



Grange Castle Waste Licence Application

Environmental Impact Assessment Report

15th October 2019



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Document Control Sheet

Client:	South Dublin County Council		
Project Title:	Grange Castle Waste Licence Application		
Document Title:	Environmental Impact Assessment Report		
Document No:	MDR1223Rp0005		

Text Pages:	133	Appendices:	4	Current Revision:	F01
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Rev.	Status	Date	Author(s)	Reviewed By	Approved By
F01	Final	15 th October 2019			

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GLOSSARY

AADT - Annual Average Daily Traffic

ACA - Architectural Conservation Area

AER - Annual Environmental Report

AFM - Annals of the Four Masters

AONB - Areas of Outstanding Natural Beauty

ATC - Automatic Traffic Counter

BAP - Biodiversity Action Plan

C&D - Construction and Demolition

CFRAM - Catchment Flood Risk Assessment and Management

CIEEM - Chartered Institute of Ecology and Environmental Management

CIRIA - Construction Industry Research and Information Association

COMAH - Control of Major Accident Hazards

CRTN - Transport's Calculation of Road Traffic Noise

CSO - Central Statistics Office

CEMP - Construction Environmental Management Plan

DAU - Development Applications Unit

DCHG - Department for Culture, Heritage and the Gaeltacht

DECLG - Department of Environment, Community and Local Government

DEFRA - Department of Environment, Food and Rural Affairs (UK)

DMRB - Design Manual for Roads and Bridges

DMURS - Design Manual for Urban Roads and Streets

EC - European Communities

EF - Emission Factor

EIAR - Environmental Impact Assessment Report

ELC - European Landscape Convention

EMRA - Eastern and Midland Regional Assembly

EIA - Environmental Impact Assessment

EPA - Environmental Protection Agency

EU - European Union

GCGC – Grange Castle Golf Club

GDA - Greater Dublin Area

GHG - Greenhouse Gas

GWB - Groundwater Bodies

HA - High Amenity

HGV - Heavy Goods Vehicle
HLC - Historic Landscape Characterisation
HLCT - High Lying Character Type
IAPS - Invasive Alien Plant Species
IEMA - Institute of Environment Management and Assessment
IFI - Inland Fisheries Ireland
IOA - Institute of Acoustics
LCA - Landscape Character Area
LCT - Landscape Character Types
LoW - List of Waste
LV - Light Vehicles
MCA - Multi-Criteria Analysis
NBDC - National Biodiversity Data Centre
NCT - National Car Test
NHA - National Heritage Areas
NIAH - National Inventory of Architectural Heritage
NLS - National Landscape Strategy
NPF - National Planning Framework
NPWS - National Parks and Wildlife Services
NRA - National Roads Authority
NTA - National Transport Authority
OPW - Office of Public Works
OSI - Ordnance Survey Ireland
pNHA - proposed National Heritage Areas
pSPA - proposed Special Protection Area
QLFS - Quarterly Labour Force Survey
QNHS - Quarterly National Household Survey
RFC - Ratio to Flow to Capacity
RMP - Record of Monuments and Places
RPO - Regional Policy Objectives
RPS - Record of Protected Structures
RSA - Road Safety Authority
RSES - Regional Spatial and Economic Strategy
SAC - Special Areas of Conservation
SCI - Site of Community Importance
SDCC - South Dublin County Council

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SMR - Sites and Monuments Record

SPA - Special Protected Areas

TEN-T - Trans-European Networks

TII - Transport Infrastructure Ireland

tpa - Tonnes per annum

TSGDA - The Transport Strategy for the Greater Dublin Area

UNESCO - The United Nations Educational, Scientific and Cultural Organisation

VOCs - Volatile Organic Compounds

WADT - Weekly Average Daily Traffic

WFD - Waste Framework Directive

WHO - World Health Organisation

WMA - Waste Management Act

ZoI - Zone of Influence

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NON-TECHNICAL SUMMARY

This EIAR has been provided to support the Waste Licence application by South Dublin County Council to the EPA for a Soil Recovery Facility at the Grange Castle Golf Club, New Nangor Road, Dublin 22, D22 WY66.

Site Location

South Dublin County Council (SDCC) owns Grange Castle Golf Club (GCGC) which is located off the N7 road at Clondalkin, Dublin 22.

The golf course is bounded by the R136 Outer Ring Road to the east and the Nangor Road to the north. A number of industrial units are located immediately north of the main entrance off the Nangor Road. Corkagh Park is located immediately to the east.

Casement Aerodrome, a military airbase owned by the Irish Department of Defence, is situated to the south west. A business park and football club and pitch are located to the south.

High density housing developments are located to the north east. In 2007, circa 50 hectares of land to the west of the site were developed for Profile Park Business Park and a number of data centres are also located in this area.

The surrounding landscape is made up of a patchwork of pasture and arable fields, with grassland being the dominant land cover. The field system is separated by clumps of mixed woodland and sparse hedgerow networks. Dense patches of mixed woodland, playing pitches and landscaped areas dominate the southern part of the area in Corkagh Park. The predominant landscape character type is flat urban fringe farmland.

Site History

Grange Castle Golf Club was established in 1998 and is owned by SDCC. The golf club is managed and maintained by Synergy Golf Limited. The golf course is located within a parkland with an 18 Hole course with seven lakes and a number of streams.

The main entrance to the golf course is located off the Nangor Road. A club house including a small café, toilet facilities and car park are located on the north of the site. A maintenance yard and associated building are located to the rear of the club house. The GCGC lands are described as follows:

- The original golf club is an active golf course in 2019.
- Phase 1 consisting of 8 Holes, c24.46ha was completed in June 2006 and now forms part of the active golf course.
- Phase 2 - known as 'the 5 Holes', c.15.58ha, commenced in October 2007, and consists of mounds of soil that have been contoured. Phase 2 works were placed on hold early 2008 due to access restrictions from poor ground conditions and these works have not yet been completed.

- Phase 3 - known as 'Holes 14 and 15' is c.8.38ha and consists of mounds of soil that have been contoured. Phase 3 works (Holes 14 and 15) commenced in February 2008. These works were paused in May 2009 and have not yet been completed.

The development of Phases 1, 2 and 3 (hereafter referred to as "the site") are indicated in **Figure A** and are the subject of the Waste Licence application and this EIA.

During October 2007 and May 2009 some material was imported to GCGC from various sources to areas defined as the 5 holes (Phase 2) and holes 14 & 15 (phase 3) to provide a mounding around the perimeter of the course and between fairways to enhance safety and prevent stray balls leaving the course or injuring players on the adjacent hole.

No waste material was imported to Phase 1 which is now been fully landscaped as an active golf course. The volume of infill material within the '5 holes' (Phase 2) and 'holes 14 & 15' (Phase 3) was calculated following a review of historic (1998) and current (2009) topographic surveys which provided information on pre and post filling levels.

The volume of infill material was calculated at 90,230m³ for Phase 2 and 126,726m³ for Phase 3. It is estimated (based on a unit weight of material *in situ* assumed to be c. 1.5t/m³) that approximately 325,000 tonnes of material was imported into the site.

The material was described in the 2011 Environmental Risk Assessment (refer **Appendix C**) as being typically comprised of a grey/brown gravelly clay matrix with a minor waste component. The waste component comprised less than 2% extraneous inert materials from construction and demolition developments such as plastic, timber, textiles, brick, concrete and metals.

The material previously imported comprises the following EWC Codes;

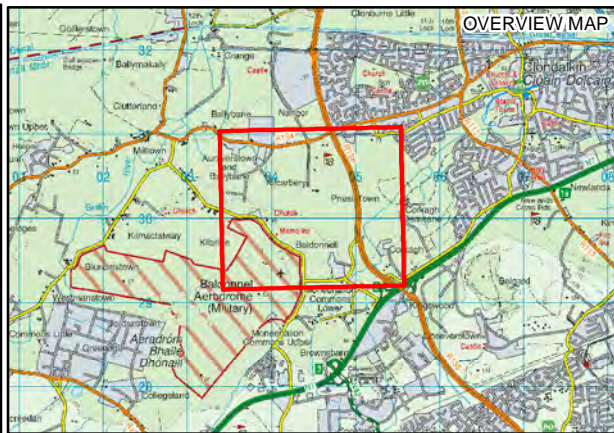
- 17 05 04 soils and stones other than those mentioned in 17 05 03; and
- 17 01 07 mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06.

Enforcement History

The importation of material to the site for the further development of the course was the subject of an initial complaint to the Environmental Protection Agency (EPA), with the core of the complaint relating to the requirement for waste authorisation.

Following receipt of information from SDCC, the EPA issued a decision indicating that the activity was not subject to a requirement for waste authorisation.

Following this decision, two additional complaints were received in September 2010. The EPA completed a site inspection in October 2010 and subsequently issued a site inspection report whereby the EPA advised that it was rescinding the previous declaration and considered the infill material to be a waste and subject to waste management legislation and advising of the necessity for a Waste Licence for the site.



Legend

Extent

Phases of Development

- Initial Golf Course Development
- Phase 1
- Phase 2
- Phase 3



Initial
Golf Course
Development

Phase 2
(5 Holes)

Phase 1
(8 Holes)

Phase 3
(14 & 15
Holes)

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PROJECT **Grange Castle Golf Club - Waste Soils Recovery Facility**

TITLE **Figure A - Extent of Grange Castle Golf Club and Phases of Development**

	West Pier	T: +353 1 488 2900
	Business Campus	F: +353 1 4620814
	Dun Laoghaire	W: www.rpsgroup.com/Ireland
	Co Dublin	E: Ireland@rpsgroup.com

Drawing No. :	MDR1223Arc0002D01	Drawn By. :	NA
		Checked By. :	CW
		Approved By. :	xxx
		Date :	03/08/2016

SCALE: 1:11,000 (A3)

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

In February 2011, SDCC commissioned an Environmental Risk Assessment (ERA) and this is included in **Appendix C** of this EIAR. This ERA was completed on Phase 1, Phase 2 and Phase 3 of the site. This ERA report was submitted to EPA in May 2011 following which the EPA requested SDCC to provide a proposal to regularise the site in accordance with the Waste Management Act, 1996 (as amended) having regard to Ministerial Direction of 3rd May 2005 (Circular WIR: 04/05).

Proposed Development

The proposed development constitutes the regularisation of waste areas in Phases 1 to 3 at the golf club as a Soil Recovery Facility through the application for a retrospective Waste Licence as per the EPA direction. The Waste Licence application is being made to regularise the site in respect to the historical unregulated importation of soil onto the site.

The Main Class of Activity selected in for the purposes of this Waste Licence application is:

R5: Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials

No other classes of activity are being sought.

