than the surrounding bank (Waddell 2005, 365). They are widely distributed, and while they vary in size most seem to range in overall diameter from approximately 15m to 25m. The limited evidence of circular ring-barrows and ring-ditches indicates cremation-type burials from the later centuries BC and early centuries AD, with the occasional deposition of small token deposits of bone. Ring-ditches are interpreted as being the likely remains of ploughed-out ring-barrows, especially when they occur in groups of two or more as ring-barrows sometimes do, forming small cemeteries.

A *fulacht fiadh* (DU017-084) is recorded in Nangor townland, approximately 530m north west of the proposed development area. It is recorded (www.archaeology.ie) that monitoring of topsoil-stripping in 2000 revealed the remains of a small *fulacht fiadh* in this area, consisting of a small pit or trough, a spread of heat-cracked stone and a linear feature to the south west of the trough. The pit/trough consisted of a sub-circular cut into natural geology which measured 1.25m x 0.56m. The spread of stone measured 1.92m north/south x 1.18m with a maximum depth of 0.05m. Approximately 6m to the west of the spread, a linear gully feature was revealed. This consisted of a cut into natural boulder clay measuring 2.57m north/south x 0.28-0.54m. It had a depth of 0.16m with sharply sloping sides and a flat base. The cut

was filled with a moderately compact, mid-brown clay containing frequent pieces of oxidised clay and occasional flecks of charcoal. Infrequent fragments of burnt bone were noted in the fill.

A habitation site (DU021-012) is recorded approximately 400m south east of the proposed development area in Corkagh Demesne townland (www.archaeology.ie). Excavations prior to the construction of the North Eastern Gas Pipeline revealed a scatter of stake/post holes in possible association with a gully. Stone implements including a flint leaf-shaped point and a chert end scraper were found.

During the Iron Age (c. 600 BC-400 AD) new influences came into Ireland which gradually introduced the knowledge and use of iron, although for several centuries bronze continued to be widely used. The Iron Age in Ireland however is problematic for archaeologists as few artefacts dating exclusively to this period have been found, and without extensive excavation it cannot be determined whether several monument types, such as ring-barrows or standing stones, date to the Bronze Age or Iron Age. Most knowledge for this period stems from Irish folklore, the epic poems and legends of warrior kings and queens that are traditionally believed to be Celtic in origin.

The Early Medieval period (c. 400-1169 AD) is depicted in the surviving sources as entirely rural, characterised by the basic territorial unit known as *túath*. Walsh (2000, 30) estimates that there were at least 100, and perhaps as many as 150, kings in Ireland at any given time during this period, each ruling over his own *túath*.

The new religious culture brought changes in settlement and agricultural patterns. The ringforts and associated field patterns of the Early Medieval period indicate a life largely based on grazing. During this turbulent period roughly circular defensive enclosures known as ringforts were constructed to protect farmsteads. They were enclosed by an earthen bank and exterior ditch, and ranged from approximately 25m to 50m in diameter. The smaller sized and single banked type (univallate) was more than likely home to the lower ranks of society, while larger examples with more than one bank (bivallate/trivallate) housed the more powerful kings and lords. They are regarded as defended family homesteads, and the extant dating evidence suggests they were primarily built between the 7th and 9th centuries AD (Stout 1997, 22-31).

The ringfort is considered to be the most common indicator of settlement during the Early Medieval period. The most recent detailed study (*ibid.*, 53) has suggested that

there is an approximate total of 45,119 potential ringforts or enclosure sites throughout Ireland.

Enclosure sites belong to a classification of monument whose precise nature is unclear. Often they may represent ringforts, which have either been damaged to a point where they cannot be positively recognised, or are smaller or more irregular in plan than the accepted range for a ringfort. An Early Medieval date is in general likely for this site type, though not a certainty.

An enclosure (DU017-040) has been recorded through aerial photography in Bawnoges townland, approximately 600m north east of the proposed development area. This feature no longer survives above-ground.

The Early Medieval period is also characterised by the foundation of a large number of ecclesiastical sites throughout Ireland in the centuries following the introduction of Christianity in the 5th century. The early churches tended to be constructed of wood or post-and-wattle. Between the late 8th and 10th centuries mortared stone churches gradually replaced the earlier structures. Many of the sites, some of which were monastic foundations, were probably originally defined by an enclosing wall or bank similar to that found at coeval secular sites. This enclosing feature was probably built more to define the sacred character of the area of the church than as a defence against aggression. An inner and outer enclosure can be seen at some of the more important sites; the inner enclosure surrounding the sacred area of church and burial ground and the outer enclosure providing a boundary around living quarters and craft areas. Where remains of an enclosure survive it is often the only evidence that the site was an early Christian foundation.

The commencement of Viking raids at the end of the 8th century and their subsequent settlement during the following two centuries marked the first ever foreign invasion of Ireland. Viking settlement evidence is scarce and has been found in Dublin and Waterford, however excavations there have revealed extensive remains of the Viking towns. Outside these towns, understanding of Viking settlement is largely drawn from documentary and place-name evidence. In addition to Dublin and Waterford, documentary sources provide evidence for the Viking foundation of the coastal towns of Limerick, Wexford and Cork (Edwards 2006, 179). Other indirect evidence which suggest Viking settlement, or at least a Norse influence in Ireland, is represented by upwards of 120 Viking-age coin hoards, possible votive offerings of Viking style

objects and the assimilation of Scandinavian art styles into Irish design. Whilst the initial Viking raids would have been traumatic, the wealth and urban expansion brought into the country as a result of Viking trading would have eventually benefited the Gaelic Irish and the cultural assimilation in some parts would have been significant.

The arrival of Anglo-Normans in Ireland towards the end of the 12th century caused great changes during the following century. Large numbers of colonists arrived from England and Wales and established towns and villages. They brought with them new methods of agriculture which facilitated an intensification of production. Surplus foods were exported to markets all along Atlantic Europe which created great wealth and economic growth. Results of this wealth can be seen in the landscape in the form of stone castles, churches and monasteries.

The political structure of the Anglo-Normans centered itself around the establishment of shires, manors, castles, villages and churches. In the initial decades after the Anglo-Norman invasion a distinctive type of earth and timber fortification was constructed- the motte and bailey. Mottes were raised mounds of earth topped with a wooden or stone tower while the bailey was an enclosure, surrounded by an earthen ditch with a timber palisade, used to house ancillary structures, horses and livestock. There are six motte and baileys recorded in County Dublin (www.archaeology.ie).

In certain areas of Ireland Anglo-Norman settlers constructed square or rectangular enclosures, now termed moated sites. Their main defensive feature was a wide, often water-filled, fosse with an internal bank. As in the case of ringforts, these enclosures protected a house and outbuildings usually built of wood. They appear to have been constructed in the latter part of the 13th century though little precise information is available. There are six moated sites recorded in County Dublin (www.archaeology.ie).

A church (DU017-038001), graveyard (DU017-038002) and moated site (DU017-038003) are recorded in Kilmahuddrick townland, approximately 750m north of the proposed development area.

More substantial stone castles followed the motte and bailey and moated sites in the 13th and 14th centuries. Tower houses are regarded as late types of castle and were erected from the 14th to early 17th centuries. Their primary function was defensive, with

narrow windows and a tower often surrounded by a high stone wall (bawn). An Act of Parliament of 1429 gave a subsidy of £10 to “*liege*” men to build castles of a minimum size of 20ft in length, 16ft in breadth and 40ft in height (6m x 5m x 12m). By 1449 so many of these £10 castles had been built that a limit had to be placed on the grants. The later tower houses were often smaller, with less bulky walls and no vaulting. There are 61 tower houses recorded in County Dublin (www.archaeology.ie).

An unclassified castle (DU017-037) is recorded in Nangor townland, approximately 200m north west of the proposed development area. It was named “*Nangor castle*” on the First Edition OS 6-inch map and “*Nangor castle on site of castle*” on a later edition, suggesting that it had been incorporated into a 19th century structure. All buildings on the site have been demolished, leaving no surface trace of the earlier structure. There are earthworks in the field to the south of the castle. Pre-development testing in the vicinity of the castle in 1996 produced evidence for a substantial ditch and an associated shallower linear feature of uncertain date. Trial-trenching in the field bounding the castle to its south uncovered several lignite cores and slivers, pottery and metal slag, suggesting a date in at least the Early Medieval period. Human skeletal remains were also uncovered, as were numerous charcoal-flecked irregular features (www.archaeology.ie).

An unclassified castle (DU021-011001) is recorded in Corkagh Demesne townland, approximately 330m south of the proposed area of land take. According to Ua Broin (www.archaeology.ie), Corkagh House “*stood within the moat of a castle, ruins of which consisted of an arched entrance, portion of a battlemented parapet and eight windows*”. Corkagh House was demolished except for the stable yard in the 1960's, and there is no visible surface trace of the castle or the moated site (DU021-011002). A mill (DU021-011003) of uncertain date has also been noted near Corkagh House (www.archaeology.ie).

A tower house (DU017-039) is recorded approximately 450m north of the proposed development area in Deansrath townland. All that survives of Deansrath Castle is portion of a stair tower, which rises to two storeys with a partially vaulted over-ground floor. It appears to be part of a gatehouse shown in a drawing by Beranger in 1773 (www.archaeology.ie), and was part of a larger castle complex described in the 18th century as defended by a deep enclosing ditch. The Dean of St. Patrick was proprietor in 1641, but by 1656 it was described as the “*stumpe of a castle*”.

A Medieval field system (DU017-082) is centered on a point approximately 380m north west of the proposed development area in Nangor townland. An excavation in 2001 revealed a Medieval ditch complex which appears to have represented the remains of field boundaries with associated water management gullies.

Field systems are regarded as a group or complex of fields which are related and may date to any period from the Neolithic onwards. The practice of enclosing fields in Ireland for agricultural and other purposes dates back to the Neolithic period. The enclosed land could have been used for stock-raising, plant husbandry and crop protection. The fields can vary in size and it is possible that many of them are more extensive than currently thought. A wide range of monuments, such as barrows, ringforts, souterrains, hut sites, ecclesiastical remains *etc.*, can be found inside field systems.

The 14th century throughout north west Europe is generally regarded as having been a time of crisis, and Ireland was no exception. Although the Irish economy had been growing in the late 13th century, it was not growing quickly enough to support the rapidly expanding population, especially when Edward I was using the trade of Irish goods to finance his campaigns in Scotland and Wales. When the Great European Famine of 1315-17 AD arrived in Ireland, brought about by lengthy periods of severe weather and climate change, its effects were exacerbated by the Bruce Invasion of 1315-18 AD. Manorial records which date to the early 14th century show that there was a noticeable decline in agricultural production. This economic instability and decline was further worsened with the onset of the Bubonic Plague in 1348 AD.

Before the Tudors came to the throne the kings of England were also the kings of western France and so, during the 14th and 15th centuries, the various lords who ruled in Ireland were largely left to themselves. The Tudor conquest however brought a much greater interest in the affairs of Ireland. They wanted to put a stop to the raids of the Gaelic Irish on areas under English rule. To do this, they ruthlessly put down any rebellions and even quashed inter-tribal feuds. English settlers were then brought in to settle their lands. The first of these plantations occurred in the mid-16th century in what is now Laois and Offaly. After the Desmond rising in Munster in 1585 AD came another plantation, and parts of south western Tipperary were planted at that time.

From 1593 until 1603 there was a countrywide war between the Gaelic Irish, who were supported by the French, and the Elizabethan English. The Irish were finally

defeated and with the “*Flight of the Earls*” from Rathmullan, County Donegal in 1607, Ulster, which had previously been independent of English rule, was planted.

Expansion in the agricultural sector following a period of economic growth in Ireland from the mid-1730s led to rising prices and growth in trade. This increase in agricultural productivity resulted in growth in related industrial development throughout the country.

The 1798 Rebellion was a major event in Ireland’s history. Formed in 1791, The United Irishmen had variant views: from parliamentary reform within the existing English structure to an outright overthrow of the system and the establishment of an Irish Republic. This period has been described as the “*crucible of Modern Ireland*” (Killeen 2003, 5).

A mill (DU021-008) is recorded in Fairview townland, approximately 270m east of the proposed area of land take. No further information is recorded on the National Monuments Service online database. A well (DU021-009) is also recorded in Fairview townland, approximately 390m east of the proposed development area. Known as Two Sisters well, it no longer survives above-ground (www.archaeology.ie). A corn-drying kiln (DU021-097) is recorded in Baldonnell Lower townland, approximately 880m south of the proposed development area. Again, no further information is recorded on the National Monuments Service online database.

3.2 Summary of Previous Fieldwork in the General Development Area

Reference to Summary Accounts of Archaeological Excavations in Ireland (www.excavations.ie) confirmed that no fieldwork programmes have been carried out within the proposed development area.

Numerous fieldwork projects however revealing extensive archaeological remains have been carried out in townlands surrounding the proposed development area.

The following list summarizes sites in which archaeological material has been discovered in close proximity to the proposed development area.

Site name	Corkagh Demesne
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Licence No.	Not recorded
Licence holder	Margaret Gowen
Site type	Suspected enclosure
ITM	E 705616m, N 730291m
No further information is recorded on this possible Medieval enclosure.	

Site name	Nangor Castle/Grange Castle, Kilmahuddrick, Clondalkin
Licence No.	97E0116
Licence holder	Cia Mc Conway
Site type	Medieval?
ITM	E 704428m, N 731227m
<p>Test-trenching was carried out along the line of a road leading northwards from the vicinity of the now-demolished Nangor Castle to Grange Castle, within the area of a proposed industrial park. This was the second phase of testing, the first phase having concentrated on the field to the immediate south of Nangor Castle and its general vicinity.</p> <p>An intensive geophysical survey had been carried out along the line of the proposed road and several anomalies were identified. This testing specifically examined the areas of anomalies, as agreed with the National Monuments Service. Trenching was carried out by machine, and halted once <i>in situ</i> archaeological deposits were encountered. However, as experienced before, only subsoil-cut features survived-years of ploughing and the fairly shallow ploughsoil led to the removal of any potential archaeological stratigraphy.</p> <p>Seven trenches were opened. Of these, only three, all located in Grange Field 3, to the east of Grange Castle, produced any significant archaeology. Two linear features 0.5-0.8m wide, of unknown date and function, ran in a north/south direction. However, their proximity both to the 15th century castle and to one another could suggest substantial archaeological potential. Some spreads of brown soil had 20th century pottery inclusions in their upper surface, while other areas, a mix of brown soil and broken slate subsoil, were probably the result of the dragging action of the plough.</p>	

Site name	Grange Castle Business Park, Kilmahuddrick, Clondalkin
Licence No.	97E0116ext
Licence holder	Richard N. O'Brien
Site type	Medieval
ITM	E 703948m, N 731830m

Monitoring and excavation were undertaken in advance of the construction of an access road and the excavation of foul sewers for a Business Park at Grange Castle. The excavation work continued until February 1998. Documentary evidence is scarce for Nangor Castle, but it is known that a castle stood on the site in the 16th century. Grange Castle is an upstanding 15th century tower house. It is proposed to develop an industrial park in this area.

Previous archaeological assessment by Cia Mc Conway and geophysical survey by A. Mc Cleary, ADS Ltd, in February 1997 established that the area was archaeologically sensitive.

In advance of construction of a site access road, topsoil was stripped from a 24m wide area by mechanical excavator, under archaeological supervision, for a distance of 480m northwards from Nangor Road. A further strip, 6m wide and 1.3km long, was excavated for sewers. The full 24m wide strip was excavated in the field adjacent to Grange Castle.

All archaeological features uncovered had been truncated by deep ploughing, resulting in the removal of all but sub-surface features cut into natural boulder clay.

A curving ditch was identified in Field 1; it terminated at Nangor Road, and was orientated north east/south west. It was 30m in length, 0.8-0.9m deep and 1.2-2.4m wide. The eastern terminus continued beyond the limits of the excavation. The upper fills contained charcoal, mortar, flint and animal bone, and were aceramic. A decorated bone comb, stick-pin and knife gave the later ditch phase a terminus *ante quem* of from the 12th to the 13th century AD.

A stone causeway, 0.5-0.6m wide and 0.06-0.1m deep, crossed the ditch. The existence of this ditch had been shown in Mc Conway's assessment.

Field 7 is located between Grange Castle and the Kilmahuddrick Housing Estate. Two curving ditches were identified in this field. One was found under a Post-Medieval stone and brick trackway. It was 51m in length and varied in width from 1.1m to 1.4m, and in depth from 0.3m to 0.4m. A stone causeway, 0.6-0.84m wide, crossed it towards the western side of Field 7. No datable finds came from the primary fills of the ditch, but the secondary fills consisted of charcoal-rich clays with animal bone. It continued beyond the limits of the excavation at its western end.

A second ditch was found 1.6m east of the eastern terminus of the first. No archaeological features or deposits were found in this gap. The second ditch closely resembled the first; it was 22m long, 2m wide and 0.5-0.6m deep. The primary fills were sterile apart from some animal bone. The secondary fills consisted of charcoal-rich clays in which were found animal bone, mortar, two metal knives and a fragment

of worked lignite. An incomplete one-sided decorated bone comb and fragments of another in the upper fills gave a terminus *ante quem* of the 12th to 13th century AD. This ditch continued beyond the limits of excavation at its eastern end. The evidence from Field 7 suggests that extensive Early Medieval and Post-Medieval activity survives in this area; the ditches can be interpreted as Medieval field boundaries.

A pit that contained a deposit of iron slag was found in Field 2, north of the site of Nangor Castle; it was associated with post-holes and stake-holes, though no structural pattern could be discerned.

Elsewhere various pits, hearths, furrows and field drains were recorded; some of the hearths may be prehistoric in date.

Site name	Grange/Kilmahuddrick/Nangor (Grange Castle International Business Park), Clondalkin
Licence No.	00E0718
Licence holder	Ian W. Doyle
Site type	Monitoring & <i>fulacht fiadh</i>
ITM	E 704228m, N 731827m

Monitoring of topsoil-stripping commenced in early September 2000. In Nangor townland the remains of a small *fulacht fiadh* were revealed. This consisted of a small pit or trough, a spread of heat-cracked stone and a linear feature to the south west of the trough. The pit/trough consisted of a sub-circular cut into natural, 0.56m x 1.25m. The cut was steep-sided, leading to a flat base. It was filled with a mix of silt and compact, stony clays.

A spread of heat-shattered sandstone was located some 0.9m to the west of the trough. This spread consisted of a moderately compact, dark grey, sandy clay with frequent inclusions of heat-shattered sandstone fragments, pieces of burnt clay and charcoal. This spread measured 1.92m north/south x 1.18m with a maximum depth of 0.05m.

Approximately 6m to the west of the spread a linear gully feature was revealed. This gully consisted of a cut into natural boulder clay measuring 2.57m north/south x 0.28–0.54m. This had a depth of 0.16m with sharply sloping sides and a flat base. The cut was filled with a moderately compact, mid-brown clay containing frequent pieces of oxidised clay and occasional flecks of charcoal. Infrequent fragments of burnt bone were noted in the fill. Some 4m to the south of the heat-shattered sandstone spread, a small linear gully feature was excavated. This measured c. 1 m north east/south west x 0.12m with a depth of 0.14m. The fill of this comprised a mid-brown, sandy clay with

frequent charcoal flecking. No archaeological objects were recovered.

To the south of the *fulacht fiadh*, a back-filled field boundary was revealed by topsoil-stripping. The alignment of this boundary possibly corresponds with a similar ditch encountered in Field 113.

Site name	Grange Castle International Business Park, Grange and Kishoge
License No.	00E0061
Licence holder	Ian W. Doyle
Site type	Various
ITM	E 604180m, N 732147m

Test-trenching was carried out at Grange Castle International Business Park, Clondalkin, Dublin 22, on a site owned by South Dublin County Council, during February 2001. The greater part of the site was under development as a business park.

The assessment was concerned with the area immediately south of the Grand Canal in Grange and Kishoge townlands. It is intended to construct an attenuation lake in this area, which will aid drainage. The lake structure will measure approximately 250m north west/south east x 90m. An underground 110kV electricity cable will run through this area and towards the west for a length of approximately 1.5km. The terrain in the areas to be affected is relatively low-lying and the land has been used for agricultural purposes. The centre of the area intended for the attenuation lake was subjected to ground disturbance in the recent past. This disturbance appears to have been associated with the diversion of a stream and ground was stripped to bedrock in places.

Sixteen trenches were opened by mechanical excavator. These were placed in the areas which would be subjected to disturbance by the attenuation lake and the electricity cable way-leave.

Trench 1 was located at the western end of the lake and associated roadway. It revealed a long linear feature cutting natural subsoil. Where sectioned, the cut for this feature, which measured 2.6m east/west x 16.5m with a depth of 0.35m, comprised a sloping-sided flat-bottomed gully. The upper fill consisted of a moderately compact light brown clay silt with occasional inclusions of mollusc shells and small pebbles. The lower fill comprised a moderately compact grey clay with occasional mollusc shell inclusions. A small undated hearth was revealed in Trench 4, which was also located to the west of the lake.

Trench 13 was opened on the line of the electricity cable way-leave, at a point where a mound and masonry wall were observed in the extreme north eastern corner of the field. What is likely to be a modern agricultural feature was revealed, comprised of a mound, a stone wall and a metalled surface. This is likely to represent a watering-hole for livestock formed by excavating a depression, placing the upcast to the west into a mound, which was then revetted with a low masonry wall. A metalled surface was then placed at the point of animal access.

Site name	Corkagh Demesne
Licence No.	00E0935
Licence holder	Ruth Elliott
Site type	Pit furnace
ITM	E 705616m, N 730291m
<p>A nearly circular pit (measuring 1.5m x 1.2m in plan) with sharply sloping sides, a concave base and a depth of 0.17m was uncovered. Although no finds of slag or metal were recovered, it was interpreted as a probable pit furnace. It was lined by a charcoal-rich black silty clay with occasional inclusions of mottled yellow clay. This appears to have been charcoal laid down to fuel the furnace, which was subsequently raked through to retrieve the product. It was overlain by an orange friable silty clay, which may have been the broken-up remains of the furnace superstructure. A small patch of <i>in situ</i> burnt soil was situated 13.87m north west of this and may have been the remains of a feature related to the pit furnace.</p> <p>The site was situated in a County Council park within the former Corkagh Demesne estate lands. As these parklands were levelled and landscaped in modern or Post-Medieval times, it is possible that features related to the pit furnace were truncated or destroyed. It may also be inferred stratigraphically that the pit furnace was Medieval or earlier in date.</p>	

Site name	Grange Castle International Business Park, Grange and Kishoge
License No.	01E0718 ext.
Licence holder	Ian W. Doyle
Site type	Post-Medieval
ITM	E 719482m, N 736542m
<p>The archaeological assessment carried out in this area during February 2001 recommended that an archaeologist be present to monitor the stripping of topsoil.</p>	

The initial recognition of archaeological features was compromised somewhat by the contractor stripping a quantity of topsoil before informing the archaeologist. However, several metalled surfaces, field drains, pits and gullies of Post-Medieval and modern date were recognised during the stripping when an archaeological presence was established.

In Kishoge townland, to the south west of the area intended for the attenuation lake, the remains of a sub-rectangular structure, which appears to have burnt down, were detected. This consisted of what appeared to be the remains of slot-trenches cut into natural boulder clay with a fill of oxidised clay and charcoal. The feature measured 5.8m east/west x 4.6m and appeared to have been truncated through intensive ploughing. Access to this area was not available at the time of the assessment owing to dumping and storage of building materials. This area was later excavated by Edmond O'Donovan.

Site name	Grange Castle International Business Park, Grange and Kishoge
License No.	01E0754
Licence holder	Ian W. Doyle
Site type	Medieval field system
ITM	E 704328m, N 731197m

Excavations were carried out in Nangor townland, west of Clondalkin, Dublin 22, during October 2000–January 2001. The excavations revealed a Medieval ditch complex.

Construction of a biotechnology campus commenced in September 2000. The area excavated in Nangor is south of the construction site and outside the immediate area of impact. No detailed development is presently intended for the greater part of this area. However, additional excavation was undertaken to mitigate the impact of a gas pipeline and associated access road in part of the area formerly occupied by the Nangor Castle gardens. Nangor Castle is located immediately outside the southern boundary of the Wyeth Medical Ireland site. References to a castle at this site date from the 15th–16th centuries. All buildings on the site were demolished during the 1970s, but an area of archaeological potential surrounds the site.

Trench 1, which measured 60m north/south x 33m, was located some 90m to the north west of the castle site. Geophysical survey and subsequent test trenching had suggested that the area of Trench 1 held archaeological potential. Excavation in Trench 1 commenced in October 2000 and continued until December 2000. Activity

assigned to Phase I in this trench consisted of a linear feature and a pit, both of which cut natural subsoil. These features did not produce pottery or finds. The pit consisted of a rectangular cut into natural subsoil, which contained a series of ash deposits. Areas of oxidised or fire-reddened soil present on the north east and south west sides are indicative of *in situ* burning. This cut was filled with a series of sterile silty layers and dumps of ash.

The Phase I activity was succeeded by a Medieval phase of activity which consisted of further linear features, pits and cobbled surfaces. These were assigned to a single general phase which is capable of further subdivision based on stratigraphic grounds. Finds retrieved from the fills of these features include approximately 1000 sherds of Leinster Cooking Ware and Dublin-type wares, and assorted iron finds including nails, an armour-piercing arrowhead, a buckle, a key and an intact iron sickle.

Trench 2, located to the east, detected a similar sequence of linear features, which contained sherds of Medieval pottery in their fills. Trench 3, to the south of Trench 1, detected shallow linear features running on an east/west axis. These linear features were succeeded by a pit and a metallated surface, both of which were directly associated with Medieval pottery.

Trench 4, located to the west, was excavated to examine a ditch encountered during an earlier assessment. A ditch orientated north west/south east with steep sloping sides and a rounded U-shaped base was revealed. It was 1.05m wide, narrowing to 0.3m at the base, with a maximum depth of 1.1m. Its fill contained occasional fragments of animal bone, from which a radiocarbon date of cal. AD 601–883 was obtained.

Trench 5, located to the south east of Trench 4, uncovered further Medieval linear features. A narrow ditch which ran across the trench on a south east/north west axis is likely to represent a continuation of a similar feature encountered in Trench A to the south. A series of Post-Medieval field boundaries was also detected in Trench 5.

Trench A was excavated to the south of Trench 5 on the line of the gas pipeline and associated roadway. Excavation in this area revealed an undated metallated surface and a series of ditches/gullies. Excavation of these commenced in January 2001. Although there were relatively few finds from these features, their stratigraphic relationship indicates that there were five phases of ditches and gullies in the trench dating from Medieval to modern times.

The excavation of Trench B, an extension of Trench A, revealed one feature of interest, a substantial Medieval ditch which cut into natural subsoil. This was found in the extreme eastern end of the trench. The ditch ran through Trench B, outside the

northern and southern limits of excavation. The cut measured 10m north/south x 2.5m, with a depth of 1.1m as exposed, and had sloping sides and a rounded base. The ditch ran on a north/south axis with a slight curve towards the north east. In overall plan the ditch appears to have been sub-circular, enclosing an area to the east of Trench B. The fills of the ditch comprised black sticky silts with organic content. The lower and upper fills contained Medieval pottery. No trace of an enclosing bank was detected in the area opened for examination; however the depth of overburden, composed of cultivated soils, in this area may be in part composed of a levelled bank. Trench C, to the north east of Trench B, did not detect the ditch. No archaeological material was detected in Trench C, where it was found that modern disturbance had removed the old ground surface.

In total, some 1600 sherds of native Medieval pottery were recovered from the Nangor excavations. It is of some interest that only two sherds of imported Medieval pottery were recovered. The excavated linear features at Nangor may represent the remains of Medieval field boundaries with associated water-management gullies. The presence of such linear features, which can be dated to the Medieval period by the presence of Leinster Cooking Ware and Dublin-type wares, argues for land enclosure during the Medieval period. That cereal production was the purpose of such enclosures may be suggested by evidence from pollen and macro-plant analysis. The examination of a wide range of Medieval samples from the Nangor excavations has shown a predominance of wheat over other plant remains.

Site name	Grange Castle International Business Park, Grange and Kishoge
License No.	04E0299
Licence holder	Red Tobin
Site type	Burnt Mounds
ITM	E 703396m, N 731729m

Excavations were carried out during works on the Griffeen River realignment, part of ongoing infrastructure works within the precincts of the Grange International Business Park. The works are principally aesthetic in purpose, designed to enhance the appearance of the park and to highlight the river, which otherwise would have flowed behind the Takeda Pharmaceuticals complex. The area stripped will also accommodate the extended road network that will serve the business park when it is fully occupied.

Topsoil stripping for this realignment commenced in early December 2003 and

continued intermittently until May 2004. Topsoil stripping revealed the locations of three burnt mounds. Of these three features, two were excavated, as the development was likely to have a total impact on them. The third mound was preserved *in situ*, as it was located outside the development area.