The proposal in the Waste Licence application is for the material to remain *in situ*, with no construction works required. As a consequence of the EPA direction and the findings of the ERA, there is no proposed removal of the imported materials. There is no proposed movement of the materials onsite through regrading, profiling, etc. and no further importation of material to the site will take place.

This retention of the materials onsite is the subject of this EPA Waste Licence application and environmental impact assessment report.

The EPA stated that SDCC is not required to remove the material in its entirety from site and that, if granting of waste authorisation is successfully obtained by SDCC from the EPA, this may provide for the extension of the Golf Course to be completed, if deemed appropriate.

No waste material will be accepted on to the subject site, therefore, there are no quantities of waste proposed as part of the application. The existing 325,000 tonnes of material imported will remain *in situ* and will not be moved.

There is no proposed development or operations, and no construction or operational activity will take place in relation to this application. Therefore, no operational hours are proposed with respect to this application.

The application does not propose to abstract groundwater or surface water for use at the site, nor does it propose to use water from the public supply or any other source. The application does not propose to generate renewable or non-renewable electricity at the subject site.

As no activity will be taking place, no methods, processes, ancillary activities, abatement, recovery and treatment systems, operating procedures, plans, process flow diagrams, reports or supporting

documentation in relation have been proposed or developed with respect to this application. No infrastructure will be developed, and no plant or machinery will be required on site.

There are no significant existing emissions from the subject site. There is a potential for fugitive dust emissions from the existing material remaining on site, however, the effects are deemed imperceptible given the existing ground colonisation by plants that bind the material.

Aftercare monitoring of dust, surface water and groundwater is proposed at a series of locations to be agreed with the EPA under the Waste Licence.

A full Closure Restoration and Aftercare Management Plan (CRAMP) has been prepared in accordance with EPA guidelines and has been included as part of this EIAR (refer **Appendix B**).

Legislative Context

Under the European Communities (Waste Directive) Regulations 2011 (S.I. No.126 of 2011) the material imported to Phase 1, Phase 2 and Phase 3 is classified as waste and not as a by-product.

Under the Waste Management Act, 1996 (as amended) and having regard to the Ministerial Direction of 3rd May 2005 (Circular WIR: 04/05) the EPA does not require the removal of the material in its entirety from site.

Having regard to Circular 04/05, and where it is deemed appropriate to leave waste *in situ*, the holder of the waste shall:

- Carry out, or arrange for the carrying out, of a risk assessment to determine the environmental impact, if any, of the waste illegally deposited;
- Make application for a permit or licence to the relevant local authority or the Agency which will determine the actions required by the holder to remediate and manage the site into the future;
- Comply with any permit or licence so given to ensure that all remediation and management measures determined by that permit or licence are complied with and that the site poses no identifiable future threat to the environment or human health; and
- Not be permitted to import greater quantities of material for deposition other than such inert material/soil as may be necessary for site conditioning.

Alternatives

In the context of the proposal/application, alternatives relate primarily to the issues of the site location and the site layout. Given the finding of the ERA, there is no requirement for a remedial strategy, so this possibility is not considered further in this assessment. A number of different scenarios have been reviewed to determine the optimum approach to managing with the imported waste. The following alternative scenarios are assessed in this EIAR:

1. Leave on-site - leaving all materials onsite with no disturbance.
2. On-site processing – extracting all materials and processing onsite to remove those materials that are contaminated and are not appropriate for placement at the site, then

- replacing the soil and stone back in place. Extracted materials to be managed at an appropriate offsite facility.
3. Partial off-site and infill - extracting those materials that are contaminated and are not appropriate for placement at the site, and placement at an appropriate offsite facility.
 4. Dig and dump - removing all materials offsite for management at an appropriate facility

Each of the above scenarios were assessed through a review of the impacts through a set of multi criteria analysis. The analysis indicates that Scenarios 2 to 4 require construction works which would generate environmental impacts during the construction phase. These environmental impacts may be mitigated by implementing appropriate measures outlined in a Construction Environmental Management Plan (CEMP). The operation phases of Scenarios 2 to 4 would have moderate environmental impacts with effective mitigation in place.

Scenario 1 requires no construction work therefore negligible environmental impact is predicted. Also, as per the recommendation of the ERA, Scenario 1 is an acceptable option to leave the soil *in situ*, therefore Scenario 1 is the most appropriate for consideration. The contents of this EIAR assess the operational impacts of Scenario 1 involving no construction works and the soil remaining *in situ*.

Human Beings, Health and Socio-Economic

The focus of the chapter is on establishing the potential for socio-economic impact on population, health and employment in the area and impacts on the community, including the resident, working and visiting community. Land use is considered in addressing impacts on the resident and working community.

Due to the retrospective nature of this EIAR no construction phase impacts have been considered and only operational phase impacts have been considered. The operational phase refers to the imported soil remaining *in situ* subject to no further works.

As the site will continue to operate in the same location with no further import or export of soils, or other significant changes to the site layout, there will be no imperceptible effects on human beings or socio-economic impacts.

There are no mitigation measures required in regard to human beings or socio-economic impacts. The site should be managed as a non-active soils' recovery facility as licenced by the EPA.

Air Quality, Climate and Noise

This chapter of the EIAR describes the baseline environment of the site in terms of Air Quality, Climate, Noise and Vibration, and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

Air quality in the area (in line with data from the Greater Dublin Area) is good with no ongoing exceedance of air quality limits in the area. Existing sources of emissions in the area include the road network, Casemount Aerodrome and the industry in the area (pharma and data centres).

Existing sources of noise in the area would include typical suburban background noises such as wind on trees and rustling foliage, road traffic noise, noise associated with commercial activities in the vicinity, background agricultural noises depending on the time of year and noise from residential areas. Casement Aerodrome, immediately to the south west of the site, is also a major source of intermittent noise in the area.

The operational phase refers to the imported soil remaining *in situ* subject to no further works. There are imperceptible effects on climate, noise and vibration from this operation. A slight negative effect on the air quality of the surrounding area may be experienced as a result of windblown dust. While there is to be no construction works or expected further soil transfer at the site due to the presence of the un-vegetated soil there is a risk that dust may cause an impact at sensitive receptors in close proximity.

Four dust gauges will be put in place onsite to continually monitor levels and ensure monthly dust levels will remain below the guideline of 350mg/m²/day as a 30-day average at sensitive receptors as outlined in the German Government TA Luft guidance.

Landscape and Visual Impact

The surrounding landscape is made up of a patchwork of pasture and arable fields, with grassland being the dominant land cover. The field system is separated by clumps of mixed woodland and sparse hedgerow networks. Dense patches of mixed woodland, playing pitches and landscaped areas dominate the southern part of the area in Corkagh Park. The predominant landscape character type is flat urban fringe farmland.

As the site will continue to operate in the same location with no further import or export of soils, or other significant changes to the site layout, there will be no changes to the Newcastle Lowlands Character Area attributable to the subject site. There are also no views or prospects identified for preservation in the current County Development Plan in the surrounding site area.

There is a slight negative visual impact from the existing soil stockpiles. However, this is a short-term impact as the soil will be recolonised by the natural vegetation over time.

The removal of hedgerows and tree lines will be avoided for the ongoing operation of the site. There are no other specific mitigation measures required regarding landscape and visual impacts. The site should be managed as a non-active soils recovery facility as licenced by the EPA.

Biodiversity

The study area within the GCGC is widely dominated by recolonising bare ground while treelines and hedges delineate the site boundaries for the most part. Other sparse habitats include scrub, spoil and bare ground, other artificial lakes and ponds and drainage ditches. The current lack of active management of the study area does not involve any activity with the potential of impacting these ecological features and their environmental value.

The protected species identified in the area include Western European Hedgehog, Eurasian Badger and bats all of which could be affected if there were any change to the current lack of active

management. However, as there are no planned operations for the site, there are no likely effects predicted in respect of these protected species.

The nearest European site to the golf club is the Glenasmole Valley SAC (Site Code 001209) which is located circa 7km from the site. As such, no impact on European sites is predicted from the development and an Appropriate Assessment Screening (refer **Appendix A**) has been prepared for the site for inclusion in the Waste Licence application.

There are two nationally designated sites with direct hydrological connectivity with the site through the Baldonnell Stream, namely the Grand Canal pNHA and the Liffey Valley pNHA. The ERA concluded that the material import into the study area would involve a low risk to human health and to the environment (refer **Appendix C**), it is then considered unlikely that the retention of the imported inert material has had any significant effect on these two nationally designated sites.

In the absence of any change in the current management, the presence of an identified invasive species, Butterfly bush (*Buddleja davidii*), which was identified in Phase 3, will be monitored by SDCC to ensure that uncontrolled expansion does not occur. Where large or monodominant stands become established, control measures shall be considered, in accordance with NRA (2010).

Hydrogeology and Hydrology

The limestone bedrock underlying the site is classified as a locally important (Li) aquifer, i.e. bedrock which is moderately productive in local zones only. There are no gravel aquifers in the vicinity of the site.

Groundwater vulnerability is related to the type and thickness of subsoils in an area. The vulnerability for the majority of the site is classified as "high" and "extreme" for a small section in the southern part of the site.

The golf course consists of several artificial ponds which are connected via a series of interconnecting drains. The internal drainage network of the north western half of the site discharges to the Baldonnell Stream and the remainder discharges to the south east towards the Camac River. Both the Baldonnell Stream and the Camac River are tributaries of the River Liffey, which flows into Dublin Bay.

The operational phase refers to the imported soil remaining *in situ* subject to no further works. There is no predicted effect on the hydrogeology in the area. There is a slightly negatively/unperceivable effect on the hydrology. However, the imported soil comprises mainly stiff clays this would prevent the silt run off into water courses and vegetation has been established which would also prevent run off.

Groundwater and surface water monitoring is proposed as part of the licence application to allow for the future tracking of potential impacts of the proposed development and allow for any impact to be identified and readily mitigated.

Soils and Geology

The bedrock geology beneath the site comprises the Lucan Formation which consists of Carboniferous Dinantian Dark Limestone and Shale (Calp) which comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. There are no karst features on the site or within the general vicinity of the site.

The majority of the site is underlain by till derived from limestone with a thin band of alluvium to the east of the site. Site conditions encountered during the ERA reported infill material which comprised light brown slightly gravelly clay with some cobbles.

The 2011 ERA calculated the volume of infill material is circa 325,000 tonnes. The material comprised of grey/brown gravelly clay matrix with a minor waste component comprising materials such as plastic, tarmac, textiles, timber, brick, concrete and metals.

There is a slight negative/unperceivable effect on the soils on the site as there is a slight disruption to the natural lithology of the site. The imported soil comprises mainly stiff clays this would slightly reduce the soil quality and reduce water infiltration rate, this is evident in the slow rate of vegetative recolonization.

Cultural Heritage

The site is located in the townlands of Kilcarberry, Prieststown and Balldonnell Lower. There were a number of castles, large houses and demesnes historically in the area. Nangor Castle was situated to north of the facility and Kilbride Castle to the west. There is no surface evidence for either of these castles.

Corkagh Demesne is situated to the east. The house associated with this demesne was demolished in the 1960s. Kilcarberry House, which is still in existence, is a feature within the golf course.

While there are a number of interesting cultural heritage features in the vicinity of this site, there are no Recorded Monuments or Places (RMP) sites within the facility or golf course boundaries. Kilbride House is situated within the boundary of the golf course.

The operational phase refers to the imported soil remaining *in situ* subject to no further works. As such, there is an imperceptible effect on the cultural heritage of the site and the surrounding area.

Material Assets – Traffic

The site is accessed from the New Nangor Road / R134. The New Nangor Road is a two-way single-lane carriageway road, with a single footway and cycleway heading west from the entrance roundabout, and footways, cycleways and bus lanes along both sides heading east.

The New Nangor Road / R134 travels east – west and connects with the Long Mile Road / R110, which leads into Dublin city centre.

Other roads in the vicinity of the site include the N4 / M4, which runs to the west of the country; the N7 which runs to the south and south west of the county; and the M50 Dublin orbital motorway to the east.

No truck movements are predicted for this Waste Soil Recovery Facility as the facility has ceased importing or exporting material. A level of maintenance will be required on the facility and will require the movement of machines such as hedge or grass cutters to and from the facility.

Interactions and Cumulative Impacts

A matrix method has been used to explore the potential for impact interactions for the proposed development. **Chapter 13** addresses interactions between the various environmental disciplines with regard to the development. The purpose of the table is to allow interaction between various disciplines to be recognised, although the level of interaction will vary in each case. A number of factors have influenced the consideration of impact interactions including the limited environmental impact of the imported soil and the lack of future plans to implement any further works.

Cumulative impacts may arise from the combined effects of a number of existing or proposed developments, in combination with the proposal to change operations being evaluated, on a single receptor or multiple receptors. The cumulative impact for each environmental factor is predicted to be minimal for the site.

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1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared to accompany a Waste Licence application by South Dublin County Council (SDCC) to the EPA for a site at the Grange Castle Golf Club (GCGC), New Nangor Road, Dublin 22. The site location is shown in **Figure 1.1**.

1.1 PROJECT OVERVIEW

The EIAR supports an application to the EPA for a Waste Licence to regularise the site as a Soil Recovery Facility. The proposal in the Waste Licence application is for the material to remain *in situ* and therefore no additional construction works are required.

An Appropriate Assessment (AA) screening report and Closure Restoration and Aftercare Management Plan (CRAMP) have also been prepared to support the Waste Licence application. The Appropriate Assessment (AA) Screening report is attached as **Appendix A** and the Closure Restoration and Aftercare Management Plan (CRAMP) is attached as **Appendix B** to this EIAR.

In addition, an Environmental Risk Assessment (ERA) was conducted on the site in May 2011 (refer **Appendix C**). This ERA found that the imported material was be largely inert which did not require any remedial actions to prevent risk to human health or the environment.

The project will comprise the soil and stone material which was historically imported onto site remaining *in situ*. It will not be subject to additional works such as re-grading, sorting or landscaping. No further soil or other materials classified as wastes will be imported onto site (other than topsoil listed in the CRAMP for restoration). This means there will be no construction phase. This EIAR is written in the context of the current condition of the site with no further works planned. As such no construction phase impacts or mitigation measures will be considered within the EIAR.

These works have been completed - the Waste Licence application and the EIAR address historic activities. Only the operational phase impacts (i.e. the material remaining *in situ*) and associated mitigation measures of the project are considered.

The Waste Licence boundary pertains to the site - the areas which were impacted by the imported material and not to the entire golf course. The extent of the Waste Licence boundary (hereafter referred to as "the site") is indicated in **Figure 1.2**.

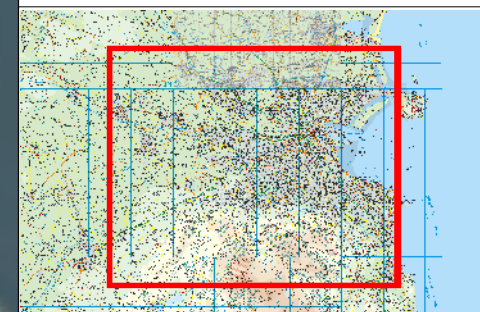


Legend

- Site Boundary
(covered by Waste Licence)
- Grange Castle Golf Club
Boundary



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Client

Project
**Grange Castle Golf Club
Waste Licence**

Title
Site Location

Figure: 1.1



**West Pier Business Campus,
Dun Laoghaire,
Co. Dublin,
Ireland.**
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E: ireland@rpsgroup.com
W: rpsgroup.com/ireland

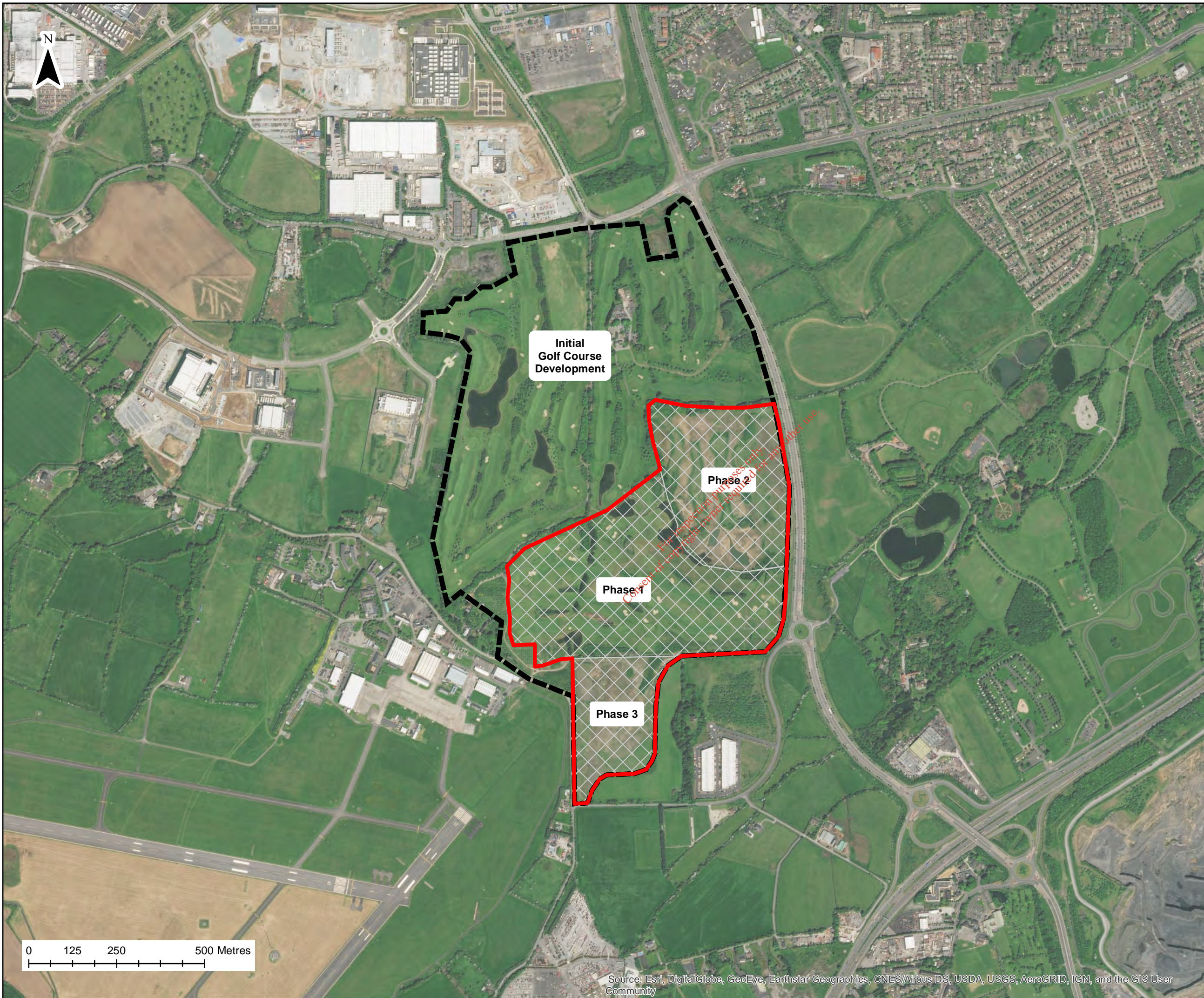
Issue Details

Drawn By: HF	Project No. MDR1223
Checked By: BMcP	File Ref:
Approved By: BMcP	MDR1223Arc1001D02
Scale: 1:100,000 @ A3	Drawing No.
Date: 08/08/2018	Arc1001
	Rev:
	D02



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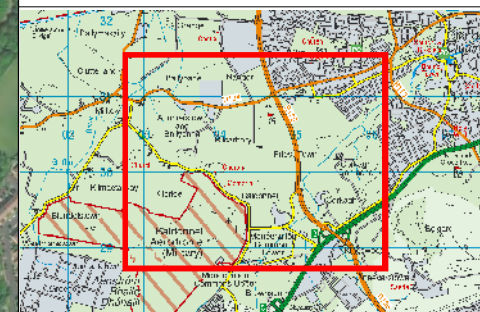


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

-  Site Boundary (covered by Waste Licence)
-  Grange Castle Golf Club Boundary



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Waste Licence
Boundary

Figure: 1.2



West Pier Business Campus,
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Issue Details

Drawn By: HF	Project No. MDR1223	
Checked By: BMcP	File Ref:	
Approved By: BMcP	MDR1223Arc1002D01	
Scale: 1:10,000 @ A3	Drawing No.	Rev:
Date: 08/08/2018	Arc1002	D01

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1.2 EIA PROCESS

An Environmental Impact Statement Report (EIAR) is the document produced as a result of that Environmental Impact Assessment (EIA) process, it is defined in the EIA Regulations (S.I. 296 of 2018) as: ‘a report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive’. Its purpose is to identify the environmental effects of a development and examine how these impacts can be avoided or reduced during the design process, construction and operational stages of the proposed development. The impacts are evaluated in terms of their significant, nature and magnitude.

Broadly speaking the EIA process involves steps which include the production of a report (EIAR), although this report is not the outcome but rather an output to assist in a wider decision-making framework. This EIAR will be used by the EPA to decide to consent or refuse the application or to seek further information if required.

In line with current guidance, the EIA for the proposal development commenced at the project design stage. Subsequently, the scope of the study was determined with input from specialists in technical, planning and environmental disciplines.