Burnt Mound 1

During monitoring of topsoil removal this site was identified as an irregularly shaped deposit of firing material (heat-shattered stone and blackened soil). The burnt-mound material extended 28m east/west along the northern edge of the stripped corridor and extended to the south x 8m from the northern baulk. The feature lay c. 25m to the west of the Griffeen River on gently undulating pasture sloping to the south. The evidence from initial survey work and subsequent excavation suggests that the main spread of this site remains preserved *in situ* to the south of this location.

The nature and extent of the mound material was exaggerated by plough action, which had dragged it from its original focal point to extend over 28m in length. After the removal of topsoil the F2 mound of firing material extended little more than 0.5m from the limit of the excavation. From this southern extremity, the mound rose to the north to a maximum height of 0.65m at the northern limit of the excavation. No cut features were exposed during the excavation.

Burnt Mound 2

The realigned Griffeen River crosses the course of the old river at two locations. To allow for the excavation of the first of these crossings it was necessary to divert the Griffeen River into a third channel. During stripping prior to this channel being dug the second burnt mound was found. During the topsoil removal this site was identified as an irregularly shaped deposit of firing material (heat-shattered stone and blackened soil).

The area of excavation measured 13m east/west x 17.5m. A silted-up streambed abutted the southern part of the mound. The stream appears originally to have flowed from east north east to south west. It had a width of 3-5m, but the length could not be discerned as it extended beyond the limit of excavation. The stream fill contained water-rolled stones, pebbles and a dark-grey silt with a minimum depth of 0.1m. Wood residue, possibly alder, was in evidence and was probably indicative of remnants of fen woodland. This stream system is likely to have been the reason for siting the burnt mound at this location.

One of the earliest features on the site was a grouping of stake-holes cut into the clayey peat. These formed a semi-circular band. All were comparable in shape and size and contained the same fill. They ranged in depth from 2mm to 5mm with a

diameter of 6-12mm. Small amounts of heat-affected pebbles and small stones around the sides of the stake-holes may be evidence for packing material. The function of the complex is not clear. Some stake-holes are vertical, while others have been driven into the ground at an angle. They follow a vague north/east to south/west pattern, but the angled stakes do not appear to have offered support to each other or to any possible structure.

The burnt mound was situated on the northern bank of the silted up stream. The bank was steep-sided. The main concentration of firing material was in the west. No evidence for a trough was found and the only evidence of activity associated with the burnt mound appears to be the stake-hole complex. The mound measured 11m east/west x 4.5m. It is more likely that the original east/west dimensions were closer to being 6m, with a depth of 0.12-0.25m.

Covering and surrounding the burnt mound was a layer of peat measuring 4.64m from north to south x 14.7m, with a surviving depth of 0.2-0.45m. This was a moist dark-reddish-brown peat of moderate compaction that contained inclusions of sphagnum moss, plants and wood. It was most pronounced to the south of the burnt mound, sloping downwards to the stream.

A third burnt mound was recorded during the course of the topsoil-strip. The site was not fully exposed but was identified by a number of concentrations of the characteristic firing material. This site was not impacted on by the development and it was possible to preserve it *in situ*. It was first sealed using a double layer of geotextile material and then covered by a soil bund forming the boundary between the business park and the pitch-and-putt course.

Site name	Grange/Ballybane/Nangor
License No.	13E0435
Licence holder	Gill McLoughlin
Site type	Furnace pit (monitoring)
ITM	E 703978m, N 703391m

Monitoring of a proposed central carriageway at Grange Castle Business Park, Co. Dublin was carried out in November 2013. Monitoring followed an archaeological appraisal carried out in September 2013 and geophysical survey was previously carried out throughout the entire area of Grange Castle Business Park.

Two features of archaeological interest were identified during monitoring of topsoil stripping in the east of the development area in Nangor townland. These features comprised a small bowl furnace (0.36m x 0.33m x 0.15m) filled with charcoal-rich soil

and slag, and a shallow oval pit (0.97m x 0.69m x 0.1m) filled with charcoal, thought to be a charcoal clamp. These features were located approximately 35m apart and may have been associated with each other.

3.3 Cartographic Analysis

Ordnance Survey Map 1:10,560 First Edition 1844 (figure 5)

The proposed development area is recorded as part of 15 fields on the First Edition map. Three townland boundaries, a parish boundary and a barony boundary are recorded within the area of land take. Research suggests that:

“hoards and single finds of Bronze Age weapons, shields, horns, cauldrons and gold personal objects can all be shown to occur on boundaries” (Kelly 2006, 28).

Two small structures are recorded in the north east corner of the proposed development area on the First Edition map, although neither of these features were noted during the walkover survey. A small area of possibly mixed woodland is recorded in the north west corner, although it is not noted on later edition maps. Several tree-lined field boundaries are recorded within the proposed development area.

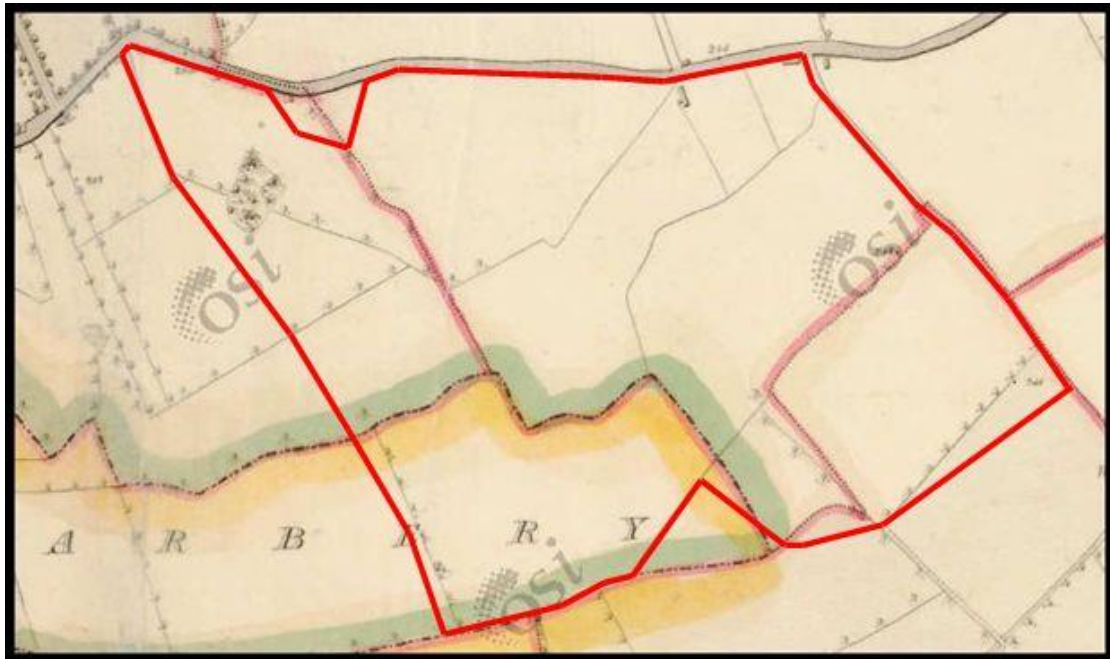


Figure 5: Extract from First Edition 1:10,560 Ordnance Survey Map (1844), showing the proposed development area

With the exception of the above-mentioned two structures, there are no archaeological or additional architectural features recorded on the First Edition 1:10,560 map within the area of proposed land take.

Ordnance Survey Map 1:2,500 First Edition 1863 (figure 6)

Two structures are again noted in the north east corner of the proposed development area. Some townland boundaries have changed between the time of the First Edition 1:10,560 map and the First Edition 1:2,500 map.

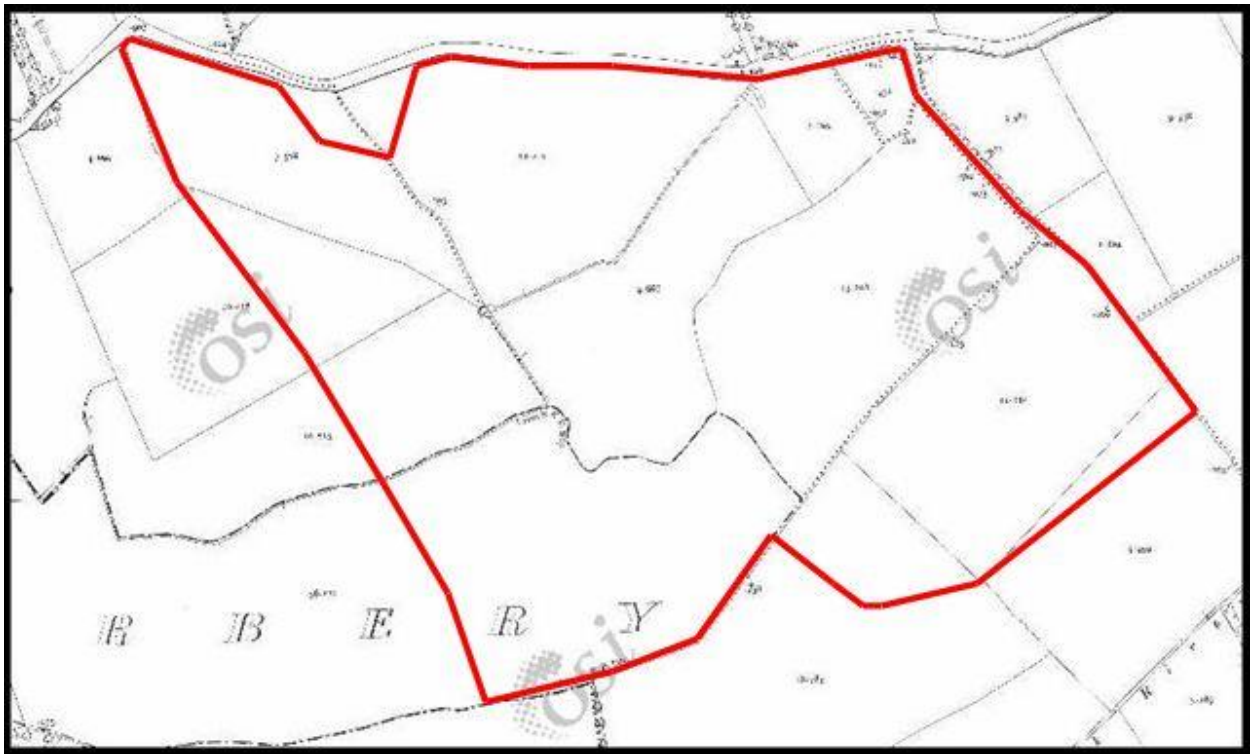


Figure 6: Extract from First Edition 1:2,500 Ordnance Survey Map (1863), showing the proposed development area

With the exception of the above-mentioned two structures, there are no archaeological or additional architectural features recorded on the First Edition 1:2,500 map within the area of proposed land take.

Ordnance Survey Map 1:10,560 Third Edition 1906 (figure 7)

One structure is recorded in the north east corner of the proposed development area where two structures were shown on earlier edition maps. "Nangor Road" is named

for the first time on the Third Edition map. A possible spring is recorded towards the north east boundary.

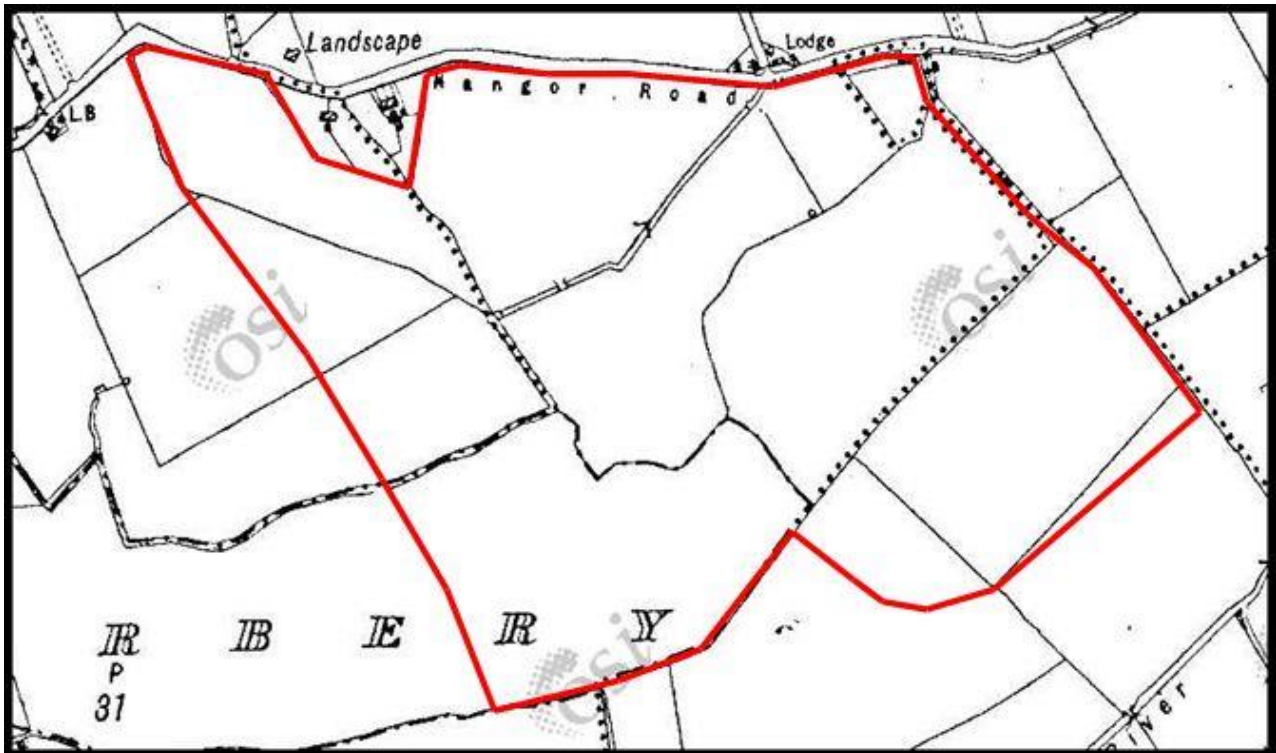


Figure 7: Extract from Third Edition 1:10,560 Ordnance Survey Map (1906), showing the proposed development area

With the exception of the above-mentioned structure, there are no archaeological or additional architectural features recorded on the Third Edition 1:10,560 map within the area of proposed land take

3.4 Aerial Photographs

Aerial photographs held by Ordnance Survey Ireland (www.maps.osi.ie) and Bing aerial photography (www.bing.com/maps) were consulted to look for the presence of archaeological or architectural features within the proposed development area.

The 1995, 2000 and 2005 Ordnance Survey photographs generally record a similar landscape to what was noted during the walkover survey (see **Section 3.8 Field Inspection** below), although the R136 Outer Ring Road, which forms the western boundary of the proposed development area, is recorded for the first time on the 2005 aerial photograph.

The north west corner of the area of proposed land take, along with a field to the south, are shown as heavily disturbed on the 2005 aerial photograph, and this activity appears to have been associated with R136 Outer Ring Road construction works.

Possible extensive previously unrecorded archaeological features of no recognizable form are noted along the western boundary of the proposed development area on the 1995 black and white aerial photograph (Fields 5 and 9 on Figure 8). These possible features are located in two separate fields, but do not appear to take the form of any standard archaeological features. They were not noted on any additional aerial photographs of the proposed development area.

The lack of clarity on the aerial photograph makes interpretation of these possible features difficult, but it is hoped further information will be provided as a result of carrying out a pre-development geophysical survey within the proposed development area (see **Section 5 Mitigation Measures** below).

Bing aerial photography noted the area of proposed land take as being similar to what was recorded at the time of the site visit (see **Section 3.8 Field Inspection** below).

With the exception of the possible features recorded in two fields on the 1995 black and white aerial photograph, there was no evidence of any additional previously unrecorded archaeological or architectural remains within the area of proposed land take.

3.5 County Development Plan

South Dublin County Council Development Plan 2016–2022

It is an Objective (HCL2 Objective 3) of South Dublin County Council to:

"protect and enhance sites listed in the Record of Monuments and Places and ensure that development in the vicinity of a Recorded Monument or Area of Archaeological Potential does not detract from the setting of the site, monument, feature or object and is sited and designed appropriately" (ibid., 153).

There are no Recorded Monuments within the proposed development area. There are 16 Recorded Monuments within the 1km study area, with the closest (Nangor

Castle) being located approximately 200m north west of the proposed area of land take.

3.6 Toponyms

Townland names are an important source in understanding the archaeology, geology, land-use, ownership and cultural heritage of an area.

Table 1: Tonyms

Name	Irish Genitive	Translation
Corkagh Demesne	<i>Dhiméin Chorcaí</i>	<i>Corcach</i> translates as marsh
Deansrath	<i>Ráth an Deagánaigh</i>	The ringfort of the dean (or Deane)
Kilcarbery	<i>Chill Chairbre</i>	Possibly translates as Carberry's wood
Nangor	<i>Nangair</i>	Possibly translates as place of nettles

3.7 Topographical Files of the National Museum of Ireland

Information on artefact finds and excavations from County Dublin is recorded by the National Museum of Ireland. Location information relating to such finds is important in establishing prehistoric and historic activity in the study area.

There are no entries recorded in the Topographical Files for any townlands located within the proposed development area.

3.8 Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography and any additional environmental information relevant to the report. The inspection took place on 14th December 2016 when weather conditions were very wet.

The site visit showed the proposed development area to consist of 11 fields (Figure 8, Fields 1 - 11).

Field 1 is located in the north west corner of the proposed development area and was shown to be very overgrown with tall grass. Views are poor in all directions.

Field 2 is a large open field with calf-length grass and occasional rushes. It is flat and dry underfoot with poor to moderate views in all directions.

Fields 3 and 4 are located in the north east corner of the proposed development area. They are both relatively small fields with calf-length grass and occasional rushes. They are flat and dry underfoot with poor views in all directions.

Fields 5 and 6 are located along the western boundary of the proposed area of land take and are both overgrown with tall grass and rushes. They are both flat with poor views in all directions.

Field 7 is a large open area located towards the middle of the proposed land take. It is flat with short to calf-length grass and is dry underfoot. It has poor views in all directions.

Field 8 is a large open flat field with calf-length grass and which is generally dry underfoot. It has poor views in all directions.

Field 9 is a very large open area located in the south west corner of the proposed land take. It is flat with calf-length grass with occasional rushes and is slightly wet underfoot. It has poor views in all directions.

Field 10 is located at the southern end of the proposed land take. It is flat with calf-length grass and is dry underfoot. It has poor views in all directions.

Field 11 is a large open flat field located in the south east corner of the proposed land take. It has short to calf-length grass and is generally dry underfoot and with poor views in all directions.

No archaeological features or artefacts were revealed within any areas of proposed land take as a result of carrying out the walkover survey.



Figure 8: Location of Fields 1 – 11 from the walkover survey



Plate 1: Field 2, looking south



Plate 2: Field 4, looking north

Plate 3: Field 6, looking east





Plate 4: Field 7, looking south

Plate 5: Field 8, looking south





Plate 6: Field 9, looking east

Plate 7: Field 10, looking south east





Plate 8: Field 11, looking west

3.9 Conclusions

There are no Recorded Monuments within the proposed development area. There are 16 Recorded Monuments within the 1km study area, with the closest (Nangor Castle) being located approximately 200m north west of the proposed area of land take. Reference to Summary Accounts of Archaeological Excavations in Ireland revealed that no fieldwork projects have been carried out within the proposed development area. Numerous fieldwork projects however revealing extensive archaeological remains have been carried out in townlands surrounding the proposed development area. Three townland boundaries, a parish boundary and a barony boundary are recorded within the area of proposed land take. Two small structures which no longer survive above-ground are recorded in the north east corner of the proposed development area on historic cartographic sources. Possible extensive previously unrecorded archaeological features are noted towards the western boundary of the proposed development area on a 1995 black and white aerial photograph. These possible features are located in two separate fields, but do not appear to take the form of any standard archaeological features. They were not noted on any additional aerial photographs of the proposed development area. There are no entries recorded in the Topographical Files of the National Museum of Ireland

for any townlands located within the proposed development area. No archaeological features or artefacts were revealed within any areas of proposed land take as a result of carrying out the walkover survey.

Based on research carried out for the preparation of this desk-based report, it is considered there is a medium to high risk of possibly extensive previously unrecorded archaeological remains surviving below-ground within the proposed development area.

4 ASSESSMENT OF IMPACTS

4.1 Construction Impacts

Groundworks associated with the proposed development will involve the mechanical excavation of all topsoil and overburden down to and through the level of geologically deposited strata. As a result of carrying out this desk-based assessment, the following potential archaeological impacts have been identified:

- There are no Recorded Monuments within the proposed development area. As a result, there will be no direct or indirect construction impact on the recorded archaeological resource.
- There are no Recorded Monuments within the proposed development area. There are 16 Recorded Monuments within the 1km study area. It is considered the proposed development will have a direct construction impact on any previously unrecorded archaeological remains that may exist within the proposed development area.
- The proposed development will have no visual or noise construction impact on the archaeological resource.

4.2 Operational Impacts

- The proposed development will have no operational impact on the archaeological resource.

4.3 Residual Impacts

- There will be no residual impacts on the archaeological resource after mitigation measures have taken place.

4.4 Cumulative Impacts

- There will be no cumulative impacts on the archaeological resource.

5 MITIGATION MEASURES

- A pre-development geophysical survey will be undertaken by a qualified geophysicist within all areas of proposed land take. The survey will be carried out under Licence to the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. A detailed report discussing the results of the survey will be submitted following completion of the fieldwork.
- A programme of Licensed pre-development archaeological test trenching will be carried out within all areas of proposed land take. The test trenching will take in to account the results of the geophysical survey, and will be carried out under Licence to the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the National Museum of Ireland. Further archaeological mitigation measures, which may include preservation *in situ* or preservation by record, may be made pending the results of the test trenching programme, and in agreement with the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the National Museum of Ireland.

Please note that all recommendations are subject to approval by National Monuments Service- Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Table 2: Summary of Impacts

Impact	Significance	Proposed Mitigation	Residual Impact
Potential direct construction impact on previously unrecorded archaeological remains	Unknown	A Licensed pre-development geophysical survey will be carried out within all areas of proposed land take. Following the geophysical survey, Licensed pre-development test trenching will be carried out within all areas of proposed land take. Further mitigation measures, which may include preservation <i>in situ</i> or preservation by record, may be made pending the results of the test trenching programme.	None

6 NON-TECHNICAL SUMMARY

This report has been prepared on behalf of South Dublin County Council to assess and define the impact on the archaeological resource, if any, associated with construction of the Corkagh Grange housing project. South Dublin County Council proposes to develop between 800 and 1,000 dwellings over a 5–7 year period on the site which measures 87.37 acres (35.36 hectares).

There are no Recorded Monuments within the proposed development area. There are 16 Recorded Monuments within the 1km study area, with the closest (Nangor Castle) being located approximately 200m north west of the proposed area of land take. Reference to Summary Accounts of Archaeological Excavations in Ireland revealed that no fieldwork projects have been carried out within the proposed development area. Numerous fieldwork projects however revealing extensive archaeological remains have been carried out in townlands surrounding the proposed development area. Three townland boundaries, a parish boundary and a barony boundary are recorded within the area of proposed land take. Two small structures which no longer survive above-ground are recorded in the north east corner of the proposed development area on historic cartographic sources. Possible extensive previously unrecorded archaeological features are noted towards the western boundary of the proposed development area on a 1995 black and white aerial photograph. These possible features are located in two separate fields, but do not appear to take the form of any standard archaeological features. They were not noted on any additional aerial photographs of the proposed development area. There are no entries recorded in the Topographical Files of the National Museum of Ireland for any townlands located within the proposed development area. No archaeological features or artefacts were revealed within any areas of proposed land take as a result of carrying out the walkover survey.

Based on research carried out for the preparation of this desk-based report, it is considered there is a medium to high risk of possibly extensive previously unrecorded archaeological remains surviving below-ground within the proposed development area.

The proposed development will have no impact on the recorded archaeological resource. The proposed development will have a direct construction impact on any

previously unrecorded archaeological remains that may exist within the proposed development area.

A Licensed pre-development geophysical survey will be undertaken by a qualified geophysicist within all areas of proposed land take. A detailed report discussing the results of the survey will be submitted following completion of the fieldwork.

A programme of Licensed pre-development archaeological test trenching will be carried out within all areas of proposed will take, and will take in to account the results of the geophysical survey. Further archaeological mitigation measures, which may include preservation *in situ* or preservation by record, may be made pending the results of the test trenching programme.

All fieldwork will be carried out in agreement with the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the National Museum of Ireland

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Placenames Database of Ireland

www.maps.osi.ie

Ordnance Survey Ireland aerial photographs

www.sdcc.ie

South Dublin County Council

APPENDIX 1: LEGISLATIVE FRAMEWORK PROTECTING THE CULTURAL HERITAGE RESOURCE

The Archaeological Resource

The **National Monuments Act, 1930 to 2004** and relevant provisions of the **National Cultural Institutions Act, 1997** are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes.

A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Record of Monuments and Places, the Register of Historic Monuments, the placing of Preservation Orders and Temporary Preservation Orders on endangered sites and National Monuments in the Ownership or Guardianship of the Minister for Arts, Heritage and the Gaeltacht or a Local Authority.

The Minister may acquire National Monuments by agreement or by compulsory order. The State or the Local Authority may assume Guardianship of any National Monument (other than dwellings). The owners of National Monuments (other than dwellings) may also appoint the Minister or the Local Authority as Guardian of that monument if the State or Local Authority agrees. Once the site is in ownership or Guardianship of the State, it may not be interfered with without the written consent of the Minister.

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the Register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the Register is illegal without the permission of the Minister. Two months notice in writing is required prior to any work being undertaken on or in the vicinity of a Registered Monument. The Register also includes sites under Preservation Orders and Temporary Preservation Orders. All Registered Monuments are included in the Record of Monuments and Places.

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These

perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage and the Gaeltacht to establish and maintain a Record of Monuments and Places where the Minister believes that such monuments exist. The Record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the State. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994.

Section 12(3) of the 1994 Act provides that:

“where the owner or occupier (other than the Minister for Arts, Heritage and the Gaeltacht) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage and the Gaeltacht to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the work until two months after the giving of notice”.

Architectural and Built Heritage Resource

The main laws protecting the built heritage are the **Architectural Heritage (National Inventory) and Historic Properties (Miscellaneous Provisions) Act, 1999** and the **Planning and Development Act, 2000** (Amended 2010). The Architectural Heritage Act requires the Minister to establish a survey to identify, record and assess the architectural heritage of the country. The National Inventory of Architectural Heritage (NIAH) records all built heritage structures within specific counties in Ireland. As inclusion in the Inventory does not provide statutory protection, the document is used to advise Local Authorities on compilation of a Record of Protected Structures (RPS) as required by the Planning and Development Act, 2000.

The Planning and Development Act, 2000 requires Local Authorities to establish a Record of Protected Structures to be included in the County Development Plan (CDP). This Plan includes objectives designed to protect the archaeological,

architectural and cultural heritage resource during the planning process. Buildings recorded in the RPS can include Recorded Monuments, structures listed in the NIAH, or buildings deemed to be of architectural, archaeological or artistic importance by the Minister. Sites, areas or structures of archaeological, architectural or artistic interest listed in the RPS receive statutory protection from injury or demolition under the 2000 Act. Damage to or demolition of a site registered on the RPS is an offence. The RPS list is not always comprehensive in every county.

A Local Authority has the power to order conservation and restoration works to be undertaken by the owner of a Protected Structure if it considers the building in need of repair. An owner or developer must make a written request to the Local Authority to carry out any works on a Protected Structure and its environs, which will be reviewed within 12 weeks of application. Failure to do so may result in prosecution.

APPENDIX 2: IMPACT ASSESSMENT AND THE ARCHAEOLOGICAL RESOURCE

Potential Impacts on Archaeological Remains

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological resources potentially affected. Housing projects can affect the archaeological resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape;
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation;
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits;
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value;
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow ;
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluvium or peat deposits;

- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, service trenches etc;
- Although not widely appreciated, positive impacts can accrue from permitted developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

There is no standard scale against which the severity of impacts on the archaeological and historic landscape may be judged. The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site specific terms, as may be provided by other specialists.

Impacts are defined as:

“the degree of change in an environment resulting from a development”
(Environmental Protection Agency 2002, 30).

Impacts are described as imperceptible, slight, moderate, significant or profound on archaeological remains.

Table 3: Significance Criteria

Level of Impact	Significance Criteria
Profound	An impact which obliterates sensitive characteristics
Significant	An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends
Slight	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities
Imperceptible	An impact capable of measurement but without noticeable consequences
Unknown	An impact on a previously unrecorded archaeological feature of unknown significance

APPENDIX 3: MITIGATION MEASURES AND THE ARCHAEOLOGICAL RESOURCE

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative impacts.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse impacts can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse impacts is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

Definition of Mitigation Strategies

The ideal mitigation for all archaeological sites is preservation *in situ*. This however is not always a practical solution, and a series of recommendations are therefore offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological excavation involves the scientific removal and recording of all archaeological features, deposits and objects to the level of geological strata or the base level of a given development. Full archaeological excavation is recommended where initial investigation has uncovered evidence of archaeologically significant material or structures and where avoidance of the site is not possible.

Archaeological test trenching is defined as:

“that form of excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development” (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 27).