This EIAR will accompany an application to the EPA where it will be circulated to statutory stakeholders and made available to the public for consultation prior to any decision being made. It is acknowledged that the EIA process can extend beyond direct consent and into implementation of monitoring and mitigation programmes with the end focus being the protection of the environment in the long-term.

Figure 1.3 outlines the overall EIA process and the position of this EIAR in the overall process. Further details on the requirement for an EIAR and other related documentation is provided in **Chapter 2 Waste Policy and Legislation**.

This EIAR has been prepared in accordance with the following guidance and reference sources:

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
- The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).
- The EPA *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)* (2017).
- The DHPLG published the revised *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (August 2018).

A reference list detailing the sources used for the descriptions and assessments included in each of the technical assessments is listed in each EIAR chapter presented. The specific objectives of this EIAR is to:

- Identify the likely environmental impacts that the imported material remaining *in situ* would have on the local environment;
- Evaluate the magnitude and significance of the likely environmental impacts; and
- Propose appropriate measures to avoid or minimise adverse environmental impacts.

The EIAR has been prepared in full by a team of RPS environmental engineers including specialists in Ecology, Hydrogeology, Hydrology, Geology and Air Quality.

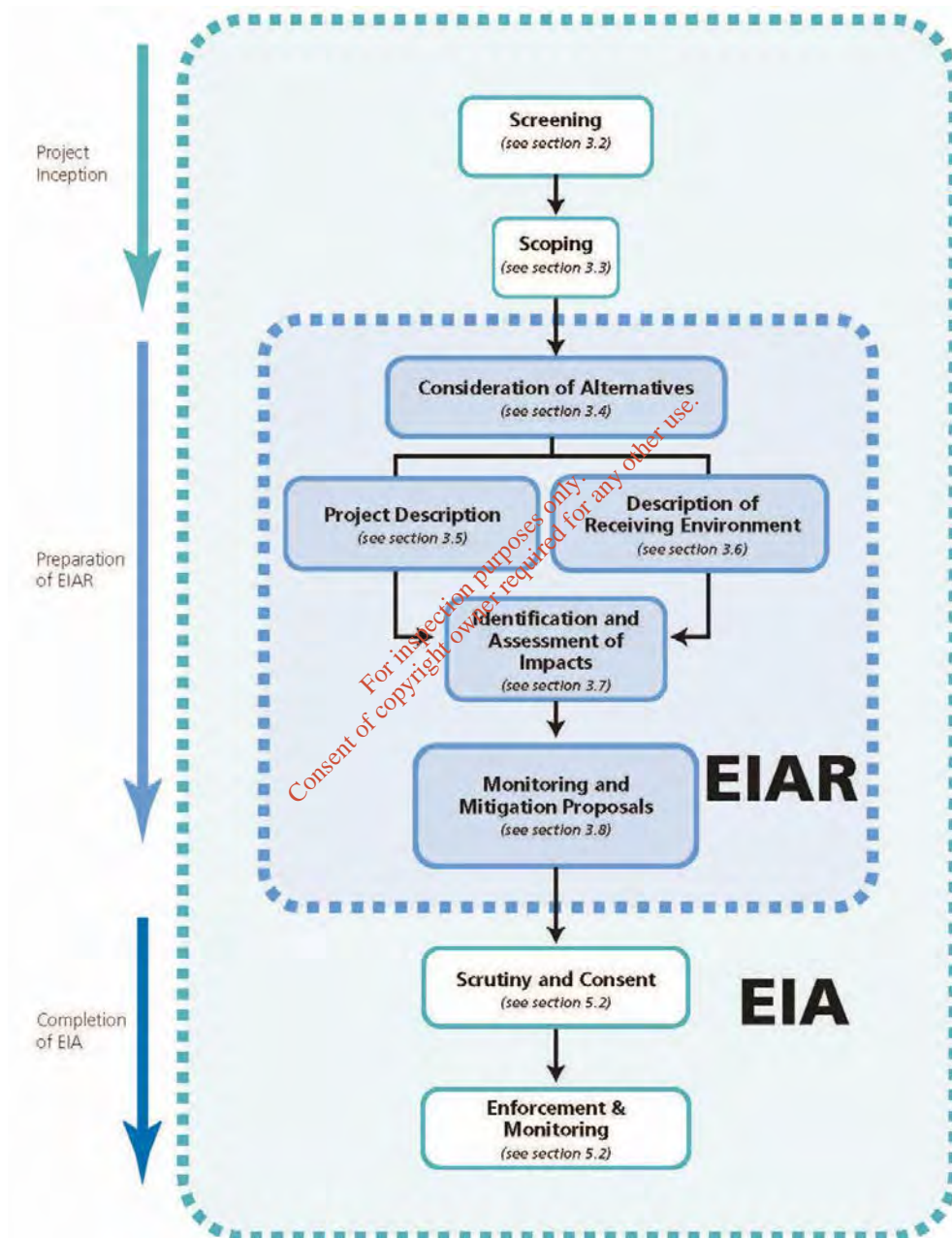


Figure 1.3 The Position of EIAR within the EIA Process¹

¹ Source: EPA Guidelines on the Information to be Contained in an EIAR, draft May 2017

1.3 EIA SCOPING

Scoping is an integral part of the EIA process, the aim of which is to identify the issues that are likely to be important during EIA and eliminate those which are not. The process of scoping involves assessing the project's possible impacts and the alternatives that can be addressed, and deciding which impacts are likely and significant.

The scoping identifies the issues and emphasis that are likely to be important during the EIA process. Important issues are initially identified by considering the principal characteristics of a proposed development against the principal characteristics of the receiving environment (the environment in which the development is being carried out). Scoping must be focused on issues and impacts, which are listed as follows:

- Environmentally based,
- Likely to occur, and
- Significant and adverse.

An EIA Scoping Report for the proposed development was prepared in September 2016 specifically for consultation with the EPA who will be regulator for the Waste Licence. In July 2017 the EPA responded with a series of notes that have been addressed within this EIAR and the wider Waste Licence Application and these are listed in **Table 1.1**.

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Table 1.1 EPA Response to the Scoping Report

EPA Note	Addressed in the Application
<i>It is noted that you intend preparing an Environmental Impact Statement. You will be aware that any new EIA will now be conducted in accordance with Directive 2014/52/EU. Thus any EIA Report (in place of an EIS) must conform to the requirements of this Directive and not, as quoted in your report, the 2011 Directive.</i>	Noted as stated in Section 1.2 .
<i>Any proposal to import waste into the facility should be quantified and described in detail in a licence application. No waste acceptance can be authorised by the Agency except where quantified and justification of need provided for the importation. This will include any soil, stone or other materials classified as waste. With regard to notifying materials as by-products, no presumption should be made that materials that would otherwise be classified as waste will be authorised for acceptance as by-products and used on that basis.</i>	Noted. There is no proposed further importation of any waste material or by-products to the site. As part of the CRAMP (refer Appendix B) it is proposed to import circa 20,000 tonnes of clean virgin topsoil to the site for restoration and seeding of Phases 2 and 3.
<i>The hydrogeological risk assessment associated with the licence application should be up to date and comprehensive. Given the scale of waste acceptance at the facility, it may be that relying on extant, off-site groundwater monitoring facilities might not be adequate to fully describe the groundwater environment (e.g. flow direction, depth, quality) beneath, upgradient and downgradient of the facility. Reliance on anything other than a bespoke monitoring programme should be technically justified in the EIAR. Your reference to the EPA's guidance regarding a general requirement for three groundwater monitoring points is relevant in this regard.</i>	Noted and this is referenced and included in Chapter 9 .
<i>The impact and risk of impact on surface water quality should be addressed in detail in the EIAR and should be based on surface water sampling and analysis carried out to date.</i>	Noted and this is referenced and included in Chapter 9 .
<i>It is not clear whether EIA has been completed previously during the grant of planning permissions for the golf course. If not, it may be appropriate to seek the detailed views of the responsible planning authority with regard to the environmental aspects of the development, as is and to be, when preparing the EIAR now. This should include in particular those aspects of the EIA that do not come within the functions of the EPA. The EPA will in any event consult as required in relation to EIA.</i>	No EIA has been carried out for the site to date. All previous planning history is recorded and noted in the application and Section 3.3 of this report. Both the SDCC planning office and ABP have been consulted as part of this EIA process (refer Section 1.5).
<i>The closure, restoration and aftercare of the waste facility should be addressed in detail in the EIAR.</i>	A site-specific CRAMP has been prepared for the site and is included in Appendix B and summarised in Section 3.8 .
<i>The techniques to be used to prevent the generation of dust and noise emissions should be addressed in detail in the EIAR.</i>	Noted and this is referenced and included in Chapter 6 .
<i>One of the objectives of your licence application is to demonstrate that there is no ongoing risk of environmental pollution arising as a result of waste activities carried out previously at the facility and proposed to be carried out in future. Any risks so identified will require mitigation measures and these should be set out and proposed for implementation.</i>	All mitigation (including ongoing monitoring) has been based on the potential for significant residual risk of contamination and all mitigation is set out in the relevant chapters.

1.4 EIAR STUDY TEAM

This EIAR has been prepared by RPS, on behalf of SDCC, with specialist inputs provided by a team of suitably competent experts as listed in **Table 1.2**.

Table 1.2 EIAR Competent Experts

Discipline	Specialist	Qualifications and Experience
Chapter 1: Introduction Chapter 2: Waste Policy and Legislation Chapter 3 Project Description Chapter 4: Alternatives Chapter 5: Human Beings/Socio Economic Chapter 9: Hydrogeology and Hydrology Chapter 10: Soils and Geology Chapter 13: Interactions	Dr. Blathnaid McPolin, RPS	Hons Bachelors Degree in Microbiology Research Masters Degree in Microbial Pathogenesis PhD in Environmental Microbiology and Contaminated Land 7 years' experience in preparing EIA for waste development.
Chapter 6: Noise, Air Quality and Climate	Paul Chadwick, RPS	BA (Mod) Chemistry M. Phil in Atmospheric Chemistry 18 years' experience in preparing EIA for waste, infrastructural, industrial and commercial development.
Chapter 7: Landscape and Visual	Ray Holbeach, RPS	BSc (Hons) Environmental Science, Master of Landscape Architecture, Chartered Member of the Landscape Institute Member of the Irish Landscape Institute 27 years' experience in urban and rural design, and Landscape and Visual Impact assessment.
Chapter 8: Ecology	Dr. Tim Ryle, RPS	Ph.D Ecology, BSc (Hons) Botany, Member of Institution of Environmental Sciences (MIEnvSc) 18 years experience in preparing ecological assessment for a range of developments in Ireland.
Chapter 11: Cultural Heritage	Dr. Clare Crowley, Courtney Deery Heritage Consultancy	PhD in Archaeology, BA (Hons) in Ancient History, Archaeology & French, Certificate in Repair and Conservation of Historic Buildings, Certificate in Condition Surveys of Historic Buildings, 20 years' experience in evaluation of archaeological monuments, buildings, sites and landscapes for EIA.
Chapter 12: Traffic and Transport	Ronan Grealy, RPS	B.E. (Hons) Civil and Environmental Engineering, M.Eng.Sc. (Civil): 'Traffic Impact Assessment of Developments' Chartered Member of the Institution of Engineers of Ireland 15 years' experience in Transport Assessments for EIA, preparing Sustainable Transport Plans and preparing Urban Area Transportation Studies.