Archaeological monitoring:

“involves an archaeologist being present in the course of the carrying out of development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works” (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 28).

GEOPHYSICAL SURVEY

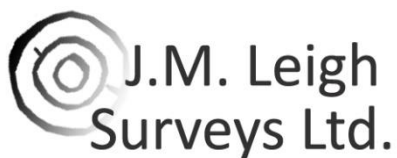
REPORT

Kilcarbery Grange Project,
Co. Dublin

Date:
02/05/2017

Licence: 17R0016

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GEOPHYSICAL SURVEY SUMMARY SHEET
KILCARBERY GRANGE PROJECT, CLONDALKIN
COUNTY DUBLIN

Site Name	Kilcarbery Grange Project	Ref No.	17003
Townland	Nangor, Kilcarbery and Deansrath	Licence No.	17-R-0016
County	Dublin	Licence Holder	Joanna Leigh
ITM (centre)	E705164, N730797	Purpose	Pre-planning investigation
Client	South Dublin County Council	Reference No.	N/A

Ground Conditions Survey area was cut and cleared by South Dublin County Council to aid the survey.

Survey Type Detailed gradiometer survey of the application area, totalling 35 hectares.

Summary of Results

The site was littered with modern ferrous debris, including areas of burnt out cars, prams and mattresses etc. The modern litter has resulted in a data set comprising of mostly modern ferrous responses.

Although modern disturbance dominates the data, some responses of interest were recorded. Linear responses and trends are indicative of former boundary features. In the south of the application area (Areas I & J), responses suggestive of former boundaries were also identified and it is possible that a former field system is represented here.

Report Date 02/05/2017

Report Author Joanna Leigh

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3. Survey Methodology	2
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5. Survey Results	4
6. Conclusion	6

Geophysical Survey Report

Kilcarbery Grange Project, Clondalkin, County Dublin

1 Introduction

- 1.1 A geophysical survey has been conducted by J. M. Leigh Surveys at a site to the south of Corkagh Park, known as Kilcarbery Grange. The survey has been undertaken on behalf of South Dublin County Council for the Kilcarbery Grange Project. The site is located within the townlands of Nangor, Kilcarbery and Deansrath, to the west of Clondalkin village and to the north of Corkagh Park, County Dublin. South Dublin County Council proposes to develop the lands for housing and the proposed survey shall form part of a wider archaeological study by Dermot Nelis Archaeology. The location of the application area is presented in Figure 1, at a scale of 1:4,000.
- 1.2 There are no recorded monuments within the application area. Recorded monuments in the vicinity include a castle (DU017:037), located c.200m to the north-west, and a medieval field system (DU017:082) c.400m to the north-west. To the south of the application area, in the townland of Corkagh Demesne, lies a habitation site (DU021:012), identified during excavations for a gas pipeline. Within Corkagh Park there is a recorded castle (DU021:011001) and associated moated site (DU0210112).

SMR No.	Class	Townland	ITM (E)	ITM (N)
DU017-037----	Castle	NANGOR	704527	731166
DU017-082----	Field system	NANGOR	704328	731197
DU021-008----	Mill - unclassified	FAIRVIEW	705863	730828
DU021-009----	Well	FAIRVIEW	705955	730915
DU021-011001-	Castle	CORKAGH DEMESNE	705516	730212
DU021-011002-	Moated site	CORKAGH DEMESNE	705515	730215
DU021-011003-	Mill - unclassified	CORKAGH DEMESNE	705514	730212
DU021-012----	Habitation site	CORKAGH DEMESNE	705849	730324

- 1.3 The aim of the survey was to locate and identify any geophysical responses of potential archaeological origin. The results of the geophysical survey shall be used to inform the test trench excavation methodology.

2 Survey ground conditions and further information

- 2.1 Modern ferrous litter and debris was scattered across the application area. In addition, areas of burnt out cars, mattresses and other burnt material was encountered across the site. Although modern material was evident, the site had been cut and cleared of vegetation and, as such, ground conditions were suitable.
- 2.2 12 fields were contained within the application area, of which detailed survey in 10 fields was conducted (Areas A-J). The location of the survey areas is presented in Figure 1, at a scale of 1:4,000. The field in the north-west corner of the application area was unsuitable, with very uneven terrain. The field in the north-east corner was also unsuitable. No survey was completed where poor ground conditions prevailed.
- 2.3 All of the fields surveyed (Areas A-J) comprised of a level topography with dense hedgerow field boundaries on flat terrain. There were no topographic features noted during the fieldwork.

3 Survey Methodology

- 3.1 A detailed gradiometer survey detects subtle variations in the local magnetic field and measurements are recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through recorded survey.
- 3.2 Data was collected with a Bartington Grad 601-2 instrument. This is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective.
- 3.3 The instrument is calibrated in the field to ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.
- 3.4 All data was collected in 'zigzag' traverses. Grid orientation remained constant throughout each field to facilitate the data display and interpretation.
- 3.5 Data was collected with a sample interval of 0.25m and a traverse interval of 1m, providing 6400 readings per 40m x 40m grid. The survey grid was set-out using a GPS VRS unit. Survey tie-in information is available upon request.

- 3.6 The survey methodology, data presentation and report content adheres to the European Archaeological Council (EAC) (2015) '*Guidelines for the use of Geophysics in Archaeology*'.

4 Data display

- 4.1 A summary greyscale image and accompanying interpretation diagram are presented in Figures 2 and 3, at a scale of 1:2,500.
- 4.2 Numbers in parenthesis in the test refer to specific responses highlighted in the interpretation diagram (Figure 3).
- 4.3 Isolated ferrous responses highlighted in the interpretation diagram most likely represent modern ferrous litter and debris and are not of archaeological interest. These are not discussed in the text unless considered relevant.
- 4.4 The raw gradiometer data is available upon request as a series of archive diagrams. The raw data is displayed as a greyscale image and xy-trace plot, both at a larger scale of 1:500. The archive plots are used to aid interpretation of the results and are for reference only. These plots are available as PDF images upon request.
- 4.5 The display formats referred to above and the interpretation categories are discussed in the summary technical information section at the end of this report.

5 Survey Results

5.1 Much of the data is dominated by magnetic disturbance resulting from modern activities. Although the magnetic disturbance complicates much of the data, some responses of potential interest, representing probable former agricultural activity, have been identified.

Areas A, B & C

5.2 Areas A, B and C comprise of significant magnetic disturbance. This is consistent with an overburden of modern material. No responses of potential interest can be identified within the magnetic disturbance.

Areas D, E & F

5.3 Area D does not have the magnetic disturbance present in Areas A, B and C. Some broad magnetic ferrous responses were identified, which result from modern material. However, faint linear trends and a ditch-type response (1) were recorded. These are typical of former field divisions and are thought to be agricultural in origin.

5.4 Further trends in Area D have no clear pattern or form and may represent natural variations in the sub-soil.

5.5 No responses of interest were recorded in Areas E and F. Modern ferrous responses and magnetic disturbance dominates the data.

Areas G & H

5.6 A linear response (2) in Area G is suggestive of a former boundary or drainage feature. A faint linear trend (3) is parallel with (2) and most likely represents the remains of a boundary ditch. Further parallel linear trends (4) in Area G may represent ploughing activity. These do not appear to correspond with the probable boundary features (2) and (3), and may represent a different phase of agricultural activity.

5.7 No responses or trends of potential interest were recorded in Area H.

Areas I & J

5.8 Areas I and J have several responses of interest which suggest former field divisions. A linear response (5) in Area I appears to continue into Area J and meets the responses (6) and (7). These are indicative of ditched boundary features. In Area I, a linear trend (8) is parallel with (5) and may represent an associated boundary ditch. These responses may represent a former field system, although this is speculative.

- 5.9 Further responses in Areas I and J may be of interest. A series of fragmented responses (9) forms a short linear pattern. A faint linear trend (10) is perpendicular with (9) and may be associated. These are suggestive of former field boundaries.
- 5.10 In the south-east of Area I there is a short linear response (11) and faint circular trend. Interpretation is tentative as the responses are at the limits of instrument detection. However, it is possible that plough damaged archaeological remains are located here.
- 5.11 In the south of Area J there is a large isolated response (12). Although it is likely that this represents further modern ferrous debris, the magnetic strength of the response is characteristic of a large pit feature. Interpretation is tentative but must be considered.
- 5.12 Responses resulting from modern activity are also present in Areas I and J. Along the north-east of Area J, magnetic disturbance (13) results from the remains of a boundary fence.
- 5.13 Along the southern edge of Area I, magnetic disturbance (14) results from a modern pipe and a spread of disturbance (15) may represent a ploughed out modern boundary or possible drainage ditch feature.

6 Conclusion

- 6.1 Much of the data is dominated by modern magnetic disturbance. Areas A, B and C suggest an overburden of modern material and no responses of interest can be discerned from the data. The magnetic disturbance here may mask any subtle responses.
- 6.2 Elsewhere, few responses of interest were recorded. Agricultural activity in the form of former field divisions and ploughing trends were recorded in Areas D and G.
- 6.3 The most interesting responses were recorded in Areas I and J. Linear responses and trends suggest possible former field boundaries and may represent a former field system, although this is speculative. The responses recorded are not indicative of habitation activity and it is most likely that agricultural practices are represented in the data.
- 6.4 Consultation with a licensed archaeologist and with the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs is recommended to establish if any additional archaeological works are required.

Technical Information Section

Instrumentation & Methodology

Detailed Gradiometer Survey

This is conducted to clearly define any responses detected during scanning, or can be applied as a stand-alone methodology. Detailed survey is often applied with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids 40m x 40m, and data is displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. A survey with a grid size of 10m x 10m and a traverse interval of 0.5m will provide a data set with high resolution.



Bartington GRAD 601-2

The Bartington Grad 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey very fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

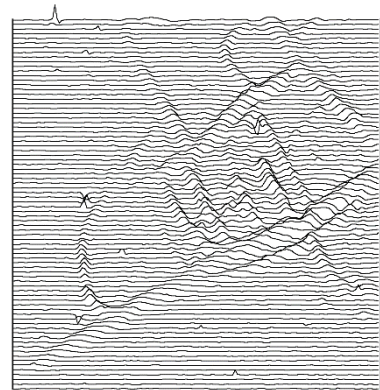
Frequent realignment of the instruments and zero drift correction; ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.



Gradiometer Data Display & Presentation

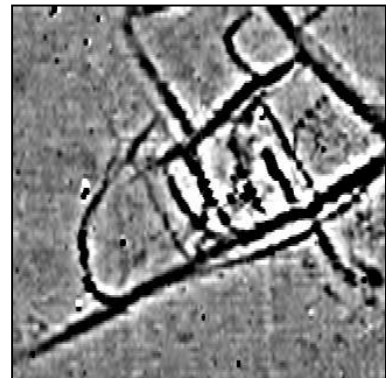
XY Trace

The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.



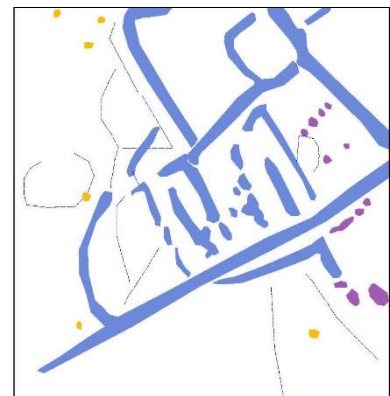
Greyscale*

As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.



Interpretation

An interpretation of the data is made using many of the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allows a detailed interpretation of the survey results with respect to archaeological potential.



**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation.*

Glossary of Interpretation Terms

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential, and are supported by further archaeological evidence such as aerial photography or excavation. The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, storage pits and associated features.

? Archaeology

This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

? Industrial

Such anomalies generally possess a strong magnetic response and may equate with archaeological features such as kilns, furnaces, concentrations of fired debris and associated industrial material.

Area of Increased Magnetic Response

These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

Trend

This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

Ploughing/Ridge & Furrow

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation activity.

? Natural

A broad response resulting from localised natural variations in the magnetic background of the subsoil; presenting as broad amorphous responses most likely resulting from geological features.

Ferrous Response

These anomalies exhibit a typically strong magnetic response, often referred to as 'iron spikes,' and are the result of modern metal debris located within the topsoil.

Area of Magnetic Disturbance

This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.

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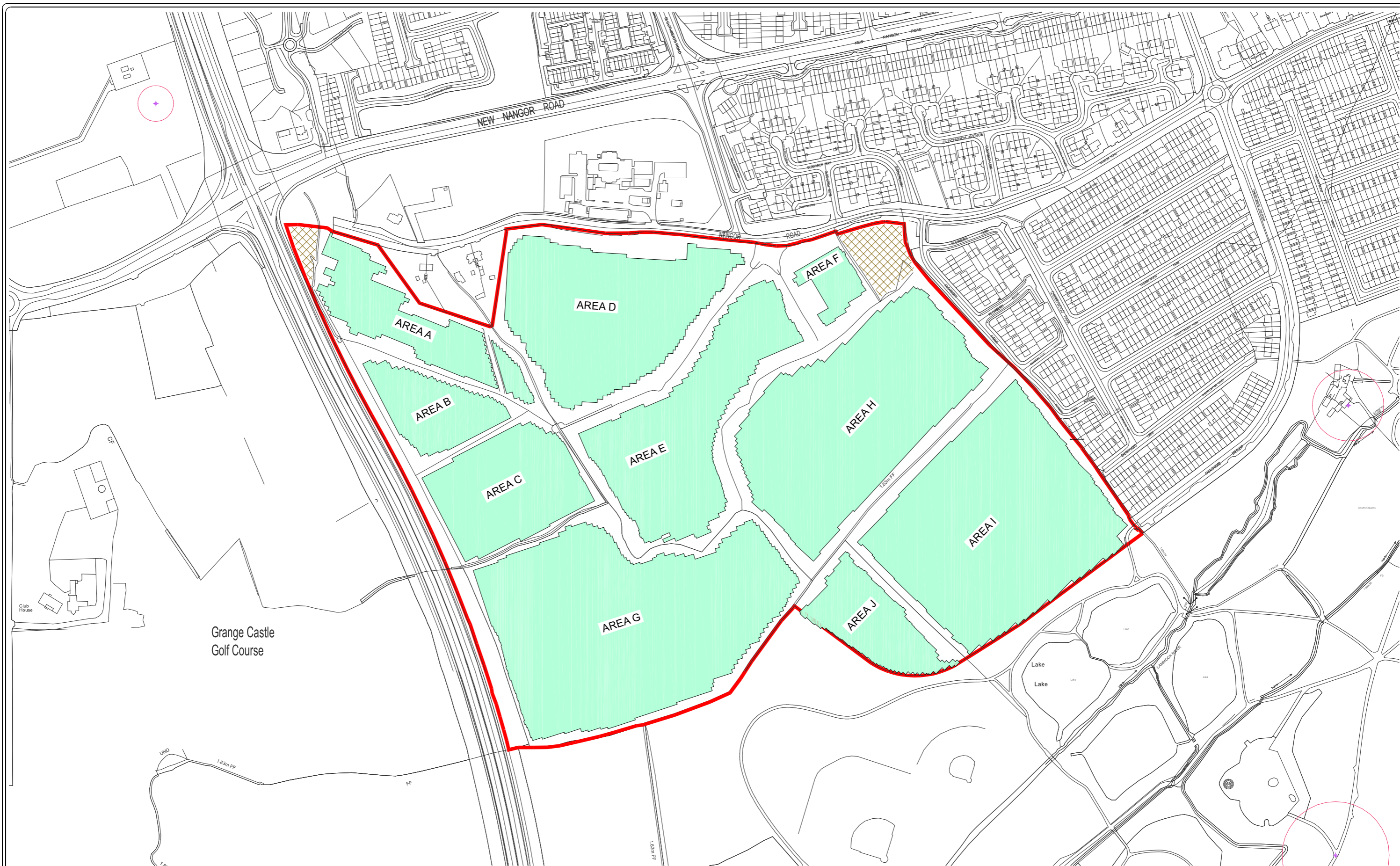
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List of Figures

Figure	Description	Paper Size	Scale
Figure 1	Site & Survey Location Diagram	A3	1:4,000
Figure 2	Summary greyscale image	A3	1:2,500
Figure 3	Summary interpretation diagram	A3	1:2,500



- Application area
- Detailed gradiometer Survey
- Unsuitable for survey
Poor ground conditions

0 metres 160



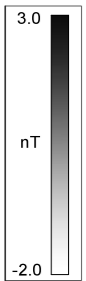
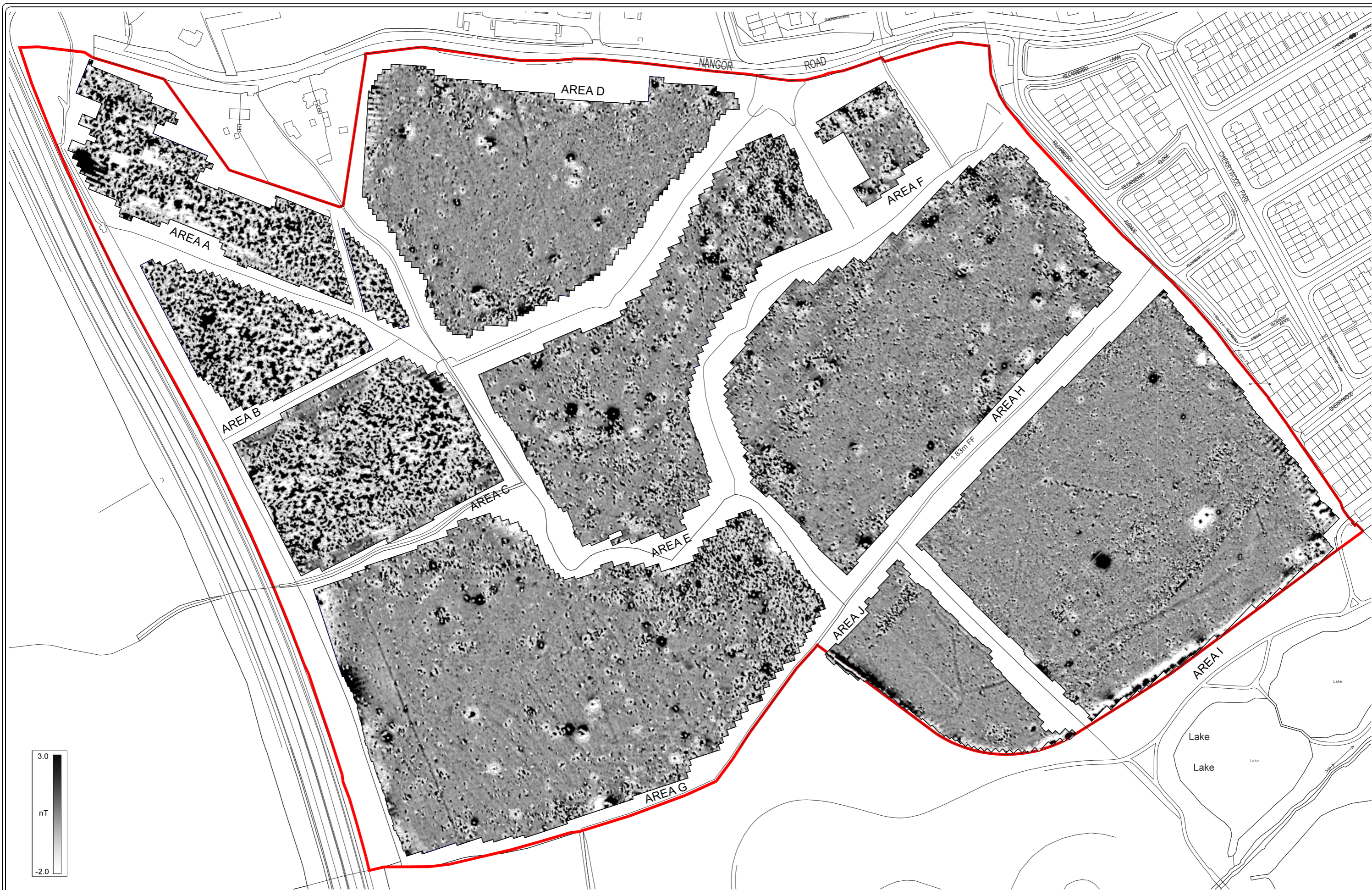
Client:
South Dublin County Council

Project:
Kilcarbery Grange Project

Title:
Site Location Diagram

J.M. Leigh
surveys
www.jmlsurveys.com

Scale @ A3: 1:4,000
Figure: 1
Licence No's.: 17R0016
Issue Date: 02.05.2017



0 metres 100



Client:

South Dublin County Council

Project:

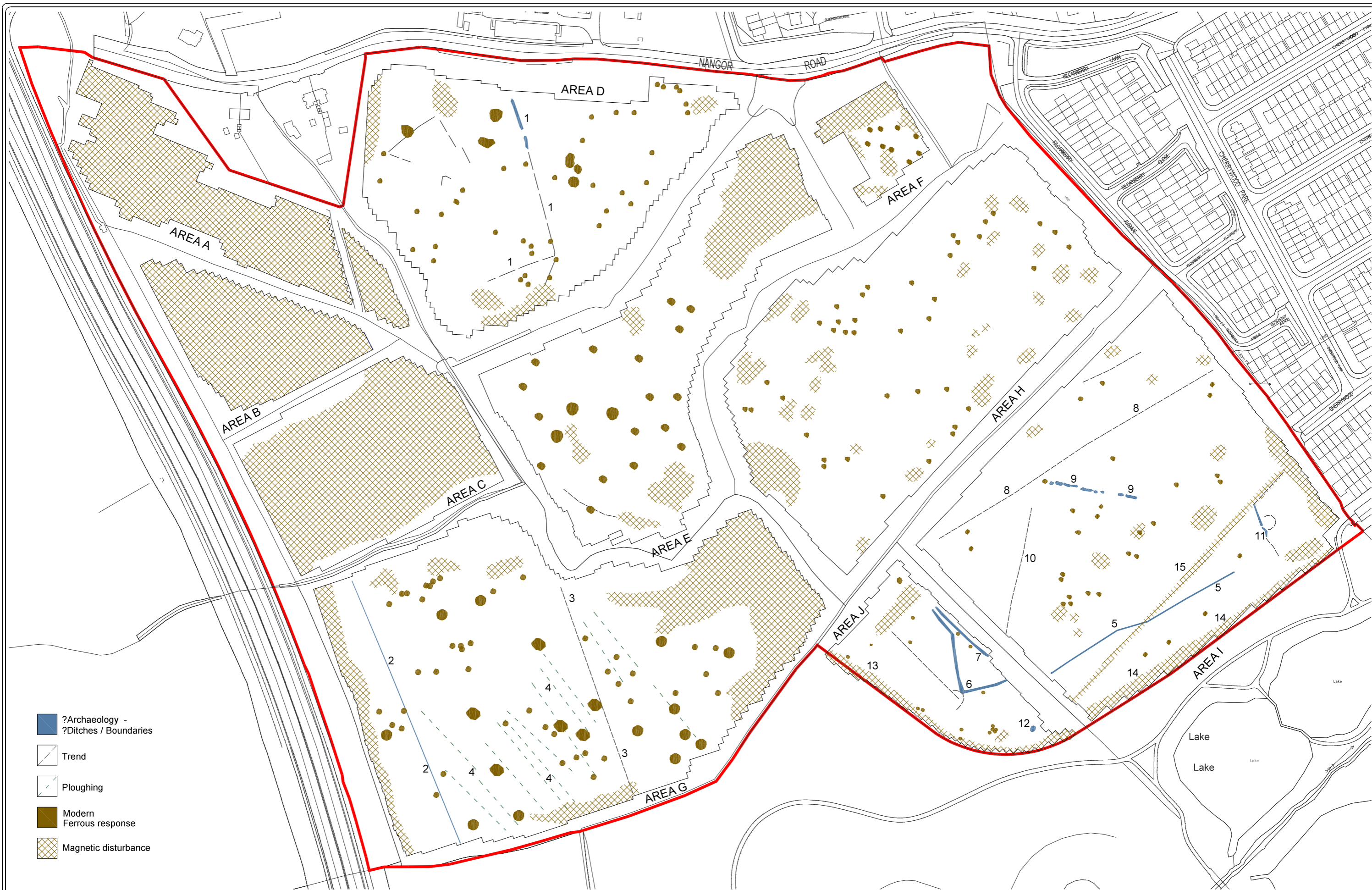
Kilcarbery Grange Project

Title:

Summary Greyscale Image

J.M.Leigh
surveys
www.jmlsurveys.com

Scale @ A3: 1:2,500
Figure: 2
Licence No's.: 17R0016
Issue Date: 02.05.2017



- ?Archaeology -
?Ditches / Boundaries
- Trend
- Ploughing
- Modern
Ferrous response
- Magnetic disturbance

0 metres 100



Client:

South Dublin County Council

Project:

Kilcarbery Grange Project

Title:

Summary Interpretation

J.M. Leigh
surveys
www.jmlsurveys.com

Scale @ A3: 1:2,500
Figure: 3
Licence No's.: 17R0016
Issue Date: 02.05.2017



Kilcarbery Grange

Ecology Baseline & Biodiversity
Management

Doherty Environmental


November 2017

Kilcarbery Grange

Ecology Baseline & Biodiversity Management

November 2017

Document Stage	Document Version	Prepared by
Final	1	Pat Doherty MSc, MCIEEM

<p>For and on behalf of</p> <p>Doherty Environmental</p> <p>Prepared By: Pat Doherty</p> <p>Signed: </p>

This report has been prepared by Doherty Environmental with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for South Dublin County Council and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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PROTECTION OF BIRDS	60
PROTECTION OF BATS	61
BA8: ENSURE THAT THE RETAINED HEDGEROWS & TREELINES AND GREEN CORRIDORS FB4, FB 5, FB6, FB 8, FB 9, FB 10, FB 11, FB14 AND GC1, GC2, GC6, GC10 AND SUDS PONDS AND EXISTING PONDS REMAIN UNLIT BY ARTIFICIAL LIGHTING.	62

1.0 INTRODUCTION

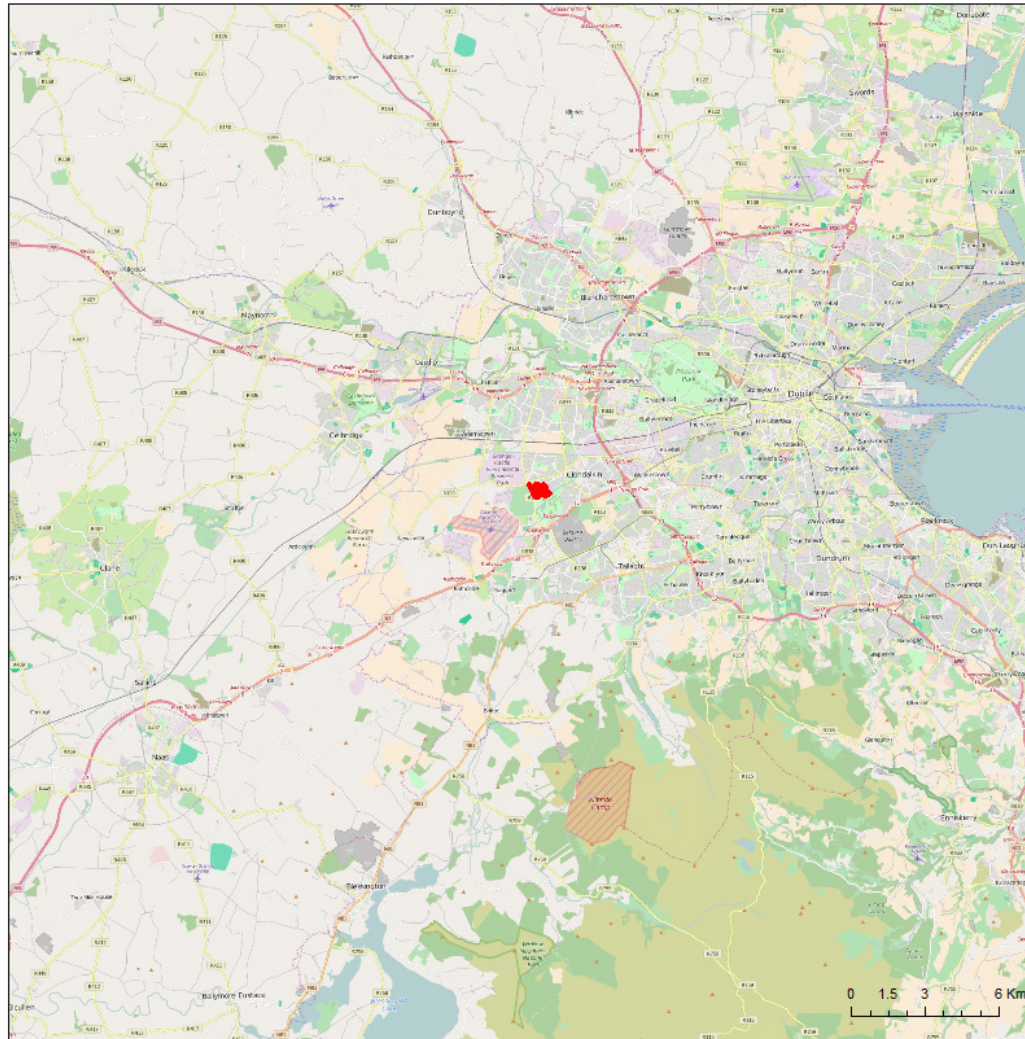
Doherty Environmental was commissioned by Minogue Associates to undertake a baseline ecology surveys of greenfield lands at Grange, Co. Dublin (see Figure 1.1 for Site Location). The purpose of the baseline ecology surveys are to inform the sensitive design of the Grange Masterplan Framework.

The aim of this survey was to identify the status of hedgerows as well as classify other habitats that occur within the study area. The lands subject to the current survey are outlined in Figure 1.1.

This report outlines the results of habitat, mammal and bird surveys undertaken at Kilcarbery Grange between late April and October 2017.

The remainder of this report is presented in the following sections:

- Methods:
 - Desktop Review
 - Habitat Surveys
 - Bat Surveys
 - Winter Bird Surveys
- Results:
 - Habitat Surveys
 - Bat Surveys
 - Winter Bird Surveys
- Evaluation of Natural Heritage Interests;
- Recommendations for sensitive design of housing developments.



Kilcarbery Grange Ecology & Biodiversity Management

Figure 1.1
Site Location

 Study Site



Drawn By	PD
Date	27/09/2017
Data Source	Bing

2.0 METHODS

2.1 DESKTOP REVIEW

A desktop review was completed for the Grange Masterplan site. This involved a review of published information on the site and surrounding area, a review of historical mapping and satellite imagery, published atlases and national databases. Information held by nature conservation organisations, including the National Parks & Wildlife Service, Bird Watch Ireland and Bat Conservation Ireland were also consulted during the desktop review.

A previous survey (Tubridy, 2008) of the study area was undertaken in 2008. The results of this survey were reviewed in advance of the field survey. A summary of the results of this survey is provided in this report.

In addition to a review of the Tubridy (2008) survey, a search of the National Biodiversity Data Centre (NBDC) for all records of flora and fauna for the tetrad in which the study site is located was also completed. The NBDC was accessed on the 27th September, 2017.

Ordnance Survey Ireland (OSI) historical maps were also reviewed to identify the presence of field enclosures and long-standing hedgerow boundaries within the study site.

2.2 PHASE 1 HABITAT SURVEY & FLORA SURVEYS

The habitat survey was based upon an extended Phase 1 Survey in line with the Heritage Council's *Best Practice Guidance for Habitat Survey and Mapping* (2010). The classification of habitats recorded during the field survey is based on the Heritage Council's *A Guide to Habitats in Ireland*.

The *Guide to Habitats in Ireland* classifies habitats according to a hierarchical framework with Level 1 habitats representing broad habitat groups, Level 2 representing habitat sub-groups and Level 3 representing individual habitat types. The Phase I Field Survey focused on identifying habitats to Level 3 of the *Guide to Habitats in Ireland*. The survey was completed on the 17th May, 16th August and 19th September 2017.

The annotation of vegetation occurring within sites was undertaken using the DAFOR scale. This scale refers to plant species in terms of dominance, abundance, frequency, occasional and rare (DAFOR). Plant nomenclature in this report follows Webb (1996) for vascular plants and Smith (2004) for mosses.

2.3 BAT SURVEYS

Prior to undertaking bat surveys, the status of habitats occurring within the study area were classified in terms of their potential to function as bat foraging habitat. The classifications follows the approach outlined by Bat Conservation Trust (2012) to assessing the value of potential development sites for bats, based on the occurrence of habitat features within the landscape, and the likelihood of bats being present. The classifications range from low to high.

Identification of Potential Bat Roosts

No structures occur within the survey site, but any mature trees occurring within the site were assessed for their potential to support roosting bats. This assessment followed established Bat Conservation Trust (BCT) guidance and sought to identify features of trees commonly used by bats for roosting and shelter. Such features include natural holes, cracks in major limbs, loose bark, hollows/cavities and dense ivy cover. Where such features were identified they were inspected for field signs indicating the presence of bats. These field signs include scratches and staining at entry points, the presence of bat droppings and the smoothing of surfaces around cavities.

Following the completion of this assessment each tree was graded according to the BCT tree roost grading system (see Table 8.4 of Hundt, 2012), which includes five categories as follows:

1. Known or confirmed tree roost;
2. Category 1* tree roost which supports multiple features capable of supporting large roosts;
3. Category 1 tree roost with definite bat potential but supports fewer features than Category 1*;
4. Category 2 tree roosts although the tree is of a size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited potential to support bats; and

5. Category 3 tree roosts which are trees with no potential to support bats.

Binoculars, high-powered torches and inspection cameras were used during the daytime assessment. Photographs were taken of all trees that were found to have potential to support bat roosts, along with a GPS record of their locations.

Manual Foraging Activity Survey

Manual foraging activity surveys were undertaken on the 27th June 2017 and again during 9th August 2017 and 15th October 2017. The manual surveys focused on walking transects along hedgerow and treeline field boundaries occurring within the Grange site. Transects were walked slowly and the location of all bat passes were recorded during each transect survey. Where bats were encountered the time, species of bat, direction of flight, number of passes and estimated number of bats were recorded.

The manual foraging survey was undertaken using a Petersson's D230 (heterodyne and frequency division). Other equipment used during the survey included a high-powered torch, an inspection camera and binoculars.

Automatic, Static Bat Detector Surveys

Seasonal automatic bat detector surveys were carried out on site between May and October 2017. The locations of automatic detector survey monitoring points are shown on Figure 2.1. All monitoring on site was completed using Wildlife Acoustic's Song Metre 4 Bat (SM4 Bat) detectors, set to record bat activity as zero-crossing files. The following monitoring was completed on site during the 2017 bat activity season:

Two static detectors monitoring between 17th May and 2nd June 2017 inclusive, amounting to 17 nights of continuous nightly bat activity monitoring;

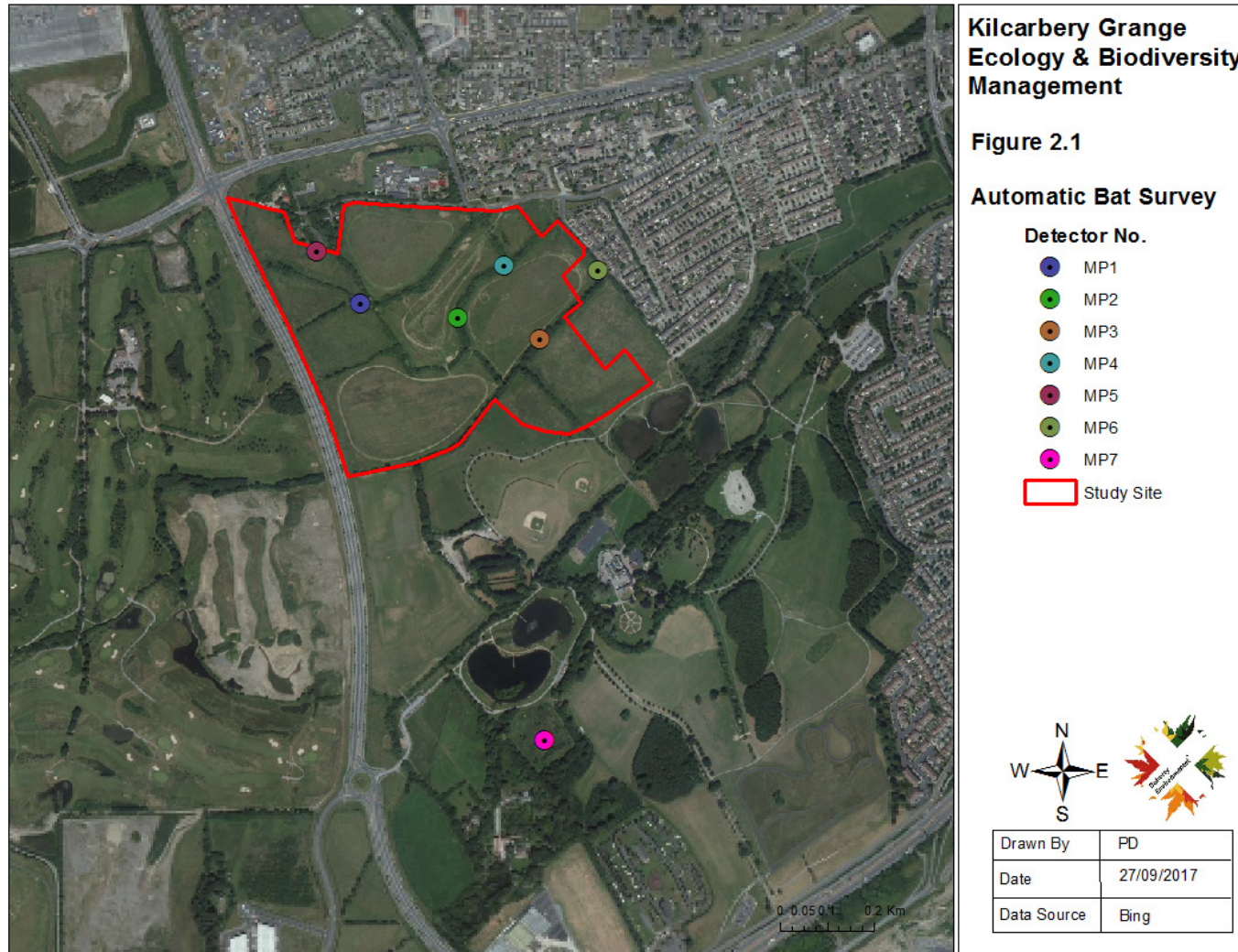
Two static detectors monitoring between 16th August and 24th August 2017 inclusive, amounting to 9 nights of continuous nightly bat activity monitoring; and

Two static detectors monitoring between 18th September and 2nd October 2017 inclusive, amounting to 15 nights of continuous nightly bat activity monitoring.

During the 2017 activity season monitoring was undertaken over 40 nights, amounting to a total of 358 bat detector monitoring hours.

2.3.1.1 Analysis of Automatic Monitoring Results

Bat calls recorded by the SM4 Bat were analysed using Kaleidoscope (V3.4.1B). The zero-crossing files recorded in the field were analysed using Kaleidoscope (V3.4.1B) bat call classifiers for British Bats. These classifiers were used to identify the species responsible for generating recorded bat call. These classifiers assign calls to species based on call characteristics, with the peak frequency of the calls being particularly important in distinguishing between species with similar call characteristics (i.e. Pipistrelle species). In order to confirm the accuracy of the Kaleidoscope classifications random calls were manually analysed using Analookw software. During the cross checking of the Kaleidoscope classifiers against manual analysis using Analookw software it was noted that some Leisler's bat calls were incorrectly classified as Serotine or Noctule bats. As these species are not confirmed as occurring in Ireland, all calls classified as Serotine or Noctule have instead been classified as Leisler's bat passes.



2.4 NON-VOLANT MAMMAL SURVEY

A survey of field boundaries and the river bankside for field signs indicating the presence of mammals was undertaken during the field surveys. Any mammal field signs typical of non-volant mammal activity were recorded during the surveys. These field signs, as described in Neal & Cheeseman ⁽¹⁾ and Bang & Dahlstrom ⁽²⁾, include:

- mammal breeding and resting places, such as setts, holts, lairs;
- pathways;
- prints;
- faecal deposits;
- latrines (and dung pits used as territorial markers);
- feeding signs (snuffle holes);
- hair; and
- scratch marks.

2.5 BIRD SURVEYS

The British Trust for Ornithology (BTO) Breeding Bird Survey (BBS) method (see Risely, 2011) was used during breeding season surveys within the proposed site. A pre-determined transects around the perimeter of the island was followed. The transect was completed

(1) Neal, E., & Cheeseman, C., (1996). 'Badgers'. Poyser Natural History, London.

(2) Bang, P., & Dahlstrom, P., 'Animal Tracks and Signs'. Oxford University Press, Oxford.

alongside woodland and marginal habitats. Breeding season surveys were completed on the 5th May 2016 and 21st June and 1st July 2016. The species of birds and their territories were noted during the transect survey.

Breeding bird surveys were completed along two transects during the breeding season. The dates of the surveys are provide in Table 3.1 below.

2.6 FRESHWATER

Biological Water Quality Assessment

A freshwater macroinvertebrate survey was undertaken at two points, SW1 and SW2, along the River Camac (see Figure 4.3 below for sample locations). The macroinvertebrate survey was undertaken to establish baseline biological water quality along the stretch of the River Camac to the south of the study area. The biological water quality survey was based on the Biotic Index or Q-value system as outlined by the EPA (McGarrigle, 2002). A three-minute kick sample was undertaken along a 10m section of the River Camac at SW1 and SW2. The kick sample was undertaken using a kick-net (mesh size: 1mm). The sample was transferred from the kick net to a 500µm sieve. The sample was cleaned and sieved on site to remove mud while stones and other organic detritus (such as leaves, wood fragments etc.) were also removed by hand. Animals clinging to stones and leaves were washed into the sieve prior to removal. The cleaned and sorted sample was transferred from the sieve to a white sorting tray. Each sample was sorted for 30 minutes. All sorting of the macroinvertebrate community was completed on site and all macroinvertebrates were released back to the watercourse following sampling.

Macroinvertebrates were identified to the level required by the EPA Q-rating system using both low and high powered microscopes where necessary. Based on the relative abundance of indicator taxa a biotic index (Q-value) was determined for the watercourse. As different taxa show different levels of tolerance and sensitivity to pollution, the presence or absence of specific organisms in the water indicates the level of water quality in a watercourse. The Q-value system is base on a five-point biotic index as outlined in *Table 2.1*. The intermediate values i.e. Q1 -2, Q3 – 4 etc. denote transitional conditions. The Q-values listed in *Table 2.1* are assigned according to the abundance of different invertebrate groups. The abundance of each indicator group will determine the Q-value assigned. The abundance categories that apply when assigning Q-values are also outlined in *Table 2.2*.

Table 2.1: Q-Value system with Five Point Biotic Index and Intermediate Values (Source: EPA, 2006).

Biotic Index	Water Quality	Pollution Status
Q5	Good	Unpolluted
Q4 – 5	Fair – Good	
Q4	Fair	
Q3 – 4	Doubtful – Fair	Slight to moderate pollution
Q3	Doubtful	
Q2 – 3	Poor	
Q2	Poor	Serious pollution
Q1 – 2	Bad – Poor	
Q1	Bad	

Table 2.2: Abundance Values and Frequency of Occurrence for assigning Q-Values (Source: EPA, 2006)

Abundance Category	Approximate Percentage frequency of Occurrence
Present	1 or 2 individuals
Scarce/Few	<1%
Small numbers	<5%
Fair numbers	5 – 9%
Common	10 – 24%
Numerous	25 – 54%
Dominant	50 – 75%
Excessive	>75%

Fish Surveys

While no dedicated fishery surveys was completed during the current baseline ecology assessment, electrofishing surveys were previously undertaken by Inland Fisheries Ireland (IFI) along the Camac River in 2011. Surveying was undertaken from two sampling points, one downstream (Moneenalion and one upstream (Riverside Estate) of the study area location (see Figure 4.3 for location).

2.7 EVALUATION

The nature conservation value of ecological receptors occurring within the Grange site are based upon an established geographic hierarchy of importance as outlined in Chapter 3 of the “Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2009). The evaluation scheme (and associated codes to be used during the evaluation of the ecological receptors occurring at the Grange Site) is as follows:

- Rating A – International Importance: examples of ecological receptors of international importance include European Sites, examples of Annex 1 habitats, resident or regularly occurring populations of birds species listed on Annex 1 of the EU Birds Directive and/or species listed in Annex II and/or Annex IV of the EU Habitats Directive;
- Rating B – National Importance: examples of ecological receptors of national importance include Natural Heritage Areas (NHAs); species listed under the Wildlife Acts and/or species listed on relevant Red Data lists;
- Rating C – County Importance: examples of ecological receptors of county importance include sites, habitats and species populations of importance in a county context or of significant high value in a local context;
- Rating D – Local Importance (Higher Value): sites, habitats and species populations of importance in a parish and district context; and
- Rating E – Local Importance (Lower Value): sites containing small areas of semi-natural habitats that are of some local importance for wildlife.

In addition to the above the UK Department of Environment, Food and Rural Affairs 2007 Hedgerow Survey Handbook was used to categorise high value species-rich hedgerows occurring within the study area. Following this guidance species-rich field boundaries were defined as those supporting five or more woody species that are native in Ireland or archaeophytes. *Rubus fruticosus* agg. (Brambles) where it occurred along field boundaries was not counted as a woody species during the field boundary assessment. Field boundaries with fewer than five woody species but supporting a diverse range of herbaceous vegetation were also identified as high value species-rich hedgerows.

3.0 SITE DESCRIPTION

The study site is located within five townlands: Corkagh Demesne, Priest Town, Kilcarberry Nangor and Deansrath. Some of the townland boundaries are delineated by existing hedgerows within the study site. The majority of the site was formally used as agricultural pasture but in recent years management of fields within the site has relaxed. Now informal grazing of the grassland within the site is undertaken by horses and ponies. Fields towards the south of the study area are used as informal horse and trap racing courses.

The study site is located within the River Camac catchment area. This watercourse flows southwest to northeast to the south of the study area.

The soils consists of surface water gleys to the south, nearer the Camac River and basic brown earths towards the north. The subsoils consist of limestone till, while the bedrock consists of Dinantian Upper Impure Limestones.

4.0 RESULTS

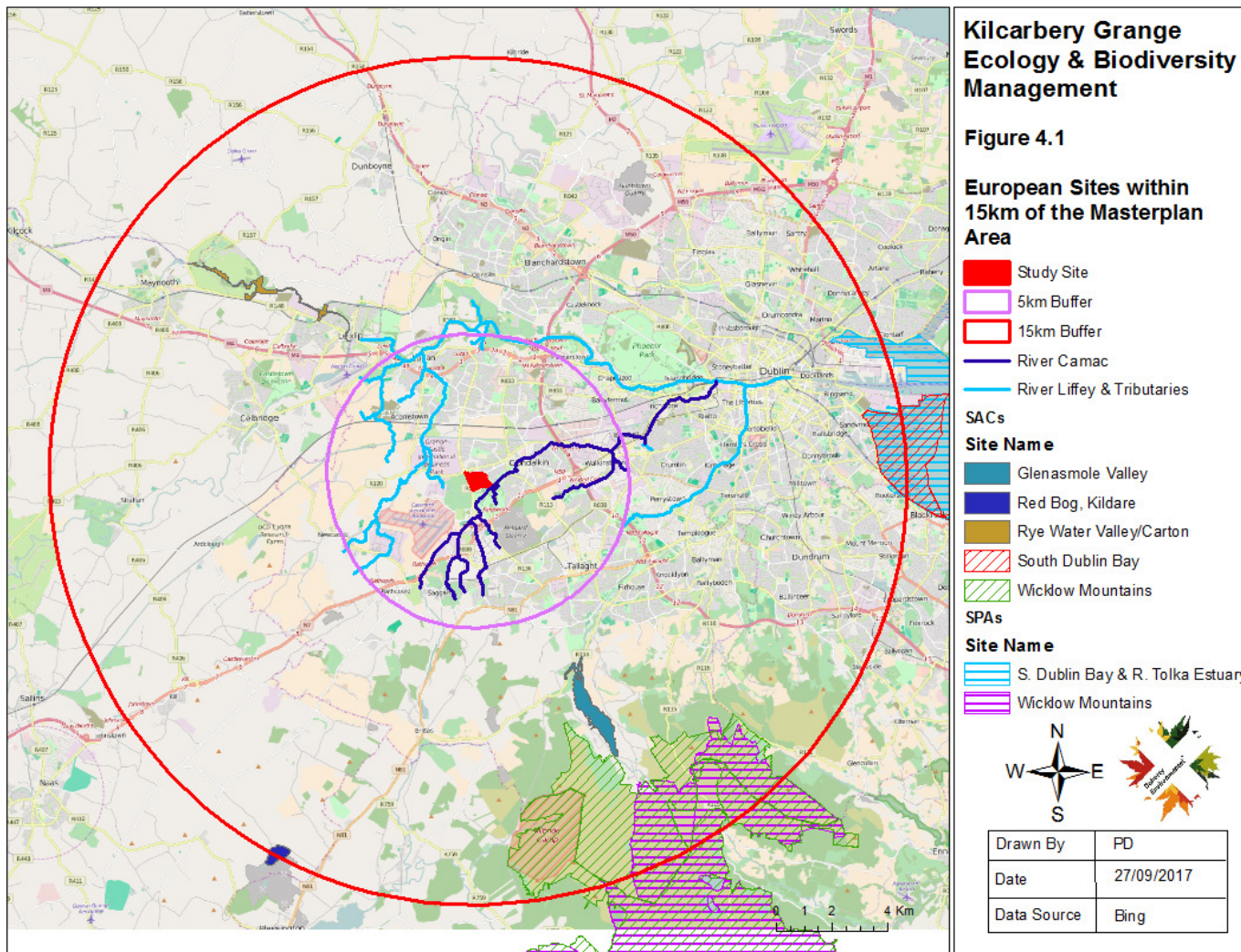
4.1 DESKTOP ANALYSIS

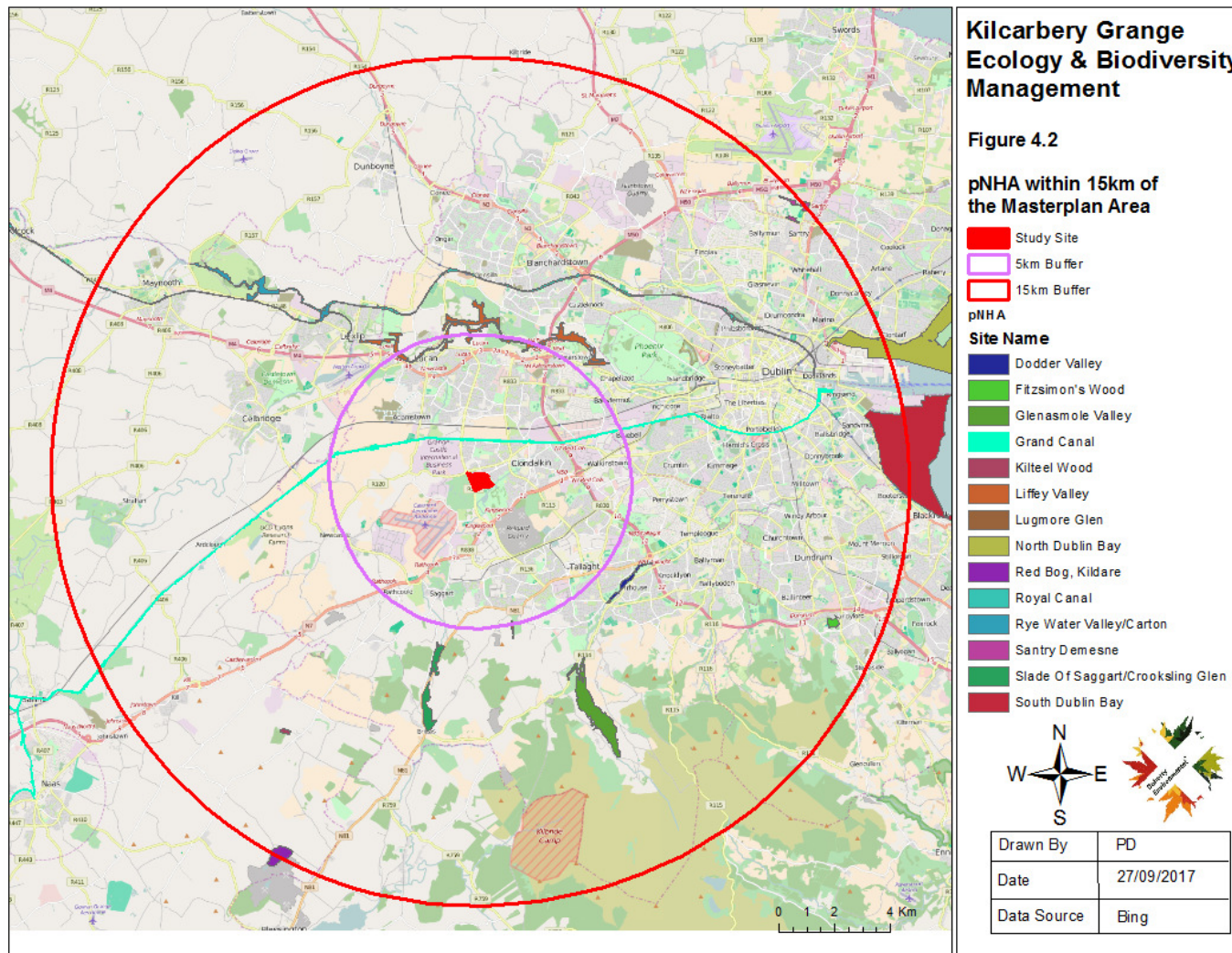
Designated Conservation Areas

The lands occurring within and immediately adjacent to the study site are not subject to any European Site designations (see Figure 4.1). The nearest European Sites to the study area is over 5km away. There are five SACs and two SPAs occurring in the wider vicinity.

With the exception of the European Sites at Dublin Bay, namely South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA, none of these European Sites are hydrologically connected to the study site. The River Camac, in whose catchment the study site is located, drains to the River Liffey, which in turn drains into Dublin Bay. As such there is a hydrological connection between the study area and these two European Sites.

No Natural Heritage Areas (NHAs) and 14 proposed NHAs (pNHAs) are located in the wider area surrounding area. The location of these pNHAs are shown on Figure 4.2. The nearest pNHA to the study site is the Grand Canal pNHA, located approximately 1.2klm to the north of the study area.





Rare, Protected & Threatened Species Records

Species records held by the NBDC for the tetrad O03K are presented in Tables 4.1 along with a commentary on the survey site's potential to support these species. Only bird species included on the Amber and Red Lists of the Birds of Conservation Concern in Ireland (2014) and/or wetland bird species are listed in Table 4.1.

No records of protected plant species (listed on the Flora Protection Order 2015) are held for both tetrads.

Table 4.1: Protected & Threatened Species Records for the Tetrad O03K

Common name	Scientific name	Record count	Date of last record	Designation	Likelihood of being supported by the survey site
Grey Heron	Ardea cinerea	1	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Green List	Drainage ditches within the study site provide sub-optimal habitat for this species.
Tufted Duck	Aythya fuligula	1	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	No. No suitable waterbodies occur within the study site to support this species.
Moorhen	Galinula chloropus	1		Protected Species: Wildlife Acts Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Green List	No. No suitable waterbodies occur within the study site to support this species.

Coot	Fulica atra	1	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Green List	No. No suitable waterbodies occur within the study site to support this species.
Mallard	Anas platyrhynchos	1	21/05/2016	Protected Species: Wildlife Acts Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species	No. No suitable waterbodies occur within the study site to support this species..
Little Grebe	Tachybaptus ruficollis	1	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Green List	No. No suitable waterbodies occur within the study site to support this species.
Common Swift	Apus apus	1	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Yes. The site provides suitable foraging habitat for this species.
Mute Swan	Cygnus olor	1	19/11/2015	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	No. No suitable waterbodies occur within the study site to support this species.

Barn Swallow	Hirundo rustica	1	21/05/2016	Protected Species: Wildlife Acts II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Yes. The site provides suitable foraging habitat for this species.
Black-headed Gull	Larus ridibundus	1	31/12/2011	Protected Species: Wildlife Acts II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	No. No suitable waterbodies occur within the study site to support this species.
House Sparrow	Passer domesticus	1	31/12/2011	Protected Species: Wildlife Acts II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Yes. The site offers suitable foraging and nesting habitat for this species.
Eurasian Tree Sparrow	Passer montanus	1	31/12/2011	Protected Species: Wildlife Acts II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Yes. The site offers suitable foraging and nesting habitat for this species.
Great Cormorant	Phalacrocorax carbo	1	19/11/2015	Protected Species: Wildlife Acts II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	No. No suitable waterbodies occur within the study site to support this species.
Common Starling	Sturnus vulgaris	2	31/12/2011	Protected Species: Wildlife Acts II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List	Yes. The site offers suitable foraging and nesting habitat for this species.

Northern Lapwing	Vanellus vanellus	1	31/12/2011	Protected Species: Wildlife Acts II Protected Species: EU Birds Directive >> Annex II, Section II Bird Species II Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List	Due to relaxed grassland management within the study area and high swards the grassland habitat is not likely to be used as a foraging resource by lapwing.
Sycamore	Acer pseudoplatanus	1	27/10/2006	Invasive Species: Invasive Species >> Medium Impact Invasive Species	Yes, this species was noted in broadleaved woodland habitat.
Japanese Knotweed	Fallopia japonica	1	29/06/2015	Invasive Species: Invasive Species >> High Impact Invasive Species	This species was not recorded during field surveys
West European Hedgehog	Erinaceus europaeus	9	02/06/2010	Protected Species: Wildlife Acts	Yes. The site offers suitable habitat for this species.
Leisler's bat	Nyctalus leisleri	1	09/08/2013	Protected Species: EU Habitats Directive >> Annex IV II Protected Species: Wildlife Acts	Yes. The study area supports suitable foraging habitat for this species. Some mature trees may provide roosting opportunities for this species.
Pipistrelle	Pipistrellus pipistrellus sensu lato	1	09/08/2013	Protected Species: EU Habitats Directive >> Annex IV II Protected Species: Wildlife Acts	Yes. The study area supports suitable foraging habitat for this species. Some mature trees may provide roosting opportunities for this species.
Soprano Pipistrelle	Pipistrellus pygmaeus	1	21/09/2010	Protected Species: EU Habitats Directive >> Annex IV II Protected Species: Wildlife Acts	Yes. The study area supports suitable foraging habitat for this species. Some mature trees may provide roosting opportunities for this species.