1.5 CONSULTATIONS

This section describes the consultation process carried out in relation to the EIA. It also outlines the any issues raised during the process and how these issues have been considered in the impact assessment chapters.

In accordance with Section 3 of the *'Draft Guidelines on the Information to be contained in Environmental Impact Assessments Reports'* (EPA, 2017), the consultation process consisted of consultation with statutory bodies, competent bodies and interested parties.

Consultation forms an essential part in the preparation of an EIAR. The early involvement of the public and other stakeholders helps to ensure that the views of various groups or individuals are taken into consideration throughout the EIA process and allows appropriate mitigation to be considered in the EIA for issues that are raised during consultation.

The aim of the consultation process was to:

- Inform and engage stakeholders and encourage feedback;
- Provide an open and transparent process for members of the public to participate in the project;
- Provide opportunities for the public and stakeholders to provide baseline and other information with respect to the potential impacts that could arise as a result of the project; and
- Keep the public informed of the project as it progresses.

RPS undertook written consultation with stakeholders during the beginning of the EIAR process to advise them of the EIAR and Waste Licence application. The consultation letters were sent out on the 7th June 2018. **Table 1.3** sets out the list of stakeholders contacted and the responses received.

The EPA response to consultation has been detailed in **Section 1.3** of this report.

Table 1.3 Statutory and Non-Statutory Organisations and other Competent Parties Consulted

Consultees	Response
Grange Castle Golf Club	No response
An Bord Pleanála	No response
Fáilte Ireland	No response
An Taisce	No response
Arts Council/An Comhairle Ealaíon	No response
Heritage Council	No response
The National Monuments Advisory Council	No response
Department of Agriculture and Food & the Marine	No response
Department of the Housing, Planning, Community and Local Government	No response
ESB	No response
Baldonell Aerodrome (military)	No response
Geological Survey of Ireland	No response
Inland Fisheries Ireland	No response
Irish Water	No response
Health Services Executive	Noted correspondence
Department of Culture, Heritage and the Gaeltacht	Recommendation made of various ecological surveys to be completed at the site as part of the EIA analysis. All surveys have been carried out by the project ecologist (refer Chapter 8).
Office of Public Works	Notification of the lands of GCGC are subject to fluvial flooding risk using the Eastern CFRAM Study. This has been factored into the hydrology analysis in Chapter 9 .
South Dublin County Council <ul style="list-style-type: none"> • Roads section • Planning and development section • Water services section 	The Water Pollution Control Section of SDCC supplied a suite of water quality data analysis undertaken in the vicinity of the site for reference and these are referenced in Chapter 9 .
Transport Infrastructure Ireland (formerly NRA)	Providing TII best practice guidelines in regard to the EIA. Noted in the traffic analysis in Chapter 12 .

1.6 DIFFICULTIES ENCOUNTERED

The EIA Regulations require that difficulties such as technical deficiencies encountered, lack of information or knowledge encountered in compiling specified information for the EIA be described.

In general, there were no significant difficulties encountered in the production of this EIA. Any issues encountered during assessment of individual factors are as noted within the specialist sections. Assumptions specific to certain environmental aspects are also discussed in the relevant chapters of this EIA.

Difficulties encountered and assumptions that have been made during preparation of this EIAR are set out below:

- The irrigation wells employed in the 2011 ERA (GW1 and GW2) could not be located on site for the purposes of informing this EIAR.
- Relevant information has obtained from publicly available sources and mapping databases such as the EPA, NPWS, GSI, OPW, etc. It has been assumed that the information is correct and while reasonable care and skill has been applied in review of this data no responsibility can be accepted for inaccuracies in the data supplied.

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2 WASTE POLICY AND LEGISLATION

A significant book of statute and policy statements governs the management of waste in Ireland. European policy and legislation provide much of the basis for national policy for managing waste and resource. This policy and legislation in Europe and Ireland are extensive and complex. European and national policies are increasingly focused on sustaining the lifespan of resources and a range of policy and market measures are being considered.

2.1 EU WASTE POLICY

At EU level, the Waste Framework Directive (2008/98/EC) ('the WFD') has previously set the legal framework for waste management in the European Union. The WFD sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The WFD lays down some basic waste management principles - it requires that waste be managed without endangering human health and harming the environment, and without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

The Directive states that:

'Waste policy should also aim at reducing the use of resources, and favour the practical application of the waste hierarchy'

The waste hierarchy consists of a methodology for the management of waste, with prevention of waste being the priority, followed by material re-use, recycling, recovery and disposal in that order. It goes on to state that the recovery of waste and use of recovered materials should be encouraged to conserve natural resources.

In May 2018 the EU published Directive (EU) 2018/851 of the European Parliament and of the Council amending Directive 2008/98/EC on waste. The revised Waste Framework Directive (WFD) provides the legislative framework for the collection, transport, recovery and disposal of waste in the EU and is to be transposed by July 2020.

2.2 NATIONAL POLICY AND LEGISLATION

A series of National Waste Policy Statements have been put in place since 1998 with the last publication, A Resource Opportunity, published in 2012. The policy landscape has changed from a focus on modernising Ireland's waste management systems through better regulation, enforcement and infrastructure to greater resource efficiency and life cycle thinking. It also introduced a rationalisation of waste management regions to ensure better planning, which in turn will free up resources for other priority areas. It sets out measures which Ireland can focus on to ultimately reduce the amount of waste produced annually. It sets out a waste hierarchy which follows that of the Waste Framework Directive as follows:

- Prevention;

- Reuse;
- Recycling;
- Recovery, and
- Disposal.

Regional policy which is aligned to the national agenda has been recently refreshed with the publication of the three regional waste management plans (refer **Section 2.3**) whose new focus is to help and deliver greater resource cycles through targeted actions involving all key stakeholders.

In Ireland, the primary legislative platform for waste is provided by the Waste Management Act (WMA), 1996, and the Protection of the Environment Act, 2003. The WFD was transposed into Irish law in 2011.

2.3 REGIONAL POLICY

The 'Eastern-Midlands Regional Waste Management Plan 2015-2021' was launched on the 14th May 2015 and is the key waste policy driver for waste management in the GDA. The three key objectives of the Eastern-Midlands Region Waste Management Plan are:

1. Prevent waste: a reduction of one per cent per annum in the amount of household waste generated over the period of the plan.
2. More recycling: increase the recycle rate of domestic and commercial waste from 40 to 50 per cent by 2020.
3. Further reduce landfill: eliminate all unprocessed waste going to landfill from 2016.

The plan is underpinned by National and European waste legislation and the work carried out will ensure the continued management of waste in a safe and sustainable manner.

2.4 MINISTERIAL DIRECTION OF MAY 2005 (CIRCULAR WIR: 04/05)

The Ministerial Direction of 3rd May 2005 (Circular WIR: 04/05) indicates that where it is deemed appropriate to leave waste *in-situ*, the holder of the waste shall comply with the following four conditions:

- *Carry out, or arrange for the carrying out, of a risk assessment to determine the environmental impact, if any, of the waste illegally deposited;*
- *Make application for a permit or licence to the relevant local authority or the Agency which will determine the actions required by the holder to remediate and manage the site into the future;*
- *Comply with any permit or licence so given to ensure that all remediation and management measures determined by that permit or licence are complied with and that the site poses no identifiable future threat to the environment or human health;*
- *Not be permitted to import greater quantities of material for deposition other than such inert material/soil as may be necessary for site conditioning.*

This Ministerial Direction is central to the proposal to allow the material at GCGC remain *in situ* at the site.

2.5 EPA INTERPRETATION OF LEGISLATION

The EPA has indicated that, in accordance with the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) the materials imported to the GCGC site are classified as waste and are not a by-product.

The EPA has indicated that, in accordance with the Waste Management Act, 1996 (as amended) and having regard to the Ministerial Direction of 3rd May 2005 (Circular WIR: 04/05) the EPA does not require the removal of the material in its entirety from the site.

2.6 REFERENCES

Eastern-Midlands Region Waste Management Plan 2015-2021, Eastern-Midlands Waste Management Region (2015).

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste

European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011

Waste Management Act 1996, No 10 of 1996 (as amended).

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3 PROJECT DESCRIPTION

3.1 SITE LOCATION

South Dublin County Council (SDCC) owns the GCGC which is located off the N7 at Clondalkin, Dublin 22.

The golf course is bounded by the R136 Outer Ring Road to the east and the Nangor Road to the north. A number of industrial units are located immediately north of the main entrance off the Nangor Road. Corkagh Park is located immediately to the east. To the south west Casement Aerodrome situated which is a military airbase owned by the Irish Department of Defence. An industrial unit and football pitch are located to the south. High density housing developments are located to the north east. 50 hectares of lands to the east were developed in 2007 for Profile Park Business Park however to date only one unit has been developed within the business park.

The surrounding landscape is made up of a patchwork of pasture and arable fields, with grassland being the dominant land cover. The field system is separated by clumps of mixed woodland and sparse hedgerow networks. Dense patches of mixed woodland, playing pitches and landscaped areas dominate the southern part of the area in Corkagh Park. The predominant landscape character type is flat urban fringe farmland.

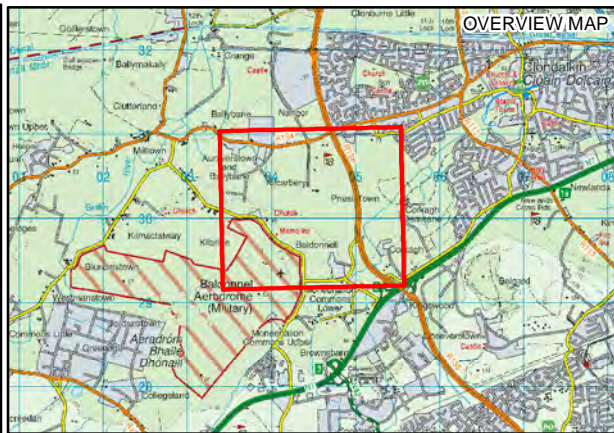
3.2 SITE DESCRIPTION

Grange Castle Golf Club was established in 1998 and is owned by SDCC and managed and maintained by Synergy Golf Limited.