4.2 RESULTS FOR THE STUDY SITE

Summary of 2008 Survey

The 2008 survey described the grassland fields dominating the footprint of the area as derelict fields enclosed by hedgerows. The grassland habitat within the footprint of the Masterplan study area was classified as dry meadows and grassy verges. The most important biodiversity

resources within or adjacent to the study area were identified as the Camac River and old (pre 1st edition OS map) hedgerows bounded by drainage ditches. The Camac River supports a wild brown trout fishery and the hedgerows are associated with a rich diversity of plants and birds. While none of the habitats or species found at the site is rare or protected by legislation, national and council policies encourage their sustainable management.

Current Habitat Description for the Study Area

The following Sub-Sections describe the habitats occurring within and immediately adjacent to the survey site. Each habitat described below has been identified to Level 3 of Fossit's *Guide to Habitats in Ireland*. The alpha-numeric code for each habitat is also provided alongside the habitat name (e.g. wet grassland GS4). The locations and extent of each habitat described below are illustrated on Figure 4.3. Appendix 1 provides plates detailing a photographic record of the survey site and surrounding area.

The nature conservation value of each of the habitats occurring within the project site is also outlined in the following sub-sections. The nature conservation value of habitats has been determined with reference to the methods outlined in Section 2.7 above.

4.2.1.1 Lowland Depositing River FW2

The Camac River is located approximately 115m to the south of the study area. The dominant instream habitat along the section of the river adjacent to the study area is glide and the river substrate is dominated by a mixture cobble, gravel and sand.

4.2.1.1.1 Biological Water Quality

According to the EPA Envision Map Viewer, the water quality of the River Camac in South Dublin is classified as Q3, indicating "Poor" status and moderate pollution. The Camac has been classified as being of Bad Status with a conservation objective to restore it to Good Status by 2027. It is currently classified as At Risk of not achieving this objective. The main risk factors identified in the Water Framework Directive report include Combined Sewer Overflows (CSOs) and Discharge Licenses.

The results of the freshwater macroinvertebrate survey at SW1 are outlined in Table 4.2 below. SW1 is located immediately downstream of a pedestrian bridge to the south of the study area.

The channel width at this location is approximately 2m. Water depth during the survey was 0.25m. Flow conditions were characterised by a riffle. The substrate is dominated by cobbles, stones, gravel and sand. Instream vegetation was dominated by *Apium nodiflorum* and *Lemna* species were also noted.. Sheltering riparian vegetation occurs along the river corridor in the vicinity of SW1.

Table 4.2: SW1 Macroinvertebrates

Indicator Group	Pollution Sensitivity/tolerance	Taxon	No. Recorded
A	Pollution Sensitive	None Recorded	
B	Less Pollution Sensitive	Cased Trichoptera	19
		Baetidae	4
C	Pollution Tolerant	Gammurus Sp.	23
		Baetis rhodani	3
		Caenidae	8
		Coleoptera	10
		Hydropsychidae	2
		Simulidae	2
		Hydrobiidae	2
		Hydracarina	2
		Ancylus fluviatilis	2
		Chironmid sp.	2
		Assellus sp.	13
D	Very Pollution tolerant	Glossiphoniidae	2
E	Most Pollution Tolerant	None Recorded	
Taxa not assigned to indicator group		Lumbricidae	2

The assemblage of macroinvertebrates at SW1 was mainly composed of Group C taxa, which were recorded in dominant numbers. Group B taxa were recorded in numerous numbers while group D taxa were recorded in common numbers. No Group A or Group E species present. The macroinvertebrate community at this sampling location is indicative of a biological water quality rating of **Q3**, indicating **moderate pollution**.

The results of the freshwater macroinvertebrate survey at WS2 are outlined in Table 4.3 below. SW2 is located immediately downstream of a pedestrian bridge to the southeast of the study area. The channel width at this location is approximately 2m. Water depth during the survey was 0.25m. Flow conditions were characterised by a riffle. The substrate was dominated by cobbles, stones, gravel and sand. Instream vegetation was dominated by *Apium nodiflorum* and *Fontanalis antipyretica*.. Sheltering riparian vegetation in the form of treelines occur along the river corridor in the vicinity of SW2 resulting in high levels of shading.

Table 4.3: SW2 Macroinvertebrates

Indicator Group	Pollution Sensitivity/tolerance	Taxon	No. Recorded
A	Pollution Sensitive	Heptageniidae	1
B	Less Pollution Sensitive	Cased Trichoptera	11
		Baetidae	2
C	Pollution Tolerant	Gammurus Sp.	208
		Baetis rhodani	3
		Caenidae	4
		Coleoptera	5
		Simulidae	2
		Hydracarina	2
D	Very Pollution tolerant	Chironmid sp.	3
		Hirundinae	7
E	Most Pollution Tolerant	Asellus sp.	19
		None Recorded	

The assemblage of macroinvertebrates at SW2 was mainly composed of Group C taxa, which were recorded in excessive numbers. Group D taxa were recorded in common numbers, while Group B taxa were recorded in fair numbers. Group A taxa were present in scarce number and no Group E taxa were recorded. Macrophyte growth was not luxuriant or excessive at SW2 (see Plates 3 & 4) and no Cladophora was noted. The macroinvertebrate community at this sampling location is indicative of a biological water quality rating of **Q3**, indicating **moderate pollution**.

4.2.1.1.2 Fisheries

No dedicated fishery survey was completed during the current baseline ecology assessment. However electrofishing surveys have recently been completed along the River Camac (IFI, 2011). Surveying was undertaken from two sampling points, one downstream (Moneenalion) and one upstream (Riverside Estate) of the study area location (see Figure 4.3 for location). Brown trout and three-spined stickleback were recorded from both sampling points. Eel and minnow were also recorded from the Riverside sampling point. Minnow was the most abundant species recorded at Riverside, while three-spined stickle-back was the most abundant recorded from Monennalion.

4.2.1.1.3 Nature Conservation Value

The stretch of the River Camac to the south of the study area supports a population of brown trout, indicating its potential to support Atlantic Salmon (should an improvement in water quality along the river be achieved). The river is also known to support foraging otters. Due to its role in supporting a population of brown trout, as well as providing habitat for a range of species including a variety of birds, mammals (including otters and several bats species) this watercourse in the vicinity of the site is representative of a habitat of high local importance (Rating D).

4.2.1.2 Improved agricultural grassland (GA1) & Amenity Grassland (GA2)

Improved agricultural grassland and amenity grassland occur to the south of the study area. These are managed grasslands supporting a range of commonly occurring and nutrient loving species. Grasses associated with this habitat included *Lolium perenne*, *Agrostis stolonifera*, *Festuca rubra*, *Poa species*, *Alopecurus pratensis* and *Phleum pratense*. Herbs include *Trifolium pratense*, *Trifolium repens*, *Ranunculus repens*, *Bellis perennis*, *Taraxacum officinale* agg, *Cerastium fontanum* and *Urtica dioica*.

4.2.1.2.1 Nature Conservation Value

The grassland habitat occurring within the site is representative of semi-improved grassland. It supports a range of commonly occurring species with some areas of the site dominated by species indicative of previous enrichment. The nature conservation value of this habitat is of local importance (lower value) (Rating E).

4.2.1.3 Ponds FL8

A number of small ponds occur in minor depressions within the study site where drainage ditches merge. These ponds do not dry out during the summer months. Commonly occurring macrophytes dominate the vegetation at and surrounding these ponds. Species include *Typha latifolia*, *Phragmites australis*, *Iris pseudacorus*, *Apium nodiflorum* and *Lemna* species.

4.2.1.3.1 Nature Conservation Value

The ponds at drainage ditch junctions currently represent the only permanent aquatic habitat within the project site. They provide suitable breeding habitat for amphibians and aquatic invertebrates but are very limited in size. This habitat is representative of local conservation importance (Rating E).

4.2.1.4 Drainage ditch FW4

Drainage ditches occur through the study site in association with hedgerows. All of these drainage ditches are ephemeral, with dry conditions noted in all of them during field surveys in the summer of 2017. The majority of the drainage ditches are heavily shaded and inaccessible, being bounded on both sides by dense *Prunus spinosa* scrub. Damp conditions persisted in the drainage ditch bounding the east of the site during the 2017 summer season and some emergent vegetation such as *Typha latifolia*, *Phragmites australis* and *Iris pseudacorus* occurs along this drainage ditch. *Chamerion angustifolium* is also abundant along this drainage ditch.

4.2.1.4.1 Nature Conservation Value

The drainage ditches on site are ephemeral and heavily shaded in scrub habitat. This habitat is representative of local conservation importance (Rating E).

4.2.1.5 Dry Meadow Grassland GS2

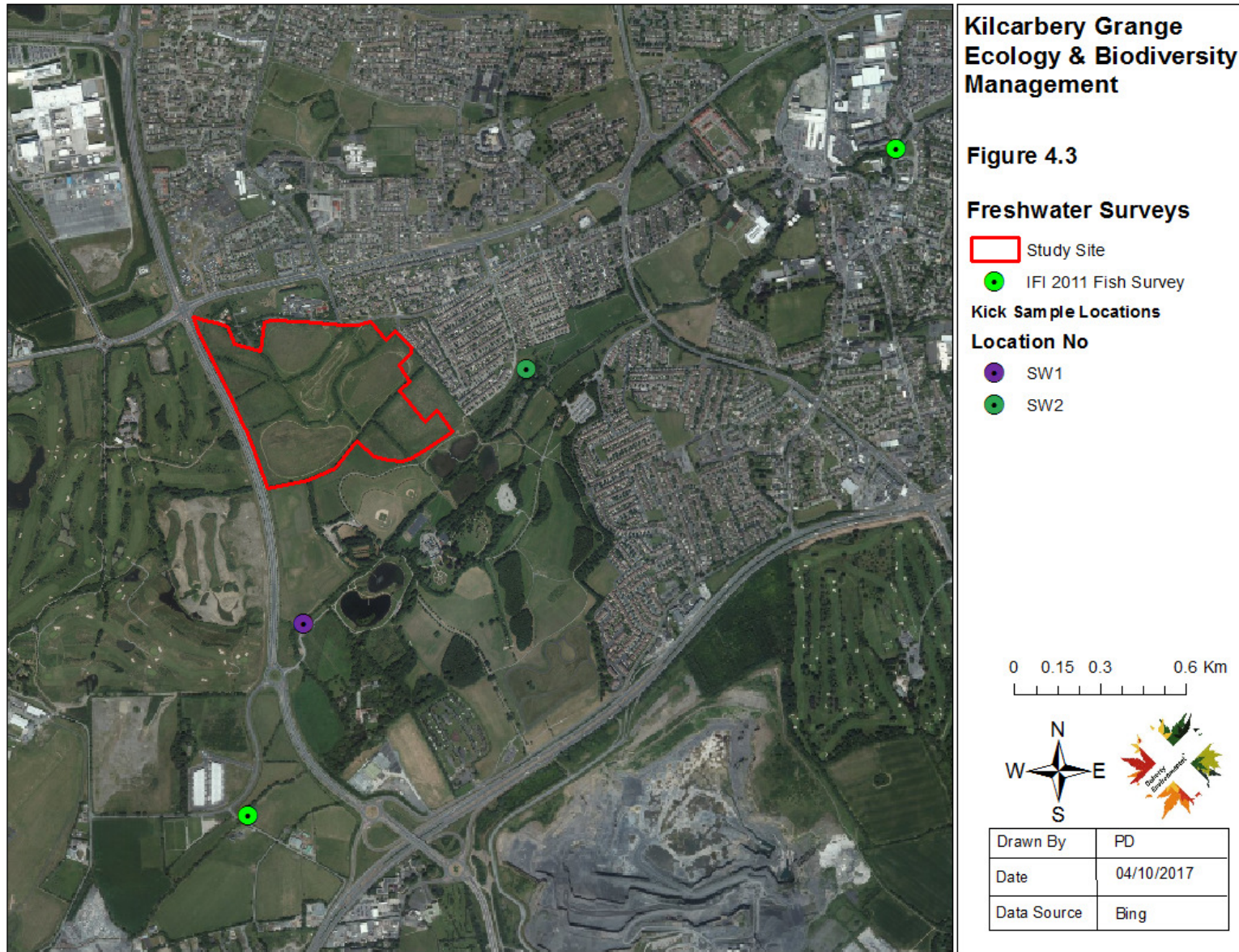
The majority of the land cover in the study is now representative of semi-improved dry meadow grassland. This grassland has been subject to a relax management regime over recent years, with little evidence of regular nutrient application or high levels of grazing. The only grazing apparent on site during field surveys undertaken between May and October 2017 was associated

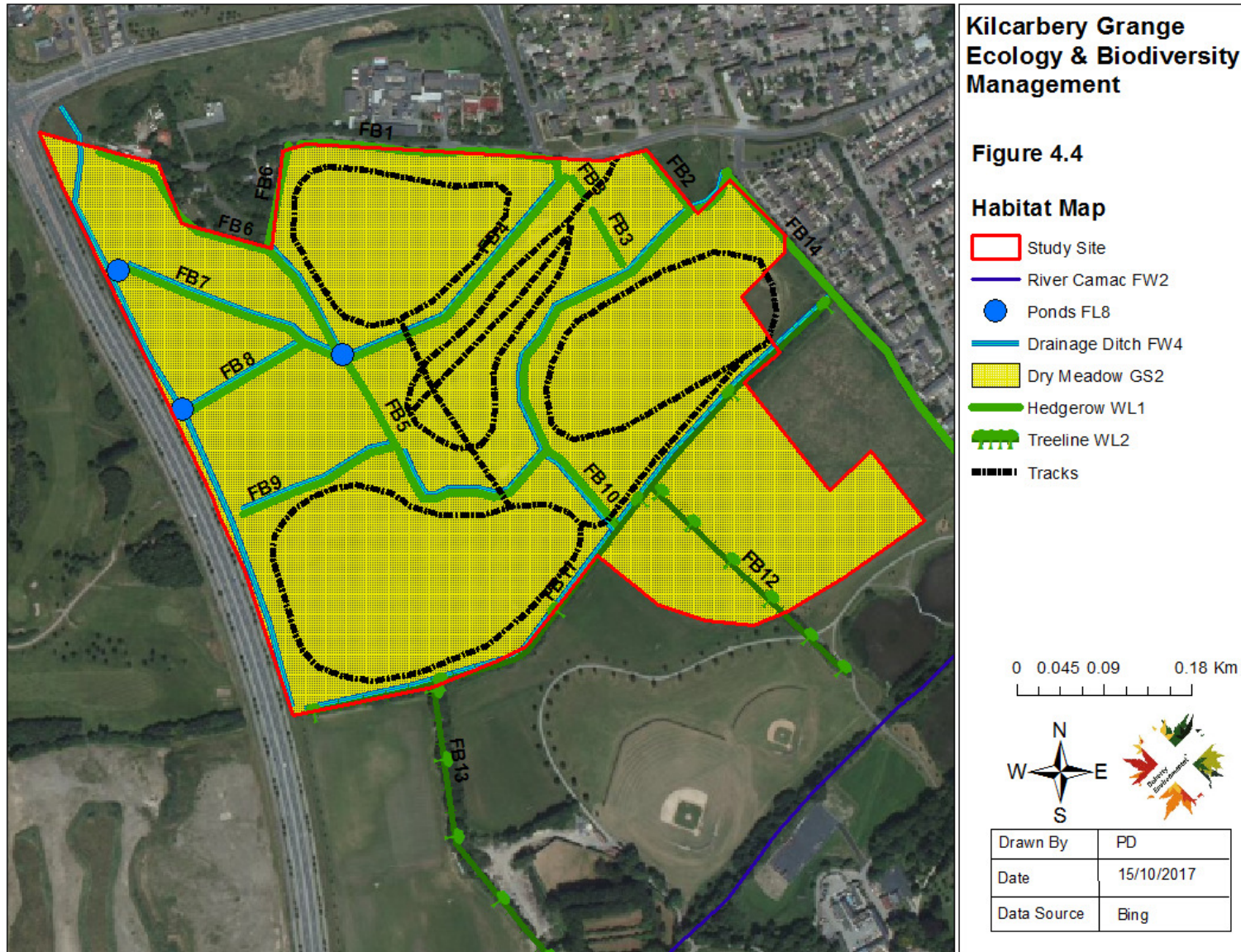
with a small number of horses grazing in fields throughout the study site. The dominant grass species occurring in this habitat include *Arrhenatherum elatius*, *Festuca rubra* and *Lolium perenne*. Other grass species occurring occasionally to frequently include *Dactylis glomerata*, *Holcus lanatus*, *Anthoxanthum odoratum*, *Poa species*, *Agrostis stolonifera*, *Elytrigia repens* and *Alopecurus pratensis*. Herbs include *Trifolium repens*, *Trifolium pratense*, *Ranunculus repens*, *Ranunculus acris*, *Sonchus arvensis*, *Centaurea nigra*, *Rumex acetosa*, *Cerastium fontanum*, *Stellaria media*, *Bellis perennis*, *Stachys sylvatica*, *Chamerion angustifolium*, *Heracleum sphondylium*, *Filipendula ulmaria*, *Plantago lanceolata*, *Plantago major*, *Urtica dioica*, *Dactylorhiza fuchsia*, *Cirsium arvense* and *Cirsium vulgare*.

A medium to high sward has developed in the dry meadow grassland.

4.2.1.5.1 Nature Conservation Value

The dry meadow grassland and its current relaxed management regime provide foraging and cover for a range of small mammal and bird species. The absence of other examples of semi-improved grassland in the surrounding area also increases the value of this habitat in the local context. This habitat is representative of local conservation importance (Rating D).





4.2.1.6 Hedgerows WL1/Treelines WL2

All fields within the study area are enclosed by hedgerows and treelines. A total of 11 hedgerows and 3 treelines have been identified within the study area. The extent of these linear habitats have not changed from that identified during the previous 2008 survey. The hedgerows and treeline field boundaries are numbered in Figure 4.5. The study area supports approximately 4.3km of linear hedgerow and treelines.

The dominant species in hedgerows are *Prunus spinosa*, *Fraxinus excelsior*, *Crataegus monogyna* and *Salix* species. Conifers in the form of *Cupressocyparis leylandii* and *Pinus* species also occur in the field boundaries. The treelines to the south are dominated by *Fagus sylvatica* and are associated with pre-1900 landscaping. All hedgerows are associated with spreading scrub on either side. The scrub spreading outwards from the field boundaries is almost entirely dominated by *Prunus spinosa*. Other shrub species noted along hedgerows include *Ilex aquifolium*, *Corylus avellana*, *Euonymus europaeus* and *Rosa canina*. The occasional mature broadleaved *Quercus petraea* and *Sorbus aria* also occur along hedgerows. A range of common herb species occur along the hedgerows.

The historic hedgerows and treelines occurring within the site are shown on Figure 4.6. Each of these field boundaries are indicated on the 1838 6-inch maps and a number of them, as indicated on Figure 4.5 represent townland boundaries. The only field boundary not indicated on the 6-inch is FB6. Some of the historic field boundaries within the study area may be representative of ancient hedgerows. The unmanaged nature of these field boundaries has also facilitated their spread (dominated exclusively by *Prunus spinosa*) into adjoining grassland habitat, resulting in wide field boundary corridors. The width of some of these are in excess of 20m, resulting in the development of features more representative of linear scrub.

4.2.1.6.1 Nature Conservation Value

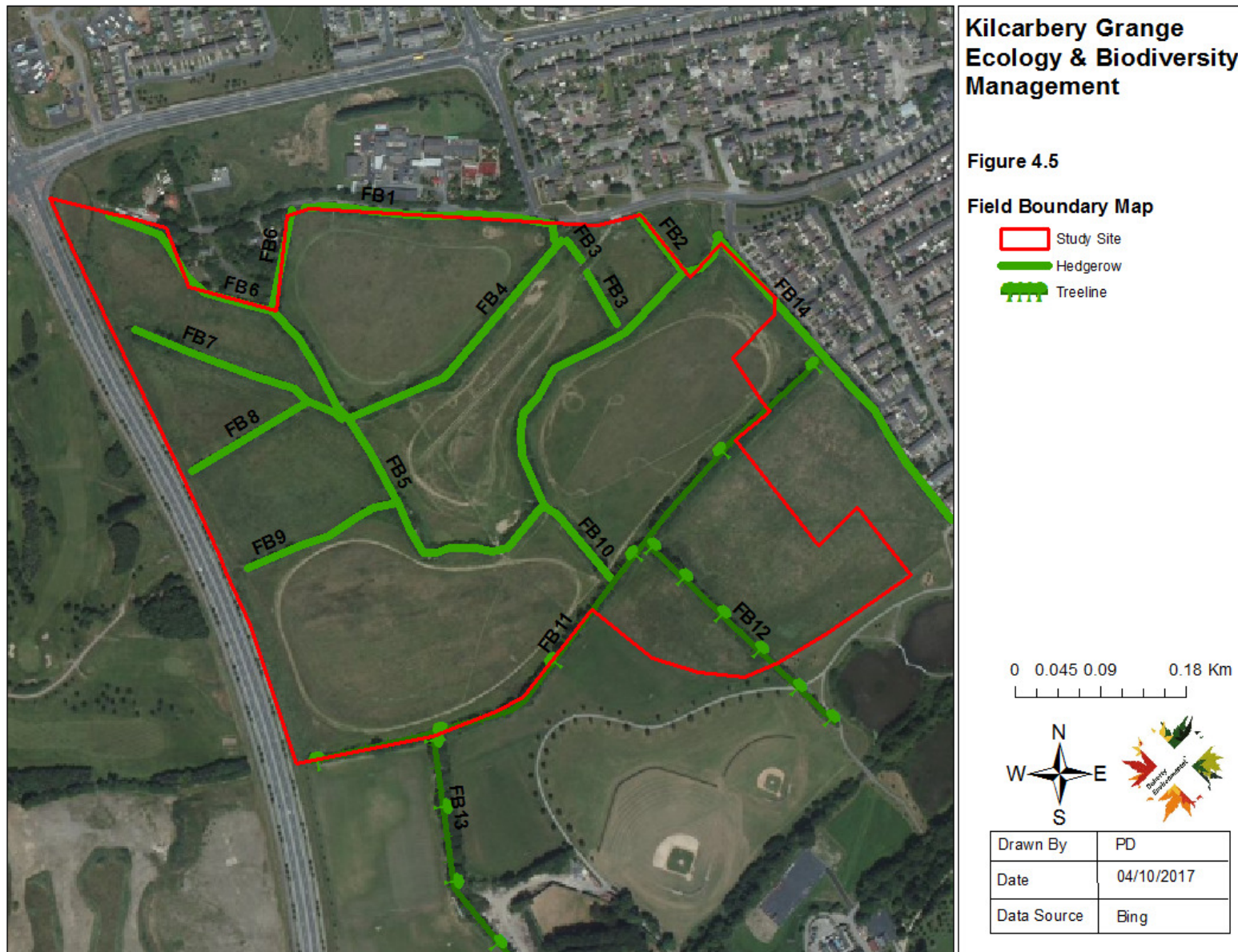
The hedgerows occurring within the study site represent a long-term habitat feature within the area. The majority of them are representative of species-rich hedgerows, are of historic value and are of high local conservation value with respect to the species potentially dependent upon them for shelter and food. These hedgerows may function as important commuting and foraging corridors for bats and non-volant terrestrial mammals as well as nesting habitat for a variety of bird species. The native flora supported by the hedgerows are also likely to support a diverse

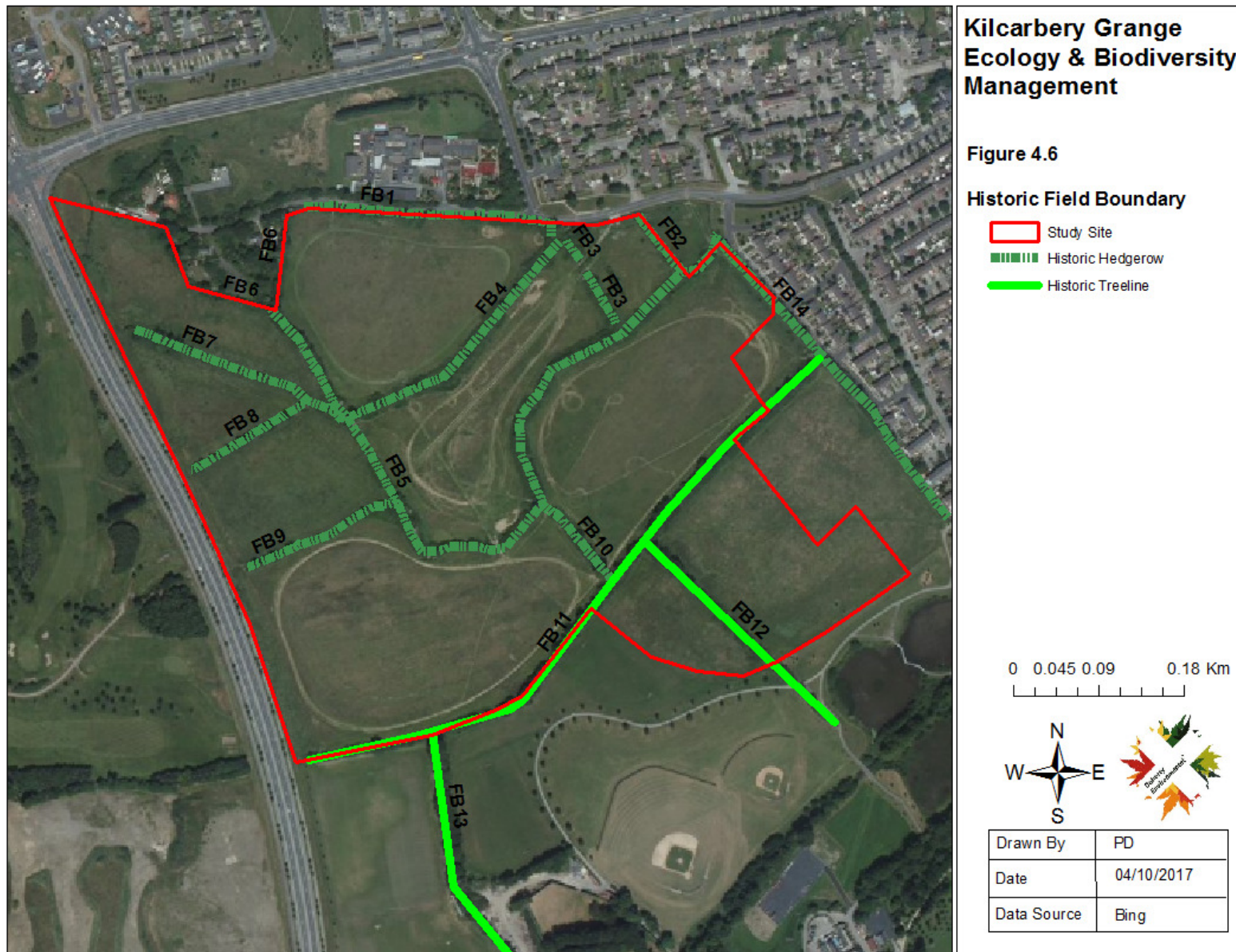
community of invertebrates. The nature conservation value of this habitat is of high local conservation importance (Rating D).

Table 4.4: Evaluation of Field Boundaries occurring within the Study Area

Field Boundary No.	No. Connections	Historical Value	Height	Width	Water	Species-rich Hedgerow	Evaluation
1	3	Yes	6	18	No	No	Low Local Value (Rating E)
2	3	Yes	3	10	No	No	Low Local Value (Rating E)
3	2	Yes	3	16	No	No	Low Local Value (Rating E)
4	3	Yes	10	28	Seasonal	Yes	High Local Value (Rating D)
5	6	Yes	10	15	No	Yes	High Local Value (Rating D)
6	3	No	8	11	No	Yes	High Local Value (Rating D)

7	2	Yes	10	10	Yes	Yes	High Local Value (Rating D)
8	2	Yes	10	10	Yes	Yes	High Local Value (Rating D)
9	2	Yes	7	10	No	Yes	High Local Value (Rating D)
10	4	Yes	7	20	Seasonal	No	High Local Value (Rating D)
11	5	Yes	10	18	Seasonal	Yes	High Local Value (Rating D)
12	4	Yes	10	10	No	No	High Local Value (Rating D)
13	3	Yes	15	15	No	No	High Local Value (Rating D)
14	4	Yes	10	12	No	Yes	High Local Value (Rating D)





Fauna

An overview of the fauna supported by the site is outlined in the following sections. The nature conservation value of the site in supporting populations of fauna is also outlined in the following sub-section.