The golf course is located within a parkland with a 18 Hole course with 7 lakes and a number of streams. The main entrance to the golf course is off the Nangor Road. A golf club house including a small café, toilet facilities and car park are located on the north of the site. A maintenance yard and associated building are located to the rear of the club house. The GCGC lands are described as follows:

- Original golf club with is an active golf course in 2019.
- Phase 1 - known as 'the 8 Holes' - c24.46ha., which was completed in June 2006 is an active golf course in 2019.
- Phase 2 - known as 'the 5 Holes' - c15.58ha - commenced in October 2007 consist of mounds of soil that have been contoured. Phase 2 works were placed on hold early 2008 due to access restrictions from poor ground conditions and these works have not yet been completed.
- Phase 3 - known as 'Holes 14 and 15' - c8.38ha - consists of mounds of soil that have been contoured. Phase 3 works (Holes 14 and 15) commenced in February 2008. These works were paused in May 2009 and these works have not yet been completed.

The development Phases 1, 2 and 3 (hereafter referred to as "the site" and subject of this application) are indicated in **Figure 3.1**.



Legend

Extent

Phases of Development

- Initial Golf Course Development
- Phase 1
- Phase 2
- Phase 3



Initial
Golf Course
Development

Phase 2
(5 Holes)

Phase 1
(8 Holes)

Phase 3
(14 & 15
Holes)

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PROJECT **Grange Castle Golf Club - Waste Soils Recovery Facility**

TITLE **Figure 3.1 - Extent of Grange Castle Golf Club and Phases of Development**

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	Business Campus	F: +353 1 4620814
	Dun Laoghaire	W: www.rpsgroup.com/Ireland
	Co Dublin	E: Ireland@rpsgroup.com

Drawing No. :	Drawn By. : NA
	Checked By. : CW
	Approved By. : xxx
MDR1223Arc0002D01	Date : 03/08/2016

SCALE: 1:11,000 (A3)

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

3.3 PLANNING HISTORY

Work commenced on Phase 1 (8 holes) in June 2003 following receipt, by SDCC, of Part 8 planning permission in 2002. Works were completed with the area open for play in June 2006.

Work commenced on Phase 2 ('5 holes') in October 2007 following receipt, by SDCC, of Part 8 planning permissions in 2002 and 2006. These works were indefinitely placed on hold in Spring 2008 due to bad weather conditions and access difficulties.

Phase 3 ('holes 14 & 15') received Part 8 planning permission in 2006 and in February 2008 work commenced but was subsequently placed on hold in May 2009 due to ease of access.

3.4 SITE HISTORY

The following is a brief summary of the site history.

1998	Grange Castle Golf Club was established
June 2006	Phase 1 - known as 'the 8 Holes' - c24.46ha., was completed in June 2006 is an active golf course in 2019.
October 2007	Material was imported to GCGC from various sources to areas defined as the Phases 2 and Phase 3
Early 2008	Phase 2 - known as 'the 5 Holes' - c15.58ha - commenced in October 2007 consist of mounds of soil that have been contoured. Phase 2 works were placed on hold early 2008 due to access restrictions from poor ground conditions and these works have not yet been completed.
February 2008	Phase 3 - known as 'Holes 14 and 15' - c8.38ha - consists of mounds of soil that have been contoured. Phase 3 works (Holes 14 and 15) commenced in February 2008. These works were paused in May 2009 and these works have not yet been completed.
October 2010	Following discussions between SDCC and the EPA, the EPA complete a site inspection report considering the infill material to be waste and subject to waste management legislation and advising for regularisation of the site in accordance with the WMA and Ministerial order.
February 2011	SDCC commissioned an Environmental Risk Assessment (ERA). This ERA was completed on the Phase 1, Phase 2 and Phase 3 in February 2011. ERA report submitted to EPA in May 2011. Following receipt of this ERA, the EPA requested SDCC to provide a proposal to regularise the site in accordance with the Waste Management Act, 1996 (as amended) having regard to Ministerial Direction of 3 rd May 2005 (Circular WIR: 04/05).
Sept 2016	EIS scoping document completed and issued to EPA.
July 2017	EPA issues commentary and observations on EIS scoping document.

The above has resulted in the preparation of this EIAR to support the Waste Licence application for a Soil Recovery Facility at GCGC for Phases 1, 2 and 3. The site history outlined above is outlined in more detail in the following sections.

3.4.1 Enforcement History

The importation of material into GCGC for the further development of the course was the subject of an initial complaint to the EPA, with the core of the complaint relating to the requirement for waste authorisation.

Following receipt of information from SDCC, the EPA issued a decision indicating that the activity was not subject to a requirement for waste authorisation.

Following this decision, two additional complaints were received in September 2010. The EPA completed a site inspection in October 2010 and subsequently issued a site inspection report whereby the EPA advised that it was rescinding the previous declaration and considered the infill material to be a waste and subject to waste management legislation and advising of the necessity for a Waste Licence for the site.

3.4.2 Environmental Risk Assessment (ERA), 2011

In response to these communications, SDCC commissioned RPS to prepare an Environmental Risk Assessment (ERA) in 2011. Part of this Environmental Risk Assessment involved a targeted investigation within a distinct stockpiled material containing material other than stones and soil. This ERA was completed on the Phase 1, Phase 2 and Phase 3 between January and February 2011 with respect to the imported material and a copy of this report is included in **Appendix C**.

The ERA was carried out in accordance with the EPA Code of Practice for Environmental Risk Assessment of Unregulated Waste Disposal Sites, 2007 to characterise the material and assess any environmental or human health risk arising from the imported material. It comprised of a Tier 1 Preliminary Assessment and Screening and Tier 2 Site Investigation and Testing. The investigation involved trial pitting, soil and water sampling and chemical analysis, material characterisation and comprised targeted and non-targeted investigations.

The ERA comprised both targeted and non-targeted investigations.

- The **targeted investigation** was conducted within distinct stockpiled material containing material other than soil and stones. Sampling focused on obtaining sufficient information to characterise the material and provide information to assess available options to remove this material off site for recovery or disposal.
- The **non-targeted investigation** involved the excavation of a total of 77 trial pits. A total of 39 samples were characterised whereby material encountered during investigative works was characterised with the amount of soil, stone and extraneous material (e.g. concrete, tarmac, plastic, metal, fabric) quantified. Representative composite soil samples were also taken from 39 of the 77 trial pits excavated for laboratory analysis as agreed with the EPA. Soil analytical data indicated that the infill material contained low levels of hydrocarbons and heavy metals which were not considered to pose a risk to human health or the environment.

This was followed by further investigation specifically with respect to Asbestos Sampling and Risk Assessment in July 2013. The result of this investigation showed that there were no asbestos materials found in the stockpiled material.

The ERA indicated that the site was low risk (Class C) and did not pose a risk to human health or the environment. No specific remedial requirements are considered necessary as the potential risk to human health and the environment is considered low. In light of the findings of the ERA, it was proposed to leave the material *in situ* and proceed to regularise the site having regard to the aforementioned circular.

On the 8th August 2013 SDCC sent the ERA to the EPA seeking approval to proceed with the removal of the stockpiled material to an appropriately licensed waste disposal or recovery facility. SDCC received approval from EPA on the 23rd August 2013. SDCC was also required to give notice to EPA in advance of the timing of this exercise and the destination facilities. In October 2015, SDCC removed 1,200 tonnes of quarantined from the site under approval from the EPA.

3.4.3 EPA Direction

On review of the ERA, the EPA subsequently issued correspondence requesting SDCC to provide a proposal to regularise the site at GCGC in accordance with the Waste Management Act, 1996 (as amended) having regard to the Ministerial Direction of 3rd May 2005 (Circular WIR: 04/05).

The EPA stated that SDCC is not required to remove the remaining material in its entirety from site and that, if granting of waste authorisation is successfully obtained by SDCC from the EPA, this may provide for the extension of the Golf Course to be completed, if deemed appropriate.

3.5 MATERIAL IMPORTATION

During October 2007 and May 2009 some material was imported to GCGC from various sources to areas defined as the 5 holes (Phase 2) and holes 14 & 15 (phase 3) to provide a mounding around the perimeter of the course and between fairways to enhance safety and prevent stray balls leaving the course or injuring players on the adjacent hole.

Phase 1 had been completed by 2006 so no importation of material to Phase I was undertaken between October 2007 and May 2009. This area is now been fully landscaped as an active golf course.

The volume of infill material within the '5 holes' (Phase 2) and 'holes 14 & 15' (Phase 3) was calculated² following a review of historic (1998) and current (2009) topographic surveys which provided information on pre and post filling levels and this is shown in **Table 3.1**. The volume of infill material was calculated at 90,230m³ for Phase 2 and 126,726m³ for Phase 3. It is estimated (with unit weight of material *in situ* assumed to be c. 1.5t/m³)³ that approximately 325,000 tonnes of material was imported into GCGC.

² Section 3.3.1.2 of the Environmental Risk Assessment report appended as Appendix C.

³ Waste Management (Landfill Levy) Regulations

Table 3.1 Material Importation Estimate

Phase	Volume imported (m ³)	Volume to Weight ratio	Mass Imported (Tonnes)
Phase 2	90,230	1.5	135,345
Phase 3	126,726	1.5	190,089
Total			325,434

This volume of material was imported in order to meet the contouring requirements of the site in accordance with the specified works as defined by the course designer. The depth of infill material varied from 0m to 4.6m management below ground level.

The material was described in the ERA as being typically comprised of a grey/brown gravelly clay matrix with a minor waste component. The waste component comprised less than 2% extraneous inert materials from construction and demolition developments such as plastic, timber, textiles, brick, concrete and metals.

The vast majority of the extraneous material is inert and thus does not present any risk either to the environment or to the integrity of the infill material as a construction material in its own right.

The imported material comprises the following EWC⁴ Codes:

- 17 05 04 soils and stones other than those mentioned in 17 05 03; and
- 17 01 07 mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06.

3.6 DO-NOTHING SCENARIO

The EIA Regulations require a description of the relevant aspects of the current state of the environment (baseline scenario) as well as and an outline of the likely evolution thereof without the development.

The 'Do-Nothing' scenario refers to a situation whereby the site would remain in its current condition with the waste *in situ* but without the necessary consents in place to regularise the site in accordance with the Waste Management Act, 1996 (as amended).

As such, in this EIAR the scenario referred to as the 'Do-Nothing' Scenario will have the same implication as that for the proposed development and hence there is no specific analysis of the 'Do-Nothing' Scenario. Similarly, the evolution of the baseline will be the same both with the proposed development and in the absence of the proposed development.

⁴ European Waste Catalogue and Hazardous Waste List, Environmental Protection Agency 2002

3.7 PROPOSED DEVELOPMENT

The area of the proposed development covered by this application and EIAR is shown with the red line boundary in **Figure 3.2** which will represent the Waste Licence boundary for the application.