4.2.1.7 Non-Volant Mammals

No definitive evidence of protected mammals such as badger was noted during the field surveys. Mammals paths were identified throughout the site and areas with numerous paths entering thick scrub habitat alongside hedgerows were also noted. These latter area are identified in Figure 4.4 as areas of high mammal activity. Rabbit warrens were noted along field boundaries throughout the site, especially along the bank associated with FB4, FB10 and F11. It is possible that mammal paths occurring within the study area are largely associated with the population of rabbits supported by the site.

The stretch of the River Camac between the R136 and the R113 was surveyed (on the 18th September) for field signs indicating the presence of otters. The field signs searched for during this survey are described in Section 2.4 above. No evidence indicating the presence of otters along this stretch of the River Camac were recorded during this survey.

4.2.1.8 Volant Mammals – Bat

4.2.1.8.1 Habitat Classification

Habitats occurring within and adjacent to the study area provide a potential foraging resource for bat species. The semi-improved, high-sward grassland, hedgerows and treelines, and drainage ditches within the Masterplan Area support a prey resource for foraging bats. There is an abundance of “structured vegetation” in the form of hedgerows and treelines and these features are well connected throughout the site and also provide habitat connections to Corkagh Park to the south and the range of habitats supported by this park. Habitats of high value occurring within the park include open waterbodies in the form of ponds, fringing wet woodland and reedbeds, open parkland and terrestrial woodland and scrub and the River Camac corridor. The habitats occurring within the study area have been classified for their value to function as foraging and commuting habitat for bats in line with Table 4.2 of the BCT guidance manual (Hundt, 2012). Based on the categorisation of habitats in this guidance manual the habitats

occurring within the Masterplan Area are considered to be of at least moderate value for foraging and commuting bats.

4.2.1.8.2 *Roost Surveys*

Emergence surveys on the 27th June 2017 focused on the OPW buildings within Corkagh Park to the south of the study area. This emergence survey was completed between 21:50 and 23:00. Weather conditions were ideal for bat activity with dry and still conditions and mild temperatures prevailing. No bats were recorded emerging from these buildings during emergence survey.

Tree roost emergence surveys were completed at a mature beech tree at the junction of FB10 and FB11 and along FB11 on the night of 9th August 2017. This emergence survey was completed between 21:00 and 22:00. Weather conditions were ideal for bat activity with dry and still conditions and mild temperatures prevailing. No bats were recorded emerging from the target trees during the emergence survey.

An emergence survey was also completed along FB6 adjacent to mature trees and the rear of a cottage dwelling on the night of the 15th October 2017. This emergence survey was completed between 18:15 and 19:05. Weather conditions were ideal for bat activity with high cloud cover, dry and still conditions and mild temperatures prevailing. No bats were recorded or observed emerging from the mature trees and southern elevation of the cottage during the emergence survey.

4.2.1.8.3 *Manual Transect Surveys*

Very low levels of bat activity were recorded during each of the manual transects in June, August and October.

The results of the June Manual Transect are shown on Figure 4.7. During the June manual transect the first bat was recorded at 23:15. Leisler's bats were recorded foraging over the amenity grassland field to the south of the River Camac. At least two individual Leisler's bats were foraging at this location. The next bat pass was assigned to a Soprano pipistrelle and was recorded at 23:16 commuting along FB5. The final bat pass recorded was that of an

unidentified pipistrelle species commuting along FB8 at 23:36. No further bat activity was recorded during the June manual transect survey.

The results of the August Manual Transect are shown on Figure 4.8. During the August survey Soprano pipistrelles were recorded during the emergence survey at a mature beech tree within the study area. The first Soprano pipistrelle was recorded and observed at 21:35 flying south along the hedgerow FB10. It then turned west along FB11. Up to six individual Soprano pipistrelle were recorded commuting south along FB10 between 21:35 and 21:55. The first Leisler's bat was recorded at 21:42. During the transect the only additional bat activity recorded was associated with one foraging Soprano pipistrelle along FB8. Three passes of this individual bat were recorded at 22:20.

The results of the October Manual Transect are shown on Figure 4.9. During the October survey two Soprano pipistrelle passes were adjacent to FB6 near scrub and hedgerow habitat. These passes were recorded at 19:02 and 19:06. One Soprano pipistrelle pass was recorded along FB5 at 19:18. No further bat activity was recorded during the transect survey.

4.2.1.8.4 Automatic Detector Surveys

The location of automatic bat detector surveys completed during the 2017 bat activity season are shown in Figure 2.1 above. The results of the May/June, August and September surveys are described in the following sub-sections.

May/June MP1 Survey Results

A summary of the results of bat activity detected at MP1, between the 17th May and 1st June are presented in Table 4.5 below.



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Figure 4.7

June Manual Bat Survey Results

● June Emergence Survey

June Bat Activity

Species

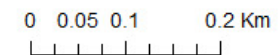
★ Leisler's Bat

★ Soprano Pipistrelle

★ Unidentified Pipistrelle

— June Transect

□ Study Site



Drawn By	PD
Date	15/10/2017
Data Source	Bing



Kilcarbery Grange Ecology & Biodiversity Management

Figure 4.8

August Manual Bat Survey Results

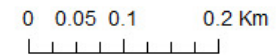
● August Emergence Survey

Species

★ Soprano Pipistrelle

— August Transect

□ Study Site



Drawn By	PD
Date	15/10/2017
Data Source	Bing



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Figure 4.9

October Manual Bat Survey Results

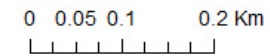
● October Emergence Survey

Species

★ Soprano Pipistrelle

— October Transect

□ Study Site



Drawn By	PD
Date	15/10/2017
Data Source	Bing

Table 4.5: Results of Monitoring at MP1 during May/June 2017

Date	My Sp	NYLE	PINA	PIPI	PIPY	PLAUR	Total Passes/Night	Nightly Bat Activity Index*
20170517	0	10	0	7	0	0	17	Medium
20170518	1	50	0	4	2	0	57	High
20170519	0	73	0	2	2	0	77	High
20170520	0	67	0	3	0	0	70	High
20170521	0	89	0	28	9	0	126	High
20170522	0	229	0	33	12	0	274	High
20170523	1	466	3	23	19	1	513	High
20170524	0	247	4	15	10	0	276	High
20170525	0	342	3	25	22	0	392	High
20170526	1	231	1	29	15	0	277	High
20170527	0	85	2	4	2	0	93	High
20170528	0	178	1	101	34	0	314	High
20170529	0	681	2	15	11	0	709	High
20170530	0	239	1	24	11	0	275	High
20170531	1	165	0	15	8	0	189	High
20170601	1	385	1	20	5	0	412	High
Total Passes	5	3,537	18	348	162	1	4,071	

As can be seen from the results outlined in Table 4.5 at MP1, activities levels were overwhelmingly dominated by Leisler's bat, accounting for over 85% of all activity. Activity for this species was consistently high throughout the monitoring period with only one of the sixteen nights (on the 17th May) of monitoring falling into the low activity category. In contrast activity for all other species was indicative of low to medium activity levels throughout the monitoring period. Aside from Leisler's bat the only other species recorded at high activity levels was that of Common pipistrelle on the night of the 28th May.

May/June MP2 Survey Results

A summary of the results of bat activity detected at MP2, between the 17th May and 1st June are presented in Table 4.6 below.

Table 4.6: Results of Monitoring at MP2 during May/June 2017

DATE	MY SP.	NYLE	PINA	PIPI	PIPY	PLAUR	TOTAL PASSES/ NIGHT	Nightly Bat Activity Index*
20170517	0	1	0	1	0	0	3	Low
20170518	1	186	0	7	0	0	380	High
20170519	0	87	0	2	0	0	176	High
20170520	0	51	0	3	0	0	105	High
20170521	0	174	0	29	5	0	382	High
20170522	0	225	2	2	3	0	457	High
20170523	0	359	1	10	4	0	733	High
20170524	0	206	0	6	2	0	420	High
20170525	0	310	2	13	5	0	640	High
20170526	0	190	2	25	9	0	416	High
20170527	0	53	0	2	0	1	109	High
20170528	0	234	0	136	24	0	628	High
20170529	0	703	0	6	6	0	1,418	High
20170530	0	274	2	6	1	0	557	High
20170531	0	296	0	6	3	0	601	High
20170601	0	457	0	1	1	0	916	High
TOTAL PASSES	1	3,806	9	255	63	1	4,135	

As can be seen from the results outlined in Table 4.6 at MP2, activities levels were overwhelming dominated by Leisler's bat, accounting for over 90% of all activity. Activity for this species was consistently high throughout the monitoring period with only one of the sixteen nights of monitoring falling into the low activity category. In contrast activity for all other species was consistently low throughout the monitoring period with only one night of high Common pipistrelle activity levels recorded on the 28th May.

August MP3 Surveys

A summary of the results of bat activity detected at MP3, between the 16th August and 24th August are presented in Table 4.7 below.

Table 4.7: Results of Monitoring at MP3 during August 2017

Date	MY Sp	LE	PIPI	PIPY	PLAUR	Total per Night	Nightly Bat Activity Index*
20170816	11	160	43	37	0	251	High
20170817	4	63	51	53	0	171	High
20170818	3	36	36	44	4	123	High
20170819	2	47	60	51	3	163	High
20170820	0	101	16	16	1	134	High
20170821	4	160	24	68	3	259	High
20170822	3	40	58	65	4	170	High
20170823	1	21	7	4	0	33	Medium
Totals	28	628	295	338	15	1304	

As can be seen from the results outlined in Table 4.7 at MP3, activities levels were dominated by Leisler's bat, accounting for almost 50% of all activity. Activity for this species was mixed throughout the survey period with activity on four of the nights falling into the high activity category, while the other four fell into the medium activity category. Pipistrelle species in the form of Soprano pipistrelle and Common pipistrelle accounted for the majority of the remaining bat activity recorded. For both pipistrelle species nightly activity fell into either the medium or high activity categories (50% respectively). Activity levels recorded for Brown long-eared and Myotis species were low throughout the survey period.

August MP4 Surveys

A summary of the results of bat activity detected at MP4, between the 16th August and 24th August are presented in Table 4.8 below.

Table 4.8: Results of Monitoring at MP4 during August 2017

Date	My Sp	NYLE	PIPI	PIPY	PLAUR	Total per Night	NIGHTLY BAT ACTIVITY INDEX*
20170816	1	96	32	11	0	140	High
20170817	7	47	46	33	0	133	High
20170818	4	73	35	12	0	124	High
20170819	0	55	47	17	0	119	High

20170820	3	68	95	21	1	188	High
20170821	2	99	25	63	0	189	High
20170822	4	35	21	18	4	82	High
20170823	0	19	29	5	0	53	High
Total	21	492	330	180	5	1028	

As can be seen from the results outlined in Table 4.8 at MP4, activities levels were dominated by Leisler's bat, accounting for almost 50% of all activity and pipistrelle (both Common pipistrelle and Soprano pipistrelle) accounting for the remaining 50%. Activity for Leisler's bat was high for five of the eight nights of monitoring and medium for the remaining three. Both Common pipistrelle and Soprano pipistrelle activity were recorded at medium levels for the majority of the monitoring session. Very low levels of Myotis species and Brown long-eared were recorded throughout the monitoring session.

September MP5 Surveys

A summary of the results of bat activity detected at MP6, to the northwest of the study area, between the 18th September and 2nd October are presented in Table 4.8 below.

Table 4.9: Results of Monitoring at MP5 during September 2017

Date	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/ Night	Nightly Activity Category
20170918	0	0	0	0	0	0	0	Low
20170919	0	0	0	0	0	0	0	Low
20170920	0	0	0	0	0	0	0	Low
20170921	0	0	0	3	0	0	3	Low
20170922	0	0	0	1	0	0	1	Low
20170923	0	0	0	0	0	0	0	Low
20170924	0	4	0	2	0	2	8	Medium
20170925	0	31	0	6	0	0	37	Medium
20170926	0	6	0	0	0	0	6	Medium
20170927	0	0	0	0	0	0	0	Low
20170928	0	1	0	0	0	0	1	Low
20170929	0	0	0	0	0	0	0	Low
20170930	0	0	0	1	0	0	1	Low
20171001	0	0	0	0	0	0	0	Low
20171002	0	0	0	0	0	0	0	Low
Total	0	42	0	13	0	2	57	
BAI	0.00	0.28	0.00	0.09	0.00	0.01	0.38	
Nightly BAI	0.00	2.80	0.00	0.87	0.00	0.13	3.80	

The of monitoring at MP5 outlined in Table 4.9 show that activities levels were dominated by low bat activity along the eastern boundary of the study area. Twelve of the fifteen nights of monitoring have been categorised within the low activity category. A total of 57 passes were recorded over the 15 nights of monitoring and approximately 65% of all activity was recorded during one night of monitoring on the 25th September. Leisler's bat again dominated activity recorded at MP5, accounting for approximately 75% of all activity recorded. Common pipistrelle was the next most recorded species, but activity for this species was overall low throughout the monitoring session. Activity levels for all other species was very low.

September MP6 Surveys

A summary of the results of bat activity detected at MP6, to the northwest of the study area, between the 18th September and 2nd October are presented in Table 4.8 below.

Table 4.10: Results of Monitoring at MP6 during September 2017

Date	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/ Night	Nightly Activity Category
20170918	0	0	0	0	0	0	0	Low
20170919	0	7	0	1	1	0	9	Medium
20170920	1	2	0	9	3	0	15	Medium
20170921	0	2	0	24	3	0	29	Medium
20170922	0	17	0	5	2	0	24	Medium
20170923	1	29	0	5	0	0	35	Medium
20170924	1	14	0	57	84	0	156	High
20170925	0	33	0	134	435	2	604	High
20170926	0	2	0	1	3	0	6	Medium
20170927	0	3	0	1	0	0	4	Medium
20170928	1	0	0	1	1	0	3	Low
20170929	0	1	0	2	0	0	3	Low
20170930	2	7	0	4	6	0	19	Medium
20171001	0	22	0	5	4	1	32	Medium
20171002	0	0	0	0	0	0	0	Low
Total	6	139	0	249	542	3	939	
BAI	0.04	0.93	0.00	1.66	3.61	0.02	6.26	
Nightly BAI	0.40	9.27	0.00	16.60	36.13	0.20	62.60	

Activity levels in the vicinity of MP6 was varied throughout the monitoring session. Medium levels of activity were dominant, being recorded on nine of the fifteen nights of monitoring. High levels of activity were recorded on the 24th and 25th September, with particularly high levels of Soprano pipistrelle activity recorded on the latter date. Outside these two nights

Soprano pipistrelle activity was characterised by low levels. Common pipistrelle and Leisler's bats were consistently recorded throughout the monitoring session, but their activity levels were also dominated by low levels.

A total of 939 passes were recorded during the monitoring session with 759 of these being recorded during two nights, on the 24th and 25th September. This equates to approximately 81% of all activity during the monitoring session being recorded on these two nights.

Activity levels for Myotis species, Brown long-eared and Nathusius pipistrelle were very low to absent during the monitoring session.

September MP7 Surveys

A summary of the results of bat activity detected at MP7, to the south of the study area in Corkagh Park, between the 18th September and 2nd October are presented in Table 4.11 below.

Table 4.11: Results of Monitoring at MP7 during September 2017

Date	MY SP	NYLE	PINA	PIPI	PIPY	PLAUR	Total/ Night	Nightly Activity Category
20170918	0	0	0	0	0	0	0	Low
20170919	0	10	0	0	2	0	12	Medium
20170920	0	6	0	0	3	0	9	Medium
20170921	0	1	0	0	2	0	3	Low
20170922	0	6	0	4	2	1	13	Medium
20170923	1	1	0	1	7	0	10	Medium
20170924	0	15	0	0	10	1	26	Medium
20170925	0	27	0	1	2	0	30	Medium
20170926	0	2	0	0	5	0	7	Medium
20170927	0	1	0	1	2	0	4	Low
20170928	0	2	0	0	1	0	3	Low
20170929	1	1	0	0	4	0	6	Medium
20170930	0	1	0	0	2	0	3	Low
20171001	0	4	0	0	3	2	9	Medium
20171002	0	0	0	0	0	0	0	Low
Total	2	77	0	7	45	4	135	
BAI	0.01	0.51	0.00	0.05	0.30	0.03	0.90	
Nightly BAI	0.13	5.13	0.00	0.47	3.00	0.27	9.00	

Monitoring was undertaken at MP7 to the south of the study site within Corkagh Park. Activity levels in the vicinity of MP7 was dominated by medium levels of activity on a nightly basis for species throughout the monitoring session. Leisler's bat and Soprano pipistrelle dominated

activity during the session with both species together accounting for approximately 90% of all activity. Activity for both species individually was dominated by low nightly activity. Similar to the results at MP5 and MP6 activity levels were highest during the night of the 25th September.

Activity levels for Myotis species, Common pipistrelle, Nathusius pipistrelle and Brown long-eared were very low throughout the monitoring session.

4.2.1.9 Birds

Bird species recorded during the breeding bird surveys along field boundaries was dominated by a range of passerines along with other commonly occurring species.

Buzzards were the only raptor species recorded during site surveys. One buzzard was recorded during surveys in August 2017. This bird was observed flying over the site and calling throughout the survey.

Table 4.9 lists the species of birds recorded during the transect and point surveys within the woodland to the north of the proposed turbine location. The conservation status of the bird species listed is derived from Colhoun & Cummins (2013).

Table 4.12: Bird Species recorded during the Breeding Season Survey

Common Name	Scientific Name	Conservation Status
Blue tit	<i>Parus caeruleus</i>	Low
Willow tit	<i>Parus ater</i>	Low
Great tit	<i>Parus major</i>	Low
Chaffinch	<i>Fringilla coelebs</i>	Low
Greenfinch	<i>Carduelis chloris</i>	Low
Goldfinch	<i>Carduelis carduelis</i>	Low
Blackbird	<i>Turdus merula</i>	Low
Robin	<i>Erithecus rubecula</i>	Low
Wren	<i>Troglodytes troglodytes</i>	Low
Song Thrush	<i>Turdus philomenos</i>	Low

Stonechat	<i>Saxicola torquata</i>	Low
Wood Pigeon	<i>Columba palumbus</i>	Low
Hood crow	<i>Corvus corone cornix</i>	Low
Rook	<i>corvus frugilegus</i>	Low
Hooded Crow	<i>Corvus monedula</i>	Low
Magpie	<i>Pica pica</i>	Low
Starling	<i>Sternus vulgaris</i>	Low

5.0 BIODIVERSITY MANAGEMENT

This section of the report provides guidelines for the sensitive design of the Grange Kilcarbery lands with the aim of maximising the value of green spaces retained within the area for biodiversity.

The aim of the biodiversity management guidelines outlined in this Section is to ensure that examples of existing habitats occurring within the site are accommodated into the design of the further development. In addition guidelines are outlined for maximising the biodiversity value of proposed green spaces associated with future development.

The policy's and objectives of the South Dublin County Development Plan supporting the protection of biodiversity are brought together in Section 5.1 below and the key guidelines for biodiversity management of existing habitats and proposed green spaces are outlined in Section 5.2 below.

5.1 COUNTY DEVELOPMENT PLAN GREEN INFRASTRUCTURE OBJECTIVES

Table 5.1 below outlines the Green Objectives of the South Dublin County Council Development Plan and demonstrates how the Kilcarbery Grange Masterplan proposes to implement these objectives during the future development of these lands.

Table 5.1:

<p>South Dublin County Development Plan: Relevant Green Infrastructure Objectives</p>	<p>Masterplan Implementation</p>
<p>G2 Objective 1:</p> <p>To reduce fragmentation of the Green Infrastructure network and strengthen ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, parks and open spaces and the wider regional Green Infrastructure network.</p>	<p>As part of the Masterplan existing green corridors in the form of hedgerows and drainage ditch will be maintained within the Masterplan Area. In addition new green corridors will be provided within the Masterplan Area that will partially offset the loss of some hedgerows within the area. The existing hedgerows and drainage ditch to be retained and the new green corridors will provide linkage to the parkland setting of Corkagh Park to the south of the project site. The retention of these features will also provide natural green corridors moving north from Corkagh Park in the direction of the Grand Canal.</p>
<p>G2 Objective 2:</p> <p>To protect and enhance the biodiversity value and ecological function of the Green Infrastructure network.</p>	<p>The Biodiversity Management Guidelines outlined below provide guidance for the protection and enhancement of biodiversity within the Masterplan Area. These guidelines will be required to be implemented during future developments within the Masterplan Area.</p>
<p>G2 Objective 3:</p> <p>To restrict development that would fragment or prejudice the Green Infrastructure network.</p>	<p>The Masterplan Area has incorporated key features of the baseline ecology within the Masterplan Area into the overall design of the future housing developments. The Masterplan Area design aims to minimise the fragmentation of green corridors, in the form of hedgerows and</p>

	drainage ditch linking this area to the Corkagh Park to the south.
<p>G2 Objective 5:</p> <p>To integrate Green Infrastructure as an essential component of all new developments.</p>	See above.
<p>G2 Objective 6:</p> <p>To protect and enhance the County's hedgerow network, in particular hedgerows that form townland, parish and barony boundaries, and increase hedgerow coverage using locally native species.</p>	The Masterplan Area has been designed to ensure that all townland boundary hedgerows are retained as part of the future development of the area. The retention of these features and the provision of additional green corridors in the form of treelines will maintain connectivity to Corkagh Park to the south.
<p>G2 Objective 7:</p> <p>To incorporate items of historical or heritage importance in situ within the Green Infrastructure network as amenity features.</p>	See Above.
<p>G2 Objective 9:</p> <p>To preserve, protect and augment trees, groups of trees, woodlands and hedgerows within the County by increasing tree canopy coverage using locally native species and by incorporating them</p>	Mature trees will be preserved and retained along hedgerows FB 4, 5, 8, 9, 10, 11 and 14. In addition the new planting along green corridors will augment the number of mature trees to be maintained within the Masterplan Area.

<p>within design proposals and supporting their integration into the Green Infrastructure network.</p>	
<p>G2 Objective 10:</p> <p>To promote a network of paths and cycle tracks to enhance accessibility to the Green Infrastructure network, while ensuring that the design and operation of the routes responds to the ecological needs of each site.</p>	<p>The Masterplan Area has been designed to incorporate a network of paths and cycle tracks that will provide access to the green infrastructure within the Area as well as to Corkagh Park to the south.</p>
<p>G2 Objective 11:</p> <p>To incorporate appropriate elements of Green Infrastructure e.g. new tree planting, grass verges, planters etc. into existing areas of hard infrastructure wherever possible, thereby integrating these areas of existing urban environment into the overall Green Infrastructure network.</p>	<p>The Masterplan has incorporated the following elements of green infrastructure into the plan: retained hedgerows and drainage ditch, new treelines, swales and SuDS ponds.</p>
<p>G2 Objective 12:</p> <p>To seek to control and manage non-native invasive species and to develop strategies with relevant stakeholders to assist in the control of these species throughout the County.</p>	<p>Non-native species occurring within the Masterplan Area will be controlled in line with the guidance outlined in these Biodiversity Management Guidelines.</p>

<p>G2 Objective 13:</p> <p>To seek to prevent the loss of woodlands, hedgerows, aquatic habitats and wetlands wherever possible including requiring a programme to monitor and restrict the spread of invasive species such as those located along the River Dodder.</p>	<p>The Masterplan Area has been designed to maximise the retention of existing hedgerows and drainage ditch.</p>
<p>G4 Objective 2:</p> <p>To connect parks and areas of open space with ecological and recreational corridors to aid the movement of biodiversity and people and to strengthen the overall Green Infrastructure network.</p>	<p>The Masterplan has been designed to ensure connectivity is provided to Corkagh Park to the south and conversely to ensure that green corridors are retained moving north from this Park towards the Grand Canal.</p>
<p>G4 Objective 3:</p> <p>To enhance and diversify the outdoor recreational potential of public open spaces and parks, subject to the protection of the natural environment.</p>	<p>Hedgerows SuDS will be managed in accordance with the guidelines outlined in this document.</p>
<p>G4 Objective 4:</p>	<p>Areas of Green Infrastructure will be unlit by artificial lighting so that conditions are optimised for wildlife. Areas to remain unlit will be the</p>

<p>To minimise the environmental impact of external lighting at sensitive locations within the Green Infrastructure network to achieve a sustainable balance between the recreational needs of an area, the safety of walking and cycling routes and the protection of light sensitive species such as bats.</p>	<p>corridors along FB 4, 5, 8, 9, 10, 11 and 14 and areas surrounding the three SuDS ponds.</p>
<p>G4 Objective 5:</p> <p>To promote the planting of woodlands, forestry, community gardens, allotments and parkland meadows within the County's open spaces and parks.</p>	<p>Examples of grassland meadow habitat will be retained along side hedgerows to be retained and along filter areas adjacent to new swales. Patches of woodland habitat will be provided along the banks of SuDS ponds.</p>
<p>G5 Objective 1:</p> <p>To promote and support the development of Sustainable Urban Drainage Systems (SUDS) at a local, district and county level and to maximise the amenity and biodiversity value of these systems.</p>	<p>The Masterplan Area has been designed to include SuDS and the SuDS features, particularly new swales and ponds will be designed to maximise their biodiversity potential.</p>
<p>G6 Objective 1:</p> <p>To protect and enhance existing ecological features including tree stands, woodlands, hedgerows and watercourses in all new</p>	<p>The Masterplan has been designed to ensure that important townland hedgerow are retained along with associated drainage ditches. In addition examples of meadow grassland will be retained</p>

<p>developments as an essential part of the design process.</p>	<p>within the area and SuDS infrastructure will be designed to provide wetland habitats.</p>
<p>G6 Objective 2:</p> <p>To require new development to provide links into the wider Green Infrastructure network, in particular where similar features exist on adjoining sites.</p>	<p>The Masterplan has been designed to ensure that continued green linkage is provided to the Corkagh Park to the south and conversely that existing green corridors will run north from Corkagh Park towards the Grand Canal.</p>
<p>G6 Objective 3:</p> <p>To require multifunctional open space provision within all new developments that includes provision for ecology and sustainable water management.</p>	<p>The Masterplan has sought to incorporate SuDS into the design of future developments and the Biodiversity Management Guidelines outline measures for ensuring the SuDS infrastructure is enhanced to maximise their biodiversity value.</p>

5.2 BIODIVERSITY MANAGEMENT GUIDELINES

The biodiversity management guidelines for the Kilcarbery Grange lands are outlined below under a list of topic heading. These guidelines and the associated Biodiversity Actions (BA) should be implemented during all future development of lands at Kilcarbery Grange. Section 8 of the Masterplan details the Green Infrastructure Objectives for future residential development within the Masterplan Area. These objectives are based on the biodiversity actions outlined in the following sections.

Habitat Retention

Hedgerows

Examples of hedgerow/treeline, drainage ditch and dry meadow grassland should be retained within the Masterplan area. Figure 6.1 shows the extent of field boundaries to be retained within the Masterplan Area. All proposed new hedgerow and treeline planting is also illustrated on Figure 6.1. The existing hedgerows FB4, FB8, FB9, should be retained. Sections of FB 5, between FB8 and FB10 should be retained. Sections of FB10 at its southern and western ends should be retained. FB11 and sections of FB14 towards the south and east of the Masterplan Area should be retained. The extent of hedgerows to be retained within the Masterplan Area will amount to approximately 2.1km (approximately 50% of the baseline extent). It is noted that new Green Corridors in the form of hedgerows and treelines will be planted within the Masterplan Area. The total length of new hedgerows and treelines associated with these Green Corridors, will amount to 2.2km in length. The combined length of the retained and proposed hedgerows and treelines within the Masterplan Area will amount to approximately 4.3km of linear hedgerows and treelines. This equals the total extent of existing hedgerows and treelines.

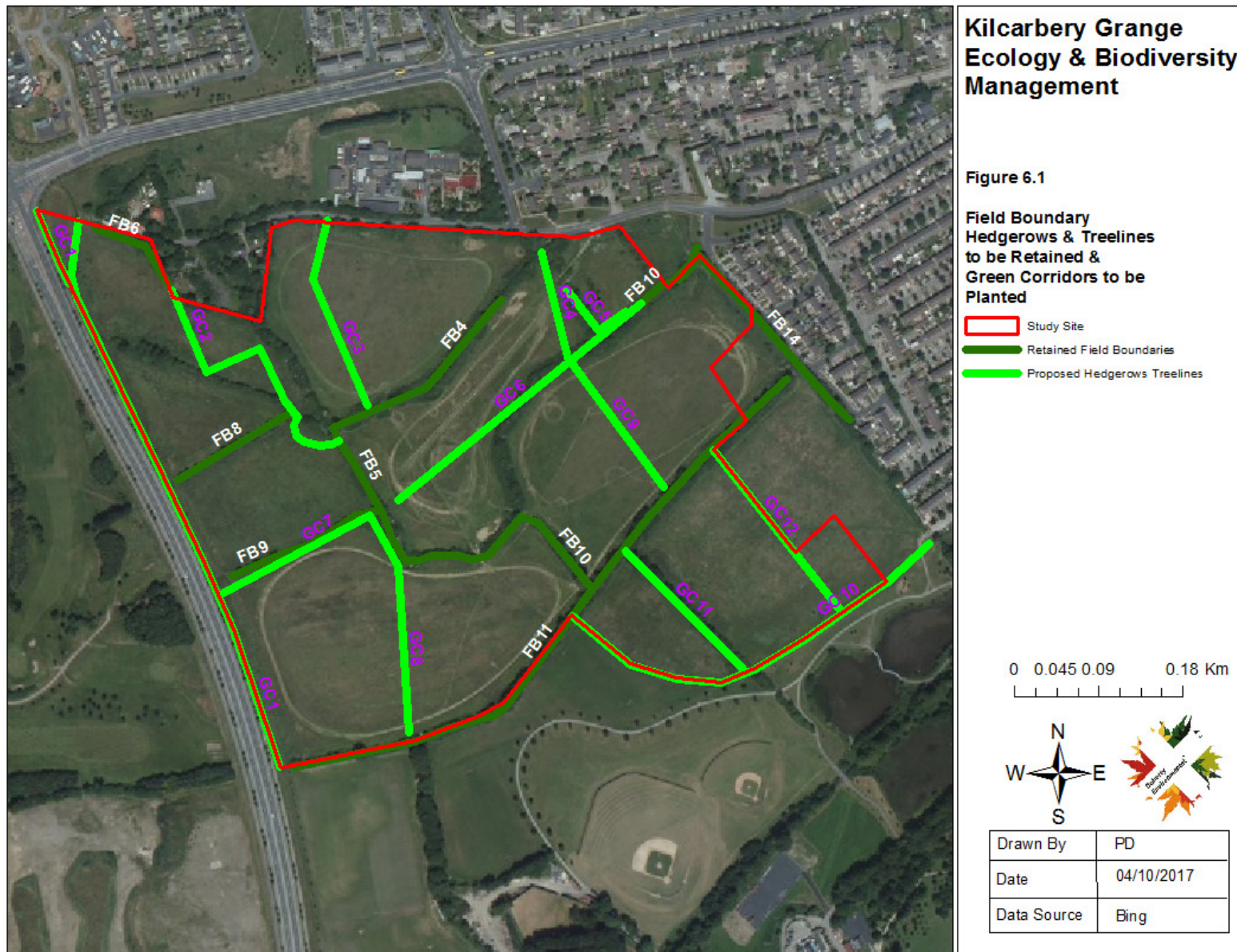
It is noted that along all of these retained field boundaries dense blackthorn scrub has spread out from the centre line of the hedgerow. It is acknowledged that this blackthorn scrub will require pruning and cutting back during future developments. However the future management of these hedgerows should aim to maximise the biodiversity value of these hedgerows. Good hedgerow management will support an abundance of insects, provide habitat for a range of birds and mammals, and provide a rich supply of food for some species throughout the year. The management of those field margins abutting the hedge is also critical for a wide range of species.

Where the hedgerow to be retained is associated with a drainage ditch such as at FB4, FB8 and FB9, then hedgerow vegetation should be retained either side of the drainage ditch.

Hedgerow management should aim to maximise the number of native woody species occurring within the hedgerow. As noted in Section 5 above the native woody species associated with hedgerows and treelines within the Masterplan Area include: ash, pedunculate oak, hazel, wych elm, crab apple, hawthorn, blackthorn, elder, spindle, eared willow and dog rose. In terms of biodiversity value the woody species that are of high value include oak, which supports

the highest number of invertebrates. Flowering and berry producing species such as crab apple, hawthorn and elder also provide a rich food resource for a range of species throughout spring, summer and autumn. Some sections of the hedgerows to be retained are species poor and overwhelmingly dominated by blackthorn. Enhancement of these sections of hedgerows should be undertaken by planting a mix of other native woody species as listed above.

The retained hedgerows on site should be managed to provide a diversity of structure along the hedgerow, that include tall sections over 5m in height as well as shorter sections, less than 3m in height. The varying structure in hedgerows is important for enhancing the role of this habitat in supporting a greater variety of bird species.



All hedgerows should be maintained so that a thick and dense cover at the base of the hedgerow is established and gaps in the hedgerows should be minimised. Ongoing management should aim to create an undulating or wavy edge to the hedgerow and avoid a uniform straight line along the hedgerow edge. Bramble, blackthorn or elder species could be used to achieve such an edge.

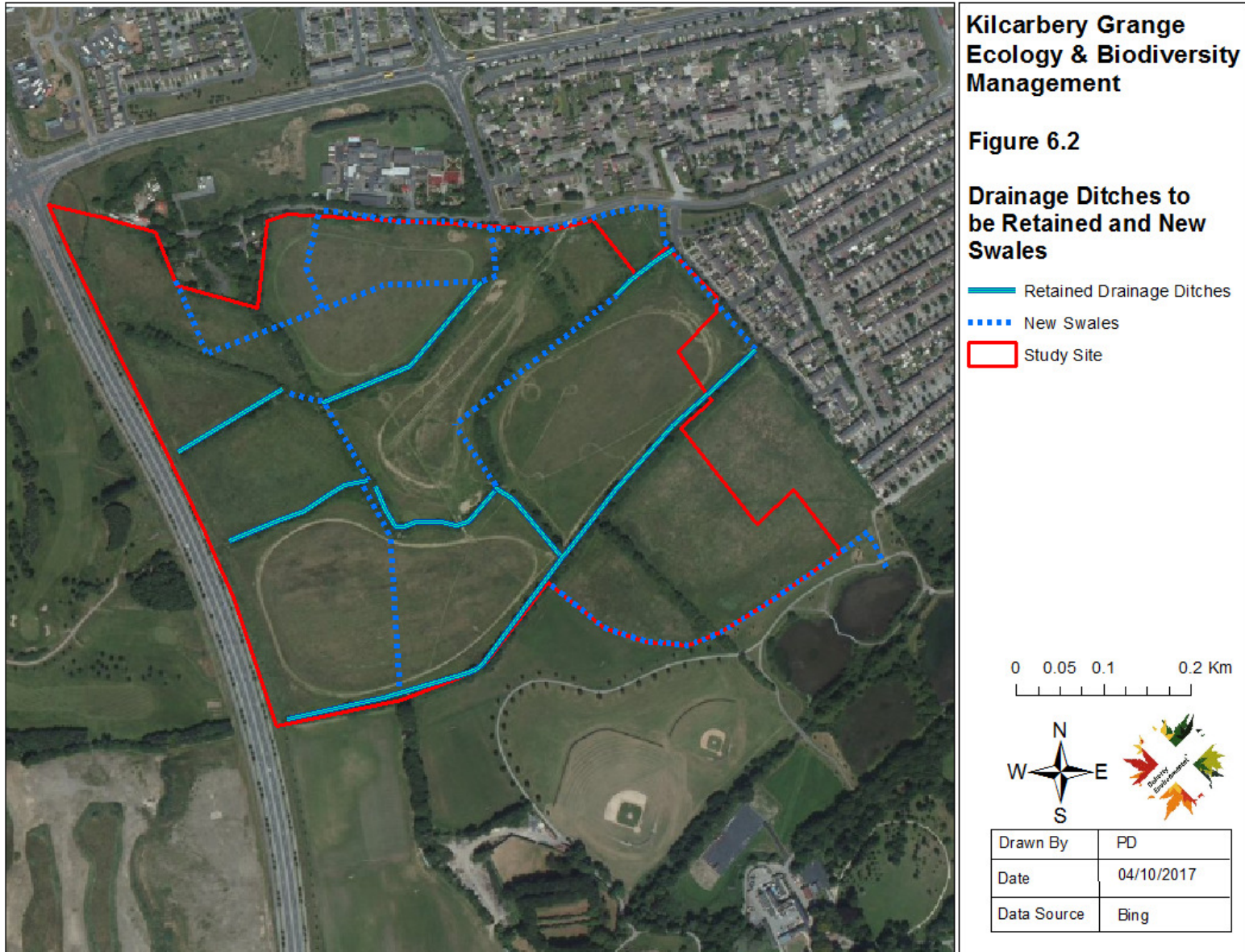
Grassland verges along the base of hedgerows should not be mown. These verges should extend a minimum of 2m either side of the hedgerows. The only management that should take place at these locations is the prevention of scrub encroachment into the grassland verge.

Ongoing management of hedgerows should be timed to reduce disturbance to the habitat and fauna. Entire lengths of hedgerows should not be cut. Instead only a maximum length of one third of each hedgerow should be cut during any cutting session. This approach will ensure that a mix of cut and uncut sections are retained along each hedgerow. Also it is recommended that the sides of hedgerows to be cut should be alternated between cutting years. The timing of cutting should be on a two to three year rotation rather than annually. This will ensure thick nesting habitat is available for birds and will also boost the crop of berry producing trees (the crop is generally most productive on second year growth after cutting). At all times the cutting regime should seek to maintain diversity in hedgerow structure and avoid uniformity along them. The timing of cuttings in any given year should be undertaken outside the breeding bird season, ideally during the months of January and February. Cutting at this time of the year will avoid the destruction of bird nests and allow any berry crop to be used by wintering birds.

BA1: Retain field boundaries FB4, FB5, FB8, FB9, FB10, FB11 and FB14 as indicated on Figure 6.1. Manage these field boundaries in line with the guidance outlined in this Biodiversity Management Guidelines.

Drainage Ditches

The drainage ditches occurring within the site are predominantly seasonal with the exception of the drainage ditch along the western boundary of the Masterplan area. The total length of drainage ditch occurring within the Masterplan Area, as mapped on Figure 4.3 is approximately 3.1km. All drainage ditches occurring along hedgerows to be retained should



also be retained and used as swales as part of the Suburban Drainage Scheme (SuDS) design for the Masterplan area. Figure 6.2 illustrates the existing drainage ditches to be retained within the Masterplan Area. This will amount to a total of length of approximately 1.65km. Retaining existing drainage ditches along the retained field boundaries FB4, FB5, FB8, FB9, FB10, FB11 and FB14 and using them as swales will enhance the overall value of these corridors and provide habitat for an increased range of species.

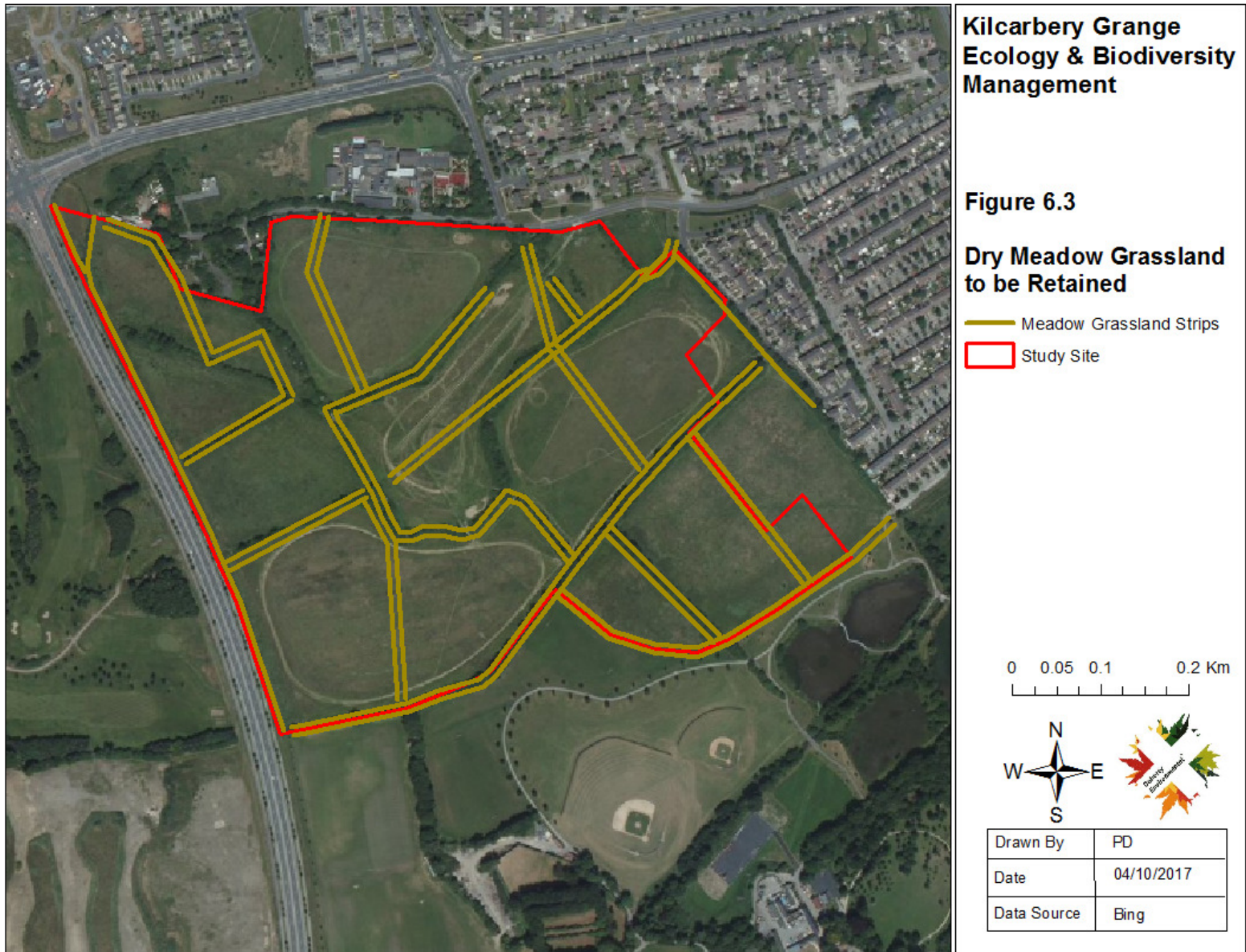
It is also noted that new swales will be provided within the Masterplan Area. The guidelines for the management and design of these swales are outlined in Section 6.2.2 below. The approximate total length of new swales to be installed within the Masterplan Area will amount to 4.1km. Once installed the combined total length of new swales and retained drainage ditches will be greater than the existing extent of drainage ditches occurring within the Masterplan Area (i.e. 4.1km compared to the existing 3.1km).

BA2: Retain existing drainage ditch along hedgerows to be retained and use as swales as part of the SuDS design for future developments.

Dry Meadow Grassland

Examples of dry meadow grassland should be retained either side of all hedgerow field boundaries to be retained within the Masterplan Area. The grassland verges along these field boundaries should be a minimum of 2m in width and should be left uncut and only managed to prevent the encroachment of scrub.

An example of meadow grassland should be retained within open green space within the Masterplan Area. It is recommended that this area of grassland be situated to the south of the Masterplan Area, buffer this area and Corkagh Park. This area of grassland should be managed to promote a diversity in grassland structure, namely sward height. Wild grazing in this area by rabbits is likely to be continue and this should provide some control over scrub development. However it may be necessary to implement a mowing regime in this area to supplement any passive management gained from rabbit grazing. Any mowing regime in this area should aim to create a grassland with a diversity of sward height. This should include low, close cropped patches, less than 5cm in height, medium height sward, 5 cm to 25 cm in



height and high sward, over 25 cm in height. Mowing should only be undertaken in dry conditions to avoid disturbance to the surface. Similarly raking should also be avoided.

All grassland to be retained within the Masterplan area should not be disturbed during the construction phase of future development. No construction activity or storage of construction relate plant, machinery or materials should be permitted in areas of dry meadow grassland to be retained.

BA3: Retain Dry Meadow Grassland in the area outlined in Figure X. Manage in line with the guidance outlined in this Biodiversity Management Guidelines.

Habitat Creation

Enhancing the Biodiversity Value of SuDS

Areas of standing water occur along the western drainage ditch bounding the Masterplan Area (see Figure 6.4). While no amphibians were noted using these areas of standing water during surveys in the summer and autumn of 2017 they will continue to provide potential habitat for these species. It is recommended that these areas of standing water are retained within the Masterplan Area and are incorporated into the SuDS design for future development.

The preliminary SuDS design for the Masterplan includes three open pond areas (see Figure 6.4 for location). These ponds should be managed for wildlife as well as for amenity purposes, in a similar fashion to those occurring in Corkagh Park to the south of the Masterplan Area. The bank slopes should vary in gradation with the development of marginal wetland habitats being facilitated along shallow graded slopes. Patches of wet woodland, wet scrub and marginal, emergent vegetation should be provided around the edges of the ponds. Wet woodland and scrub species should include native willow species (*Salix* sp.), alder and ash. The dominant emergent vegetation can include a range of species including *Carex rostrata*, *Carex paniculata*, *Typha latifolia*, *Phragmites australis* and *Iris pseudacorus*. Optimum water depths for large sedges and reeds are up to 5 cm. Marginal wetland plant communities should be provided in areas that will not be susceptible to prolonged drying out.

Filter strips should be provided either side of new swales. The centre of the swale should be managed as a damp area and planted with hydrophilous species typical of the area. These



include sedges such as *Carex rostrata* and *Carex paniculata* and other species such as *Phragmites australis*, *Typha latifolia* and *Iris pseudacorus*.

Only clean surface water runoff should be channeled into wildlife ponds.

BA4: Enhance the Biodiversity value of SuDS in line with the guidance outlined in these Biodiversity Management Guidelines and retain existing small ponds within the Masterplan Area.

Protection of Birds

Look after mature hedgerow trees and encourage new ones by selecting and marking promising saplings or stems to grow on, or by new planting. Mature native fruit and berry producing trees like crab apple and hawthorn are valuable as well as large trees like oak.

Allow tussocky grass growth to develop at the base, preferably extending into the field by at least 2m, cutting this only to control scrub encroachment (about once every 5 years).

Aim to avoid trimming between March and early September, and instead cut hedges in January or February.

It is an offence under Section 22 of the Wildlife Act to intentionally injure or mutilate eggs or nests. All future developments within the Masterplan Area should be cognizant of the importance of hedgerows within the area for birds. Where hedgerow habitat must be removed to facilitate future development it is recommended that this habitat is removed during the months of January and the first half of February. Where hedgerows must be removed or disturbed during the breeding season, a pre-vegetation clearance survey for the presence of nests must be completed by a qualified ecologist. In the event that nests are present the NPWS must be consulted prior to any further action being taken. The subsequent course of action will be guided by consultations with the NPWS.

BA5 Manage hedgerows to maximize their value for birds.

BA6: Provide a range of habitats at SuDS ponds. Habitats should include patches of wet woodland, emergent large sedge or reedbed communities and open water.

BA7: In the event hedgerow vegetation is to be cleared during the breeding season, pre-clearance nesting surveys will be required to be completed by a qualified ecologist. Where nests are present the subsequent course of action will be guided by consultation with the NPWS.

Protection of Bats

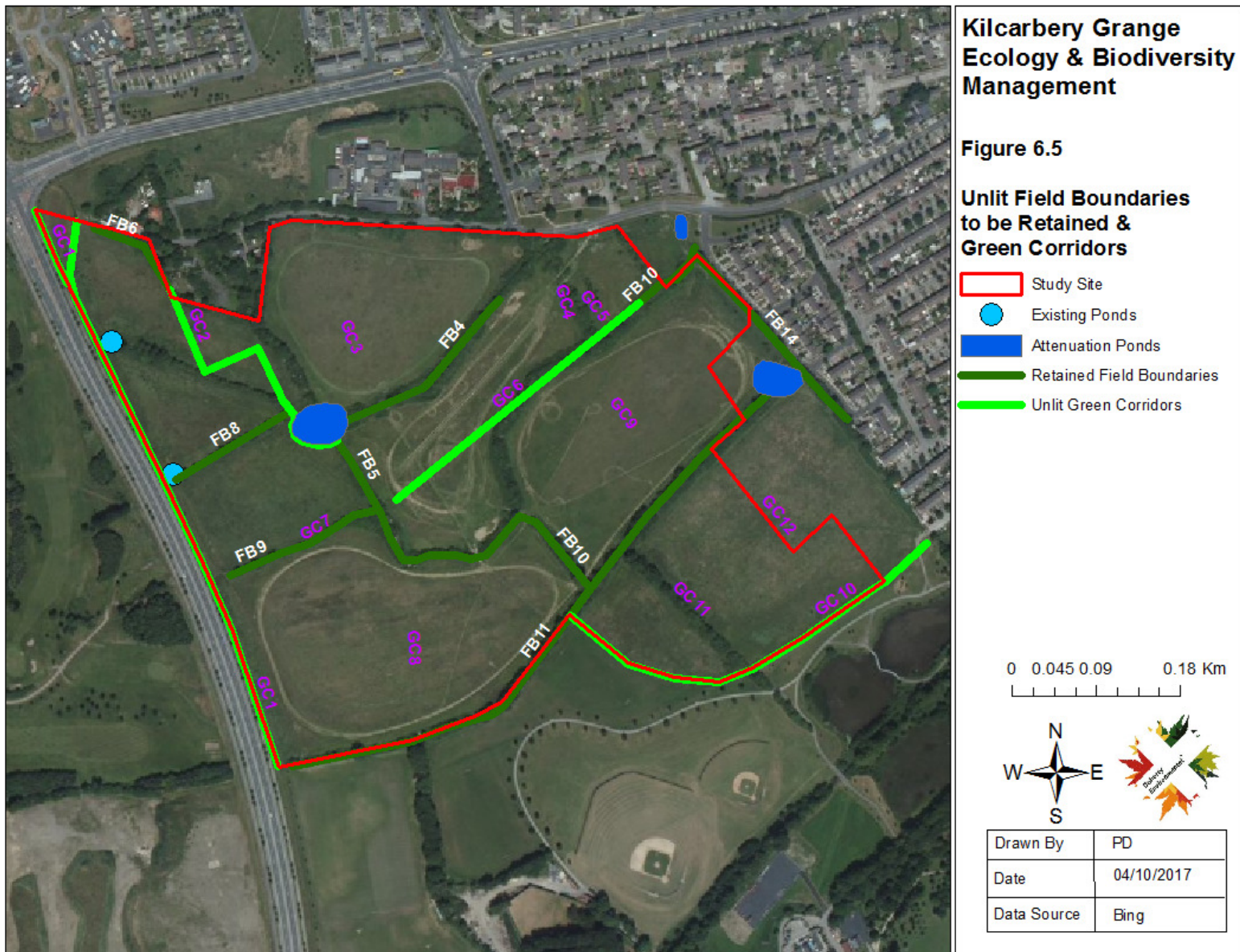
Bat activity recorded within the Masterplan Area during monitoring in 2017 was dominated by Leisler's bat. This species of bat is less reliant on structured linear vegetation and habitat features such as hedgerows and prefers open habitats, such as parkland as well as rivers and lakes.

While much of the open habitats occurring within the Masterplan Area will provide the lands necessary for future housing development the provision of open pond habitats, parklands and green corridors connecting these features to Corkagh Park to the south will be retained.

Aside from Leisler's bat the other species regularly occurring within the Masterplan Area were Common pipistrelle followed by Soprano pipistrelle. Overall, during monitoring Common pipistrelle activity was recorded at moderate levels along hedgerows, while Soprano pipistrelle activity was recorded at low to moderate levels. Both pipistrelle species tend to avoid open habitats and are more closely associated with structured habitats such as woodland, treelines, hedgerows and riparian corridors. The retention of field boundaries and the provision of treelines along green corridor will provide linkage between the Masterplan Area and Corkagh Park to the south. These linear features will also provide linkage to SuDS areas that will have the potential to provide high quality foraging habitat for these bat species.

The appropriate design of lighting within the Masterplan Area and particularly along hedgerows, green corridor treelines and in SuDS pond area will be crucial to ensuring that these habitat features have the potential to provide high quality foraging habitat for bats. These areas should not be illuminated by lighting schemes associated with the Masterplan. Figure 6.5 shows the areas of the Masterplan Area that should remain unlit. Unlit corridors should be maintained along these features, so that continued linkage and foraging is provided along them.

BA8: Ensure that the Retained Hedgerows & Treelines and Green Corridors FB4, FB 5, FB6, FB 8, FB 9, FB 10, FB 11, FB14 and GC1, GC2, GC6, GC10 and SuDS Ponds and Existing Ponds remain unlit by artificial lighting.





Kilcarbery Grange

Green Infrastructure Guidelines

Doherty Environmental

November 2017

Kilcarbery Grange Masterplan

Green Infrastructure

16th November 2017

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Draft	1	Pat Doherty MSc, MCIEEM
Draft	1.1 review	Ruth Minogue MA(Econ) MCIEEM
Draft	2	Pat Doherty MSc, MCIEEM
Final	3	Pat Doherty MSc, MCIEEM

For and on behalf of

Doherty Environmental

Prepared By: Pat Doherty

Signed:



This report has been prepared by Doherty Environmental with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is prepared for South Dublin County Council and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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1.0 INTRODUCTION

The purpose of this document is to summarise the intent described in section 5.2 of the Ecology Baseline & Biodiversity Management Report entitled Biodiversity Management Guidelines attached to the Kilcarbery Grange Masterplan, and to describe how the retention of key elements of existing green infrastructure should integrate with the overall SUDS. The document will also outline the landscape strategy and key considerations and principles in the creation of a high quality landscape and urban design principles for the site.

A key element of the Kilcarbery Grange Masterplan has been the incorporation of existing and new green infrastructure into the Plan. The principal Green Infrastructure elements existing within the Plan area are hedgerows, treelines and drainage ditches.

The new Green Infrastructure elements will comprise the provision of high quality public open space, creation of key linkages to existing parkland, new treelines, swales and integrated construction wetlands.

The Green Infrastructure objectives of the Masterplan are:

- To create high quality public open spaces that respond to their environment, are well designed, allow for a mix of active and passive recreation, facilitate ease of maintenance and are visually attractive.
- To create multifunctional green spaces that provide a setting for amenity, biodiversity and water management.
- To retain existing green corridors and create new green corridors that will encourage biodiversity and informal recreational use and maintain north-south connectivity to Corkagh Park.
- To create water features based on the site's natural drainage that function as semi-natural greenspace and sustainable drainage management.

Guidelines for the incorporation of each of these Green Infrastructure elements are outlined below.

2.0 KEY COMPONENTS FOR GREEN CORRIDORS

The Green Corridors within the Masterplan Area will consist of existing hedgerows to be retained and new hedgerow and/or treeline corridors. Figure 1 and 1a below provide a location plan of Green Corridors within the Masterplan Area. These Green Corridors, which are drawn from the Ecology Baseline & Biodiversity Management Report, will comprise the following:

- The following existing hedgerows/treelines will be retained: FB4; FB6; FB8; FB9; FB11; Sections of FB5, between FB8 and FB10; and the northern section of FB14.
- New treelines will be installed along the following Green Corridors:
- Three hedgerow treatment types have been designed for hedgerows within the Masterplan area. These treatment types are illustrated on Figure 2 Hedgerow Treatment Types. The retained field boundaries and green corridors along which each of these treatment options will be applied are outlined in Figure 1a.
 - Treatment 1 will comprise an Urban type “Box-Cut Hedgerow”, which may incorporate a swale;
 - Treatment 2 will comprise a “Natural Hedgerow”, a minimum of 2m in width. This hedgerow may incorporate an existing swale to the side finished with a grassy meadow verge a minimum of 2m bounding both sides; and
 - Treatment 3 along selected lengths of FB5 will incorporate a swale along the mid-line, a “Natural Hedgerow”, a minimum of 2m in width on both sides of the drainage ditch/swale and a grassy meadow verge, with a minimum of 2m bounding both sides.
- A signature Green Corridor field boundary treatment will be applied along FB11, the southern boundary of the Masterplan area. A wide swale and pond necklace landscape treatment will be provided along this boundary along with a pedestrian and cycle shared route. The boundary will link into the existing wetland and ponds to the southeast of the Masterplan Area within Corkagh Park. Figure 3 provides an outline design of the key elements of this southern boundary Green Corridor.
- In conjunction with the above the configuration of the southern-most green space and surrounding urban blocks should be adapted to exploit and enhance north south connectivity to the Park.
- All Natural Hedgerows will support a variety of native broadleaved tree species. A minimum of five species will be supported by these hedgerows. These species will include a mix of the following: ash, pedunculate oak, hazel, wyth elm, crab apple, hawthorn, blackthorn, elder, spindle and eared willow.

- Natural Hedgerows will be maintained so that a diversity of hedgerow structure is provided. Tall and short ($\leq 3\text{m}$) sections will be provided. Thick and dense cover at the base of the hedgerow will be maintained and gaps along hedgerows will be minimised. Gaps to facilitate pedestrian access or visual permeability will be provided at selected locations along hedgerows.
- The outer edges of the Natural Hedgerows will be maintained so that they undulate, or have a wavy plan profile.
- Natural Hedgerows will be managed as follows:
 - Hedgerow trimming will be undertaken on three year rotations.
 - Hedgerow trimming will be alternated between sections of hedgerows so that at least one-third of the hedgerow length remains uncut.
 - Hedgerow trimming will be undertaken between the months of January and February.
- Box-Cut Hedgerows will be a minimum width of 1m and a minimum height of 1.5m. They will be comprised of typical native hedgerow species occurring at Grange Kilcarbery. These species will include: hawthorn, blackthorn, and hazel.
- Box-Cut Hedgerows will be cut on an annual basis during the months of January and February.