The proposal in the Waste Licence application is for the material to remain *in situ*, with no construction works required. As a consequence of the EPA direction and the findings of the ERA, there is no proposed removal of the imported materials. There is no proposed movement of the materials onsite through regrading, profiling, etc. and no further importation of material to the site will take place.

This retention of the materials onsite is the subject of this EPA Waste Licence application and environmental impact assessment report.

The Main Class of Activity selected in for the purposes of this Waste Licence application is:

R5: Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials

This activity relates to the material already imported to the site. No other classes of activity are being sought. No additional waste material will be accepted on to the subject site, therefore, there are no quantities of waste proposed as part of the application. The existing 325,000 tonnes of material imported will remain *in situ* and will not be moved.

There is no proposed infrastructural development or operations and no construction or operational activity will take place in relation to this application. Therefore, no operational hours are proposed with respect to this application.

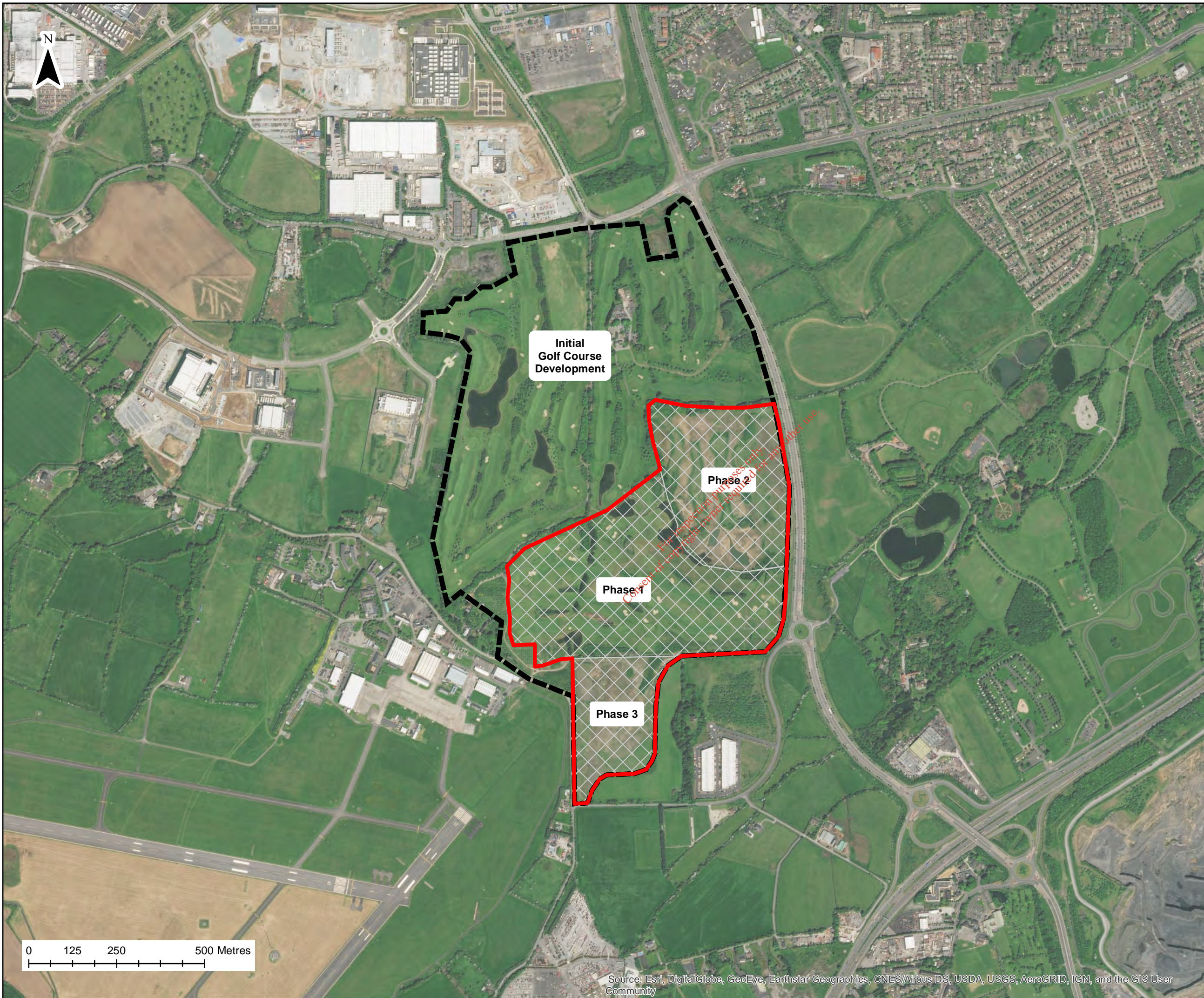
The application does not propose to abstract groundwater or surface water for use at the site, nor does it propose to use water from the public supply or any other source. There will be no drainage infrastructure or additional discharges created as a consequence of the development.

As no activity will be taking place, no methods, processes, ancillary activities, abatement, recovery and treatment systems, operating procedures, plans, process flow diagrams, reports or supporting documentation in relation have been proposed or developed with respect to this application. No infrastructure will be developed, and no plant or machinery will be required on site.



There are no significant existing emissions from the subject site. It is proposed to monitor ongoing potential fugitive emissions from the site under the Waste Licence including the following:

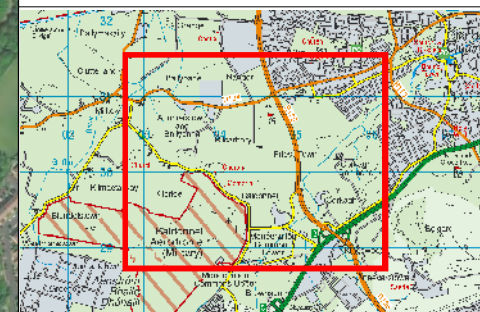
- Dust Deposition Monitoring
- Surface Water Monitoring
- Groundwater Monitoring

Each of the above will be carried out at intervals set by the EPA in the Waste Licence for standard EPA parameters.



Legend

-  Site Boundary (covered by Waste Licence)
-  Grange Castle Golf Club Boundary



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Waste Licence
Boundary

Figure: 3.2



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Issue Details

Drawn By: HF	Project No. MDR1223
Checked By: BMcP	File Ref: MDR1223Arc1002D01
Approved By: BMcP	Drawing No. Arc1002
Scale: 1:10,000 @ A3	Rev: D01
Date: 08/08/2018	

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3.8 RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

The proposal in the Waste Licence application is for the material to remain *in situ*, with no construction works required. In terms of the risk of major disasters which are relevant, given the location and physical characteristics of the proposed development, the main potential risks of flooding, wind, rain and weather events are reduced.

Regarding the flood risk of the proposal, the Waste Licence boundary will not be affected by a 100-year event. A flood risk assessment of the proposed development is presented in **Chapter 9** and confirms the low vulnerability of the proposed development.

3.9 SITE RESTORATION AND AFTERCARE

A full Closure Restoration and Aftercare Management Plan (CRAMP) has been prepared in accordance with EPA guidelines and has been included as part of this EIAR (refer **Appendix B**).

In relation to restoration, the two areas proposed for works include the following:

- Phase 2 - known as 'the 5 Holes' which is circa 15.58ha.
- Phase 3 - known as 'Holes 14 and 15' which is circa 8.38ha.

Phase 1 has been fully restored and is now an active golf course so there are no additional restoration works proposed at this area of the site.

Subject to EPA approval of the CRAMP, a total area of 23.96ha (equivalent to 239,600m²) will be covered with a thin (circa 10cm) layer of topsoil to facilitate future planning of grasses and shrubs across the site. All material imported will be clean, virgin topsoil and will be heavily regulated to ensure that no further waste material enters the site. All works will be supervised by a suitably qualified manager on behalf of SDCC.

Earthworks will be undertaken by a groundworks contractor consisting of a series of mobile plant including front loaders, dump trucks and tracked bulldozers. It is estimated that this operation will take circa one to two months to complete.

Following groundworks, a landscaping contractor will be employed to layout, seed and manage the landscaping plan for the site. It is expected that the majority of the site will be seeded as grass with additional low lying vegetation at the verges. No larger shrubs or trees are proposed. This element is expected to take a further month with ongoing aftercare provided as required.

According to the EPA *Guidance on assessing and costing environmental liabilities* (EPA, 2014) the restoration/aftercare plan refers to 'longer term measures which are necessary where there are environmental liabilities remaining following closure, e.g. contaminated soil and groundwater, landfills, extractive waste facilities, mines, quarries and soil recovery facilities. Measures may encompass activities such as rehabilitation, remediation, restoration, on-going emissions control and monitoring.'

On the GCGC site these works will include:

- Environmental monitoring as specified in the various schedules of the Waste Licence (once granted) – for the purposes of this assessment a standard set of monitoring is proposed;
- Site maintenance – in line with the requirements of the Environmental Management Programme;
- Typically, a final validation report must be submitted to the EPA in due course when the CRAMP has been executed.

Monitoring will continue for the parameters identified in the licence with a suggested regime presented in **Table 3.2**. If monitoring identifies possible environmental pollution, action will be taken to rectify this deviation. After parameters settle to baseline levels, it is proposed that monitoring will be reduced in frequency subject to approval from the EPA.

Table 3.2 Monitoring Requirements during the Aftercare Period

Monitoring Parameters	Frequency	Location
Groundwater at 4 locations	Biannually for 12 months in 1 st year post-construction and annually thereafter	GW3 to GW6 (refer Chapter 9)
Storm Water at 4 locations	Biannually for 12 months in 1 st year post-construction and annually thereafter	SW1 to SW4 (refer Chapter 9)
Dust at 4 locations	Three months per annum	D1 to D4 (refer Chapter 6)

The remediation works do not incorporate any active systems. Pollution control systems are also not required for the end-use, aftercare and maintenance stage, therefore, there will be no energy requirements for the operation of the remediation solution and no waste materials produced during its operation.

The site will be subject to ongoing visual checks to ensure that there is no environmental risk associated with the site. The ongoing visual checks will be carried out by a suitably qualified engineer as part of an annual inspection audit carried out in compliance with the requirements of the licence.

The end-use, aftercare and maintenance works at the site will be very limited, involving only routine maintenance works such as grass cutting, park maintenance, etc. for the upkeep of the site for recreational use.

SDCC will have regard for the conditions of the facility licence, the EPA Manual on Landfill Monitoring 2nd Edition (2003) and Annex III of the Landfill Directive, which outlines control and monitoring procedures in the aftercare phase to check *'that environmental protection systems are functioning fully as intended'*.