Figure 1: Field Boundary Map



Fig 1a: Retained field boundary and new planted green corridors



Fig 2: Hedgerow Treatment Types

Hedgerow Treatment Types

Note: -Dimensions indicated are generally minimum
 -Hedgerows heights to be within range indicated

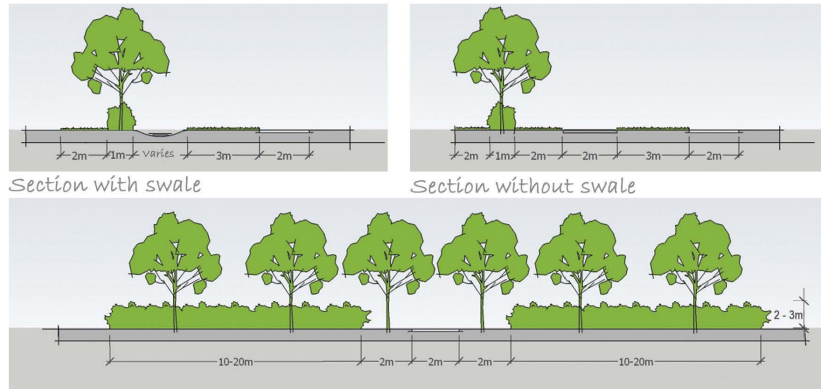
Figure 2

1. Box cut hedgerow - with or without swale



Elevation

2. Natural hedgerow - with or without swale



Elevation

3. Natural hedgerow - double-sided with swale (FB5 only - tba)

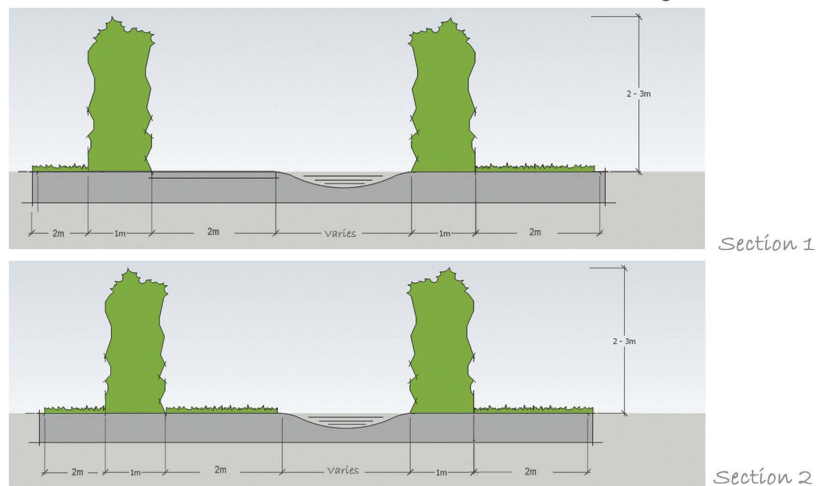
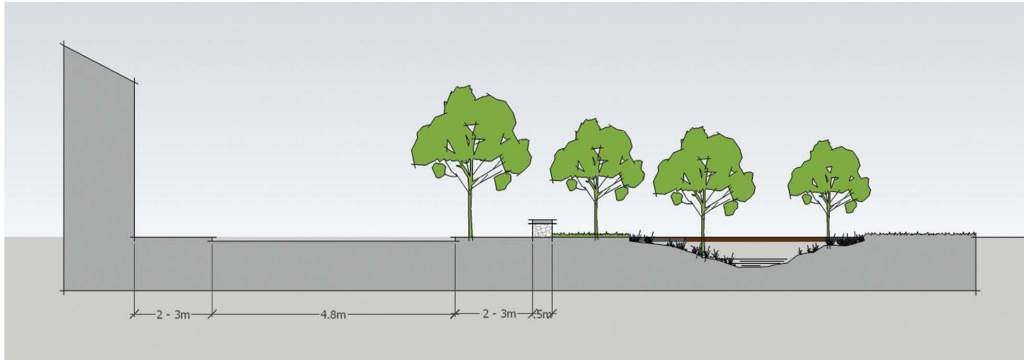


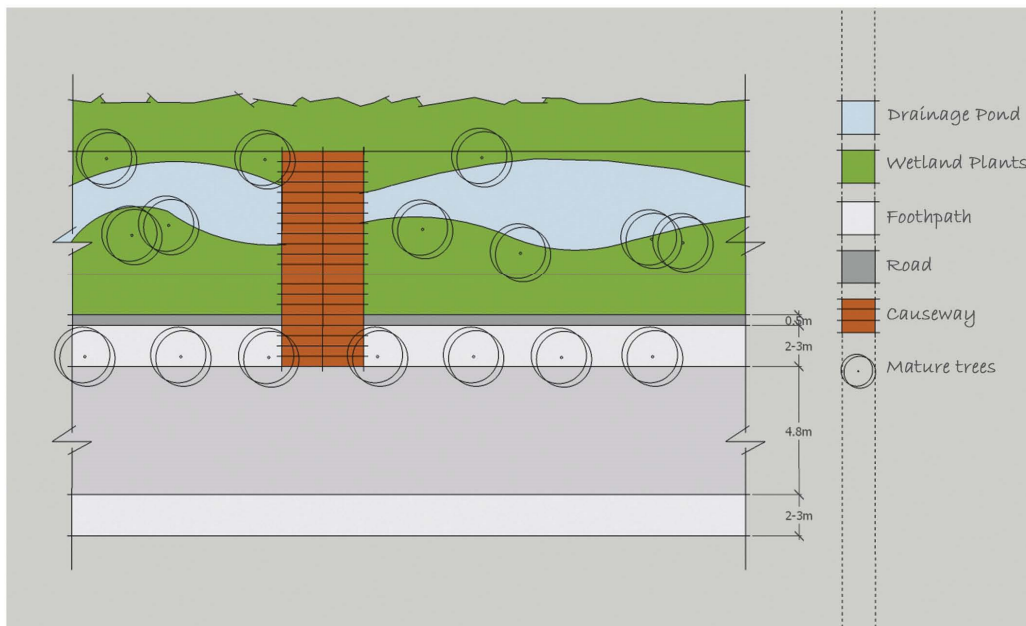
Fig 3: Preliminary Design of Southern Boundary Corridor with Corkagh Par

Preliminary Design of Southern Boundary Corridor with Corkagh Park

Figure 3



Elevation

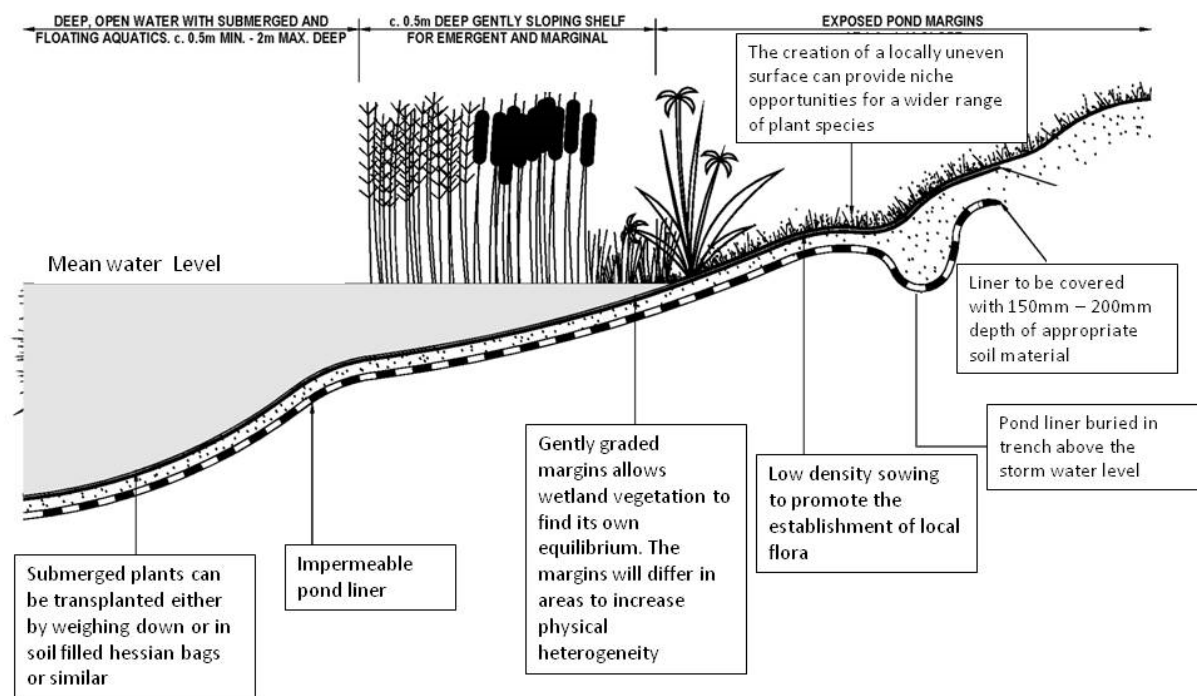


Plan

3.0 KEY COMPONENT FOR SUDS

- Filtration of all surface water run-off from the site prior to final discharge into existing surface water networks must be incorporated into the design of the SUDS system by way of integrated Constructed Wetland (ICW).
- Suggested locations for ICW are illustrated on Figure 7
- The detailed design of the ICW will comply with all relevant standards and will also be designed to maximise their potential to support biodiversity. A typical sketch of an ICW pond that aims to maximize its potential to support biodiversity is provided as Figure 4 below.

Figure 2: Section through margin of ICW Pond. Adapted from Vol. 4 UK DMRB



The following specifications will be incorporated into ICW ponds to maximum their value for Biodiversity:

- Bank slopes will be graded unevenly to promote greater physical heterogeneity. Sections of the banks should include gently sloping sides, no steeper than a slope of 3:1;
 - Sections of the sloping banks should be permanently saturated so that they are able to support aquatic and semi-aquatic vegetation. The following species will be planted permanently saturated bank slopes: Bulrush (*Typha latifolia*); Floating sweet-grass (*Glyceria fluitans*); Common club-rush (*Schoenoplectus lacustris*); Common reed (*Phragmites australis*); Yellow iris (*Iris pseudocarus*); Amphibious bistort; bottle sedge (*Carex rostrata*)
 - In the marginal zone the following herbaceous vegetation will be sown: water mint (*Mentha aquatica*), water plantain (*Alisma plantago-aquatica*), lesser spearwort (*Ranunculus flammula*), meadowsweet (*Filipendula ulmaria*), marsh woundwort (*Stachys palustris*), purple-loosestrife (*Lythrum salicaria*), horsetail species (*Equisetum* spp), marsh pennywort (*hydrocotyl vulgaris*), sneezewort (*Achillea ptarmica*), wild angelica (*Angelica sylvestris*), marsh-marigold (*Caltha palustris*), cuckooflower (*Cardamine pratensis*), wavy bitter-cress (*C. flexuosa*), hairy bitter-cress (*C. hirsuta*), common mouse-ear (*Cerastium fontanum*), sedge species (*Carex* spp), creeping bent (*Agrostis stolonifera*), red fescue (*Festuca rubra*), smooth meadow grass (*Poa pratensis*), rough meadow grass (*Poa trivialis*), marsh foxtail (*Aleopecurus geniculatus*).
 - The pond liner will be covered with appropriate soil material to support planted vegetation; and
 - Variable depths will be installed and maintained in the pond.
 - An island habitat to provide additional habitat and refuge for fauna, particularly wetland bird species will be instated within the pond;
- Attenuation may be achieved by means other than ponds and the following mechanisms are open for consideration Stormtec, oversized pipes, green and blue roofs, tree-box filers, downspout disconnection etc.
 - Where Stormtec is being incorporated the preferred location is under cul de sac roads rather than open space (subject to agreement in relation to context and specific details with Local Authority)
 - Surface water conveyancing systems where possible should be via the existing ditch and hedgerow systems (modified as per typical sketches). Where required underground and oversized piped systems may also be incorporated.

- The existing drainage ditches along field boundaries, FB5, FB8, FB9, FB10, FB11 and FB14 will be retained and used as swales.
- Design criteria for swales will include the following:
 - Maximum side slopes will be 3:1. Slopes and depths should be minimised to the extent practical for aesthetic and safety reasons. The base width should be a minimum width of 2 feet.
 - Check dams should be installed at regular intervals along the swales to promote ponding. Large rocks that are obvious and do not become concealed by vegetation should be used as check dams. Such rocks will create an attractive as well as effective check dam and will provide micro-habitat for species (e.g. basking sites for invertebrates etc.). Figure 5 provides examples of swales.
 - All new swales will be bounded by filter strips a minimum of 2m in width. Broadleaved trees should be planted along the filter strips (see example diagram in Figure 6).
 - Grassy verges along retained field boundaries and new green corridors will function as natural filter strips.

Figure 3: Example of Swale (source: Natural England 2009)



Figure 4: Example of Swale Design Features (source: Graham et al. 2012)

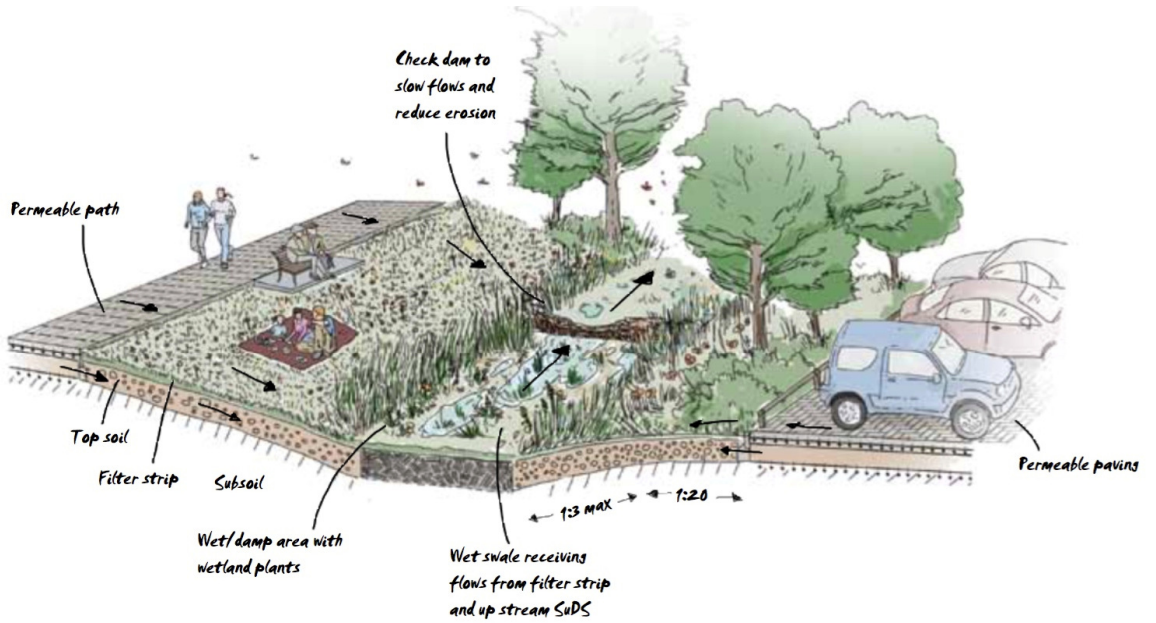


Figure 5 Suggested locations for Integrated Constructed Wetlands (ICW)



4.0 KEY COMPONENTS FOR LIGHTING

The following key principles for public lighting along Green Corridors (i.e. all retained and new hedgerows and treeline corridors) within the Masterplan area should be implemented to reduce the potential negative impacts of lighting on wildlife:

- Where feasible a Central Monitoring System (CMS) for lighting should be used for all public lighting within the Masterplan Area. This will facilitate the implementation of a variable lighting regime (VLR) to suit both people and wildlife within the Masterplan Area.
- Maintain a “Dark Corridor” along the southern side of FB11 and along the western side of the Green Corridor shown in Figure 8 below.
- Maximise the spacing between lights to reduce light intensity.

- Reduce light spill by directing light only where it is needed. The upward spread of light above the horizontal plane should be avoided. This will be achieved by installing low beam angle lights, less than 70 above the horizontal plane.
- Blue-white short wavelength lights should be avoided.
- Lights with a high UV content should be avoided.

Figure 8 Dark corridors identified for Kilcarbery Grange



5.0 KEY COMPONENTS FOR LANDSCAPING AND URBAN DESIGN

A high quality landscape and urban design is required to ensure/include/address the following:

GREEN INFRASTRUCTURE

The broader **Green Infrastructure** context of the surrounding area of the site should inform the site layout and the provision of open space. Connections to or from the proposed open spaces to existing/other open spaces, provision of amenity for future residents, climate change adaptation, retention of existing mature trees and hedgerows and the potential for permeability through walk/cycle routes are all elements to be strongly considered prior to proposing the site layout.

At the project stage a **Site Survey** is required showing existing site features such as specimen trees, mature trees, hedgerows, rocky outcrops, important views and existing water features/streams. Significant natural features should be retained and inform the proposed site layout.

Water attenuation by means of **Sustainable Urban Drainage Systems** (detailed elsewhere) contributes to **Blue-Green Infrastructure**; however, delivery of Blue-Green Infrastructure should be carefully balanced with the necessity to deliver usable public open/green space.

LANDSCAPE DESIGN

Open space design (including parks, squares, streets and SUDS) must deliver high quality usable space within a Landscape Masterplan that defines the role of each space.

The proposed open space shall form an accessible interconnected network designed to retain the sites natural features, protect biodiversity, provide variety, and high levels of amenity.

The provision of safe, accessible, legible, well-lit (depending on biodiversity objectives for specific locations) and clearly defined routes linking and connecting spaces are required. These should facilitate shared or segregated (as appropriate) walking and cycling use.

To promote a greater sense of place, proposed development should be designed around major parks and squares as a focal point or feature. Incidental left over spaces are not acceptable.

The landscape design should create: welcoming open spaces, parkland settings, or urban landscapes that enhance their settings and complement the character of the area. Treatment of boundaries to the overall site and within the site shall be carefully considered and detailed.

The landscape design shall include the consideration of visual amenity in the open space. Elements such as landmark buildings, natural features, clear sightlines and vistas in conjunction with signage and information contribute towards legibility and perform important functions for wayfinding, particularly for the elderly or people with cognitive impairments.

Proposed building edges shall front on to open spaces, not back on or side on in order to provide strong passive surveillance of open space.

The street design shall provide clear accessible streets that support walking and encourage social interaction within the whole community with a comprehensive design of footpaths, boundary treatments and street trees and furniture to include a materials palette.

The quality of materials used within the landscape and street design should reflect the hierarchy of spaces within the site. The quality of materials, especially at significant locations is important to sustainable place-making. Durability and ease of maintenance is to be carefully considered within the proposals.

The landscape design shall include both the location, placement and type of public lighting, street furniture, signage and seating. Careful placement is required to make a landscape user friendly and legible. A furniture palette shall be prepared that matches the furniture proposed to location and details the specification of each. Consideration to be given to visual amenity, prevent of clutter, creating a specific character for the area through consistency and creating a hierarchy of public spaces matching high quality 'special' pieces to areas of high visual or public importance.

The open space shall cater for both active and passive recreation; natural play is to be incorporated into open spaces to provide for active, imaginative, and controlled risk taking by younger children. Active recreation provision should incorporate facilities / designs suitable for all generations; including teenagers and older people, encouraging outdoor use and active lifestyles.

The school site shall incorporate an all-weather pitch that is available for community use after school hours. The design of boundaries and accesses to the pitch shall facilitate this dual use.

Public Realm construction standards should be commensurate with the specification for the Spine Road Infrastructure and constructed to SDCC Taking in Charge Standards for roads and public lighting

URBAN DESIGN

Site analysis should lead to a site **Concept Plan**. This should be illustrated with a Design Statement that also addresses the 12 Criteria contained in the Urban Design Manual (DoEHLG).

The proposed layout shall allow the use of sustainable forms of transport such as cycling, walking and public transport, with clearly defined footpaths and cycle-ways linking all buildings and public areas. Parking areas should not be a dominant feature.

The location of public space close to public transport connections and interchanges or other major linkages.

Promote greater connectivity and permeability throughout the development through the provision of a network of well-connected public spaces and streets, with materials, and signage that is easily interpreted by all.

Crossing points and routes should be clearly identifiable, appropriately located with respect to facilities and follow pedestrian desire lines.

All street designs shall comply with DMURS (Design Manual for Urban Roads and Streets).

PROPOSED PLANTING:

New planting within the site should ensure enhanced visual amenity, sensory stimulation, and have a seasonal interest. New planting along Green Corridors should aim to provide functional linear habitat for biodiversity. Planting plans should carefully consider use of consistency to provide legibility and rhythm (e.g. along a street side). At other locations the use of variations in texture, colour and species can provide interest and variety. While visually prominent sites can incorporate special planting schemes, in the main planting should also ensure ease of maintenance.

Trees Generally:

A tree planting strategy should be developed for tree planting in the overall area; that shows a consistency of tree type along particular street corridors, or within local areas.

Proposed trees in open space should be large size and of native species in general open space areas. Non-native species can be included in hard-scape areas or areas where space is confined

Street Trees

A tree planting strategy should be developed that shows a consistency of tree type along particular street corridors, or within local areas.

Proposed **street trees must not conflict with proposed lighting standards** and the finalised locations of both must be shown on the landscape plan. Street trees will be narrow-crowned species. Tree trunks should be located 5 metres away from proposed street lights in accordance with **SDCC Tree Policy**. Lighting along Dark Corridors (see Figure 8) should be consistent with the objectives outlined in Section 4 above.

Street trees provide a vital decorative role for the streetscape and break up the hard edges of the built environment. They also play an important role in promoting biodiversity by providing areas of refuge for native fauna.

Street trees should be provided at every opportunity on all streets within Kilcarbery Grange. Street trees should be semi-mature in higher specification areas at the time of planting. Heavy standard trees may be planted elsewhere.

A continuous line of large street trees should be provided along the length of the larger streets to provide an avenue like effect. Larger streets may facilitate a double row of trees.

The distance between street trees will be dependent on species types and the requirement for other items of street furniture (such as public lighting) and on-street parking. However, every effort should be made to provide a formal line of planting with regular distances between each tree.

Street trees should be provided at regular intervals along site streets and back streets. The placement of trees will be dependent on on-street parking. Placement should be maximised by opportunistic placements in areas such as between sections of parking bays and within verges.

A neighbourhood by neighbourhood approach should be taken to species selection, with each neighbourhood characterised by a particular type of tree planting and design of tree pits.

Tree pits should consist of porous materials, which may include some paving or resin bound gravel. Tree pits are to be adequate in size to accommodate the future growth of large trees. Where trees are in paving a structural (urban) soil is required that can extend under adjacent paved areas to ensure adequate pit size.

Where larger species of trees are provided along larger streets trees should be planted within a continuous urban soil strip that extends under adjacent parking bays or hard paved areas.

The selection of street trees should have careful consideration to the width of verges and setbacks to adjacent buildings. Preference will be given to native species that improve biodiversity by providing habitats for native fauna where possible.

DRAWINGS:

At the project stage a **Landscape Scheme** is required to include:

A **Site Survey** drawing showing location of existing landscape features (streams, views, trees, hedges etc.) and the proposed retention or loss of any of these in the proposals, including tree protective fencing lines.

Tree and Hedgerow Survey: where trees and hedges are present on site a Survey should be carried out at the very outset of site investigation by a qualified Arborist (ideally a member of the Arboriculture Association, Irish Chapter). This should inform and influence the site layout and ensure retention of existing good trees and hedgerows. It shall be lodged in conjunction with an Ecology report, be carried out in accordance with British Standard 5837:2012 and shall comprise three colour drawings to 1:500 scale with a written report, as follows:

- A Tree Survey drawing showing all existing trees/hedges on site, showing all trees on site in their true and current condition, regardless of the proposed development (impartial assessment of trees on site).
- An Arboricultural Implications Assessment drawing (AIA) with Arboricultural Method Statement (AMS) (indicates the effects of proposed development on existing trees).
- A Tree Protection Plan showing the line of protective fencing for all trees and hedges to be retained on site during the course of construction,

A **Landscape Masterplan** and other relevant drawings all at appropriate scales and in colour, to include both **detail plans and cross-sections** and detailing the boundaries of and within the site.

Planting Plan and written specification are required with an emphasis mainly on native planting.

Detail design drawings and written specifications for **hard landscape features and play spaces** using the principles of **Natural Play**.

Details associated with temporary roads, showing **location of site compounds**, construction storage areas, to ensure no conflict with existing features being protected and retained.

Developers are urged, not obliged, to use **Chartered Landscape Architect** services for larger schemes and preferably a member of the Irish Landscape Institute (I.L.I.) to ensure high professional standards.

The Landscape Architect is to be retained during site works and shall provide a **Certificate of Practical Completion**.

REFERENCES

Graham, A, Day, J., Bray, B., & Mackenzie, S. (2012). Sustainable Drainage Systems: Maximising the Potential for People and Wildlife. RSPB & WWT.

Natural England (2009). Green Infrastructure Guidance.

UK Highways Agency (2006). Design Manual for Roads and Bridges: Vegetative Treatment Systems for Highway Runoff. Volume 4, Section 2.

Construction Environmental Management Plans (CEMPs)

A CEMPS shall be prepared in advance of the physical elements proposed as part of this masterplan and will be implemented throughout. Such plans shall incorporate relevant mitigation measures indicated below.

- South Dublin County Council (SDCC) will be informed in advance of construction activities in sensitive environmental areas.
- SDCC will be informed of all construction or maintenance works located within the vicinity of watercourses linked to designated conservation areas. Monitoring of works in these locations will be undertaken and the results of monitoring will be provided to SDCC.
- Where works are undertaken in/adjacent to sensitive environmental receptors all construction/maintenance staff will be inducted by means of a "Tool-box Talk" which will inform them of environmental sensitivities and the best practice to be implemented to avoid disturbance to these receptors

All construction and maintenance works will be undertaken in accordance with the following guidance documents:

- o Inland Fisheries Ireland's Requirements for the Protection of Fisheries Habitat during Construction and Development Works.
 - o CIRIA (Construction Industry Research and Information Association) Guidance Documents
 - o Control of water pollution from construction sites (C532)
 - o Control of water pollution from linear construction projects: Technical Guidance (C648)
 - o Control of water pollution from linear construction projects: Site Guide (C649)
 - o Environmental Good Practice on Site (C692)
 - o NRA Guidance Documents
 - o Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes
 - o Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads
 - o Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and Post Construction of National Road Schemes
-
- Any excavations and/or vegetation removal will be minimised during construction and/or maintenance works.
 - Excavated material will not be stored immediately adjacent to watercourses.
 - Disturbance to natural drainage features should be avoided during the construction and/or maintenance of routes.
 - Construction machinery should be restricted to public and or site roads. As a general rule machinery should not be allowed to access, park or travel over areas outside the footprint of proposed walking/cycling routes.

- During route maintenance no construction activities should be undertaken at watercourse crossing in wet weather conditions.
- Suitable prevention measures should be put in place at all times to prevent the release of sediment to drainage waters associated with construction areas and migration to adjacent watercourses To reduce erosion and silt-laden runoff, create, where possible, natural vegetation buffers and divert runoff from exposed areas, control the volume and velocity of runoff, and convey that runoff away from.
- Where necessary drainage waters from construction areas should be managed through a series of treatment stages that may include swales, check dams and detention ponds along with other pollution control measures such as silt fences and silt mats
- Where vegetation removal associated with treelines, hedgerows, individual mature trees, scrub or woodland is required, this shall only be undertaken outside the breeding bird season, between March and August inclusive.
- Where extensive areas of ground are to be exposed during route construction or maintenance dust suppression should be undertaken during periods of dry weather.
- All chemical substances required during construction and/or maintenance works will be stored in sealed containers.
- Any refuelling or lubrication of machinery will not be undertaken within 50m of a watercourse
- Spill kits will be required on site during construction and/or maintenance works.
- Ensure non-native, invasive species do not occur at construction/maintenance areas, or if occurring, are not spread as a result of works. The NRA Guidance on invasive species, outlined above will be adhered to as well as the Invasive Species Management and Control Plan

CEMPs typically provide details of intended construction practice for the proposed development, including:

- a) location of the sites and materials compound(s) including area(s) identified for the storage of construction refuse
- b) location of areas for construction site offices and staff facilities
- c) details of site security fencing and hoardings
- d) details of on-site car parking facilities for site workers during the course of construction
- e) details of the timing and routing of construction traffic to and from the construction site and associated directional signage
- f) measures to obviate queuing of construction traffic on the adjoining road network
- g) measures to prevent the spillage or deposit of clay, rubble or other debris
- h) alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public right of way during the course of site development works

- i) details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels
- j) containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained; such bunds shall be roofed to exclude rainwater
- k) disposal of construction/demolition waste and details of how it is proposed to manage excavated soil
- l) a water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains
- m) details of a water quality monitoring and sampling plan
- n) if peat is encountered - a peat storage, handling and reinstatement management plan
- o) measures adopted during construction to prevent the spread of invasive species (such as Japanese Knotweed)
- p) Appointment of an ecological clerk of works at site investigation, preparation and construction phases.