4 ASSESSMENT OF ALTERNATIVES

This chapter sets out the context in which the main reasonable alternatives were considered by SDCC for the proposed development and an indication of the main reasons for the final project chosen taking into account the effects on the environment. It outlines the main operational alternatives considered by SDCC to achieve the direction issued by the EPA and to regularise the site in accordance with the Waste Management Act, 1996 (as amended).

The consideration of alternatives has been undertaken by a multi-disciplinary technical, environmental and planning project team and is considered to have concluded with the identification and selection of a solution that provides the best balance between technical, environmental and community / social indicators.

The 'Do-Nothing' alternative to retain the site in its current condition but without the Waste Licence has not been considered as this would breach the requirements of Waste Management Act, 1996 (as amended).

The 2002 EPA Guidelines highlight three different categories under which alternatives should be considered. This has since been expanded to five categories in the draft 2017 draft EPA Guidelines as follows. The applicability of each of these five categories is considered below:

- Alternative Locations;
- Alternative Layouts;
- Alternative Designs;
- Alternative Processes; and
- Alternative Mitigation Measures.

Within these scenarios, a number 'Do-Something' alternative scenarios were investigated where applicable.

4.1 LEGISLATIVE CONTEXT

Annex IV to the Environmental Impact Assessment (EIA) Directive and Schedule 6 of the Planning and Development Regulations 2001 (as amended), both require that information to be contained in an EIAR includes:

'An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects of the environment'.

In preparing this chapter of the EIAR, the Guidelines on the information to be contained in Environmental Impact Statements (2002) and Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (2003), published by the EPA have both been referenced. It is noted that both documents are currently being updated and draft texts have been available since 2017. In order to ensure the widest scope of consideration for the alternatives, all versions of the texts have been referenced for completeness. Where referenced, the version of the text is clearly presented.

The 2002 EPA Guidance states that *'the consideration of alternatives also needs to be set within the parameters of the availability of land (it may be the only suitable land available to the developer) or the need for the project to accommodate demands or opportunities which are site specific. Such considerations should be on the basis of alternatives within the site'*.

The 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment', August 2018, Department of Housing, Planning and Local Government indicates, for reasonable alternatives that:

4.12. The Directive requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by the developer. These are reasonable alternatives which are relevant to the project and its specific characteristics. The developer must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment.

4.13. Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. A 'mini- EIA' is not required for each alternative studied.

4.2 LOCATION

The waste material has already been deposited at the GCGC and hence this site is the subject of the proposed development and application to the EPA. There is no scope for the determination of alternative locations in this retrospective EIA.

4.3 SITE LAYOUT

As with location, the waste materials have been deposited in specific areas within the site. These areas have been clearly delineated from the surrounding areas through the ERA site investigations. In this regard, there is no scope for an assessment of alternative layouts within this retrospective EIA.

4.4 ALTERNATIVE DESIGNS, PROCESSES AND MITIGATION

The purpose of this analysis is to review the alternative designs/processes considered as part of the proposal for the development and the rationale for the final project chosen, considering the effects on the environment. In the context of the proposed development, this relates primarily to the issues of the alternative design strategies and waste processes for managing the waste.

A number of different scenarios have been reviewed to determine the optimum way to manage the imported waste material. The scenarios assessed were:

- Alternative 1: On-site processing – extracting all materials and processing onsite to remove those materials that are contaminated and are not appropriate for placement at the site, then replacing the soil and stone back in place. Extracted materials to be managed at an appropriate offsite facility.
- Alternative 2: Partial off-site and infill - extracting those materials that are contaminated and are not appropriate for placement at the site and placement at an appropriate offsite facility.
- Alternative 3: Dig and dump - removing all materials offsite for management at an appropriate waste licensed facility.
- Alternative 4: Leave on-site - leaving all materials onsite with no disturbance but regularised with a Waste Licence to manage the aftercare.

Each of the above scenarios were assessed through a review of the various technical criteria as follows;

- **Environmental impact** - potential for the proposed scenario to have a significant impact on the receiving environment.
- **Impact on existing operations** - potential for the scenario to disrupt the activities of the golf club.
- **Construction time and cost** - summary of the financial and engineering impacts associated with the completion of each scenario.

A review of the alternative scenarios against the criteria listed above is presented in **Table 4.1**.

Table 4.1 indicates that Alternatives 1, 2 and 3 require construction works which would generate environmental impacts during the construction phase. These environmental impacts would be mitigated by implementing appropriate measures outlined in a Construction Environmental Management Plan (CEMP).

The costs associated with Alternative 3 are high due to the high costs of waste treatment for this significant volume of waste.

Alternative 4 requires no construction work therefore limited environmental impact and impact on the golf course and there are limited costs associated. Also, as per the recommendation of the ERA, Alternative 4 is an acceptable option to leave the soil *in situ* and therefore Alternative 4 is the most appropriate for consideration.

Table 4.1 Summary Table of Assessment of Alternatives

Alternative Scenario	Environmental Impact	Impact on Existing Operations	Construction Time and Costs
1. Onsite processing	Moderate - processing works required with potential for traffic, dust, noise and sediment discharge to water bodies. Would require a Waste Licence to process the waste material and also to allow for the infilling of the site. Little value over Option 4.	Moderate - disruption to golf course	Moderate – waste processing would incur operator and plant costs. Some residual waste treatment costs for waste exported.
2. Partial offsite and infill	Moderate – while no on site processing the excavation and sorting will result in potential for traffic, dust, noise and sediment discharge to water bodies. potential for traffic, dust, noise and sediment discharge to water bodies.	Moderate - disruption to golf course	Moderate – excavation and sorting would incur operator and plant costs. Some residual waste treatment costs for waste exported.
3. Dig and dump	High – potentially significant excavation of 324,000 tonnes of waste and transport off site will result in potential for traffic, dust, noise and sediment discharge to water bodies. potential for traffic, dust, noise and sediment discharge to water bodies.	Moderate - disruption to golf course	High. Significant waste treatment costs for 324,000 tonnes of waste exported.
4. Leave onsite	Limited - No changes to current site infrastructure. Some aftercare monitoring required but no additional impact as dictated by the ERA.	Negligible - No changes to site infrastructure. Waste Licence may constrain further development.	Limited to restoration and aftercare (refer to CRAMP).

4.5 CONCLUSIONS

Having regard to the reasonable alternatives considered in relation to the current proposal, the preferred project alternative on which this EIAR is based includes the retention of the waste *in situ* on the site with future management of the site regulated through the Waste Licence.

This alternative mitigates the potential for any further impact on the environment, is that recommended in the ERA and as in line with the EPA direction to regularise the site in line with the Waste Management Act. As such, the retention of the waste *in situ* on the site is the proposed development that forms the subject of this EIAR.

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5 HUMAN BEINGS, HEALTH AND SOCIO-ECONOMIC

5.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of human beings and socio-economic impacts and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

5.2 ASSESSMENT METHODOLOGY

This socio-economic impact assessment is carried out by way of a combination of desk-based studies and site visits. Population, community impact, employment, tourism and human health were investigated. Where appropriate, impacts on human beings are examined as impacts on different groupings of people in general, rather than specific individuals.

Information on the demographic, health and employment characteristics of the resident population within the catchment area that are considered of relevance is provided. Population information is sourced mainly from the Census of Population 2016 and 2011. Consideration of current unemployment patterns is based on up-to-date information available from the Live Register.

Information on tourists visiting the area was obtained from Failte Ireland Annual Tourism Facts accessed via the Failte Ireland website.

Identification of sensitive communities and land uses in the vicinity of the site was undertaken by a mix of site visits, review of Google Maps, aerial photography and Development Plan mapping.

The focus of the chapter is on establishing the potential for socio-economic impact on population and employment in the area and impacts on the community, including the resident, working and visiting community. Land use is considered in addressing impacts on the resident and working community. In this regard, any particularly sensitive land uses are identified and considered in this assessment. Each section will set out the detail of the existing environment, the characteristics of the development that could have socio-economic impacts; the consequences of such impacts; and mitigation measures where considered necessary.

5.3 RECEIVING ENVIRONMENT

5.3.1 Population

The most recent Census of Population for which population statistics are currently available is the Census of Population 2016. In order to provide a truly meaningful analysis of population and employment in the context of the proposed development, Census results need to be considered on a local level. Such local area information is generally provided by the CSO in a range of information on an Electoral Division basis.

The development site is located within the Electoral Division of Clondalkin Village.

Table 5.1 presents population figures for the years between 2011 and 2016. It incorporates a comparison between rates of growth / decline across the Electoral Divisions of the immediate catchment area, as well as comparisons with the County and State averages.

Table 5.1 Population and Rates of Population Change at Local, County and State Levels for 2011 and 2016

Area	Population 2011	Population 2016	Change 2011 - 2016 (% Change)
State	4,588,252	4,761,865	+3.8%
South Dublin County	265,205	278,767	+5.3%
Clondalkin Village	8,492	9,152	+7.8%

The population of the State increased at a rate of 3.8% between the period 2011 to 2016. In comparison, the population increase within South County Dublin was slightly higher at a rate of 5.3% and higher still within the local area where the Clondalkin Village electoral division experienced a population increase of 7.8% since 2011.

5.3.2 Community Impact

Large residential developments and the Corkagh Park public amenity land are located east of the site and are well connected to the M50, N7 and a number of public regional roads. There are a number of industrial and commercial estates in the surrounding area. The closest of these being Profile Park, which is located directly north of the site. To the south also lies Casement Aerodrome, a military air base operated by the Irish Air Corps. There are a number of shops and other commercial properties in the areas around the site. However, the majority of community facilities, including shops, schools, restaurants etc., are located approximately 2.6km to the east at the centre of Clondalkin Village.

5.3.3 Employment

The most recent information available from the Census of Population, in respect of the principle economic status of the local population of the Clondalkin Village Electoral Divisions is from the 2006 Census of Population.

Unemployment rates can be obtained from live register figures recorded by the Central Statistics Office. Live register figures also give a more up-to-date picture. In this regard, it should be noted that the unemployment rate recorded for the State as a whole in May 2016 was 8.8% (205,600 No. persons). The number of people of the live register has also further decreased since with 143,700 No. persons recorded in May 2018.

Information on 'principle economic status', information on 'population by socio-economic group' available on a localised Electoral Division basis from the 2016 Census gives some indication of the types of employment the local population. **Table 5.2** shows the proportions of the population by difference socio-economic groupings. For comparative purposes, figures for the State and South Dublin County as a whole are also presented.

Table 5.2 Proportion of Population by Socio-Economic Grouping, 2016

Area	Employers & Managers	Higher & Lower Professional	Non-Manual & Manual Skilled	Semi-Skilled & Unskilled	Own Account Workers	Farmers & Agric. Workers	Others	Total
State	15.6%	17.2%	27.2%	12.4%	6.0%	6.0%	15.6%	100%
South Dublin County	15.6%	15.2%	37.8%	10.7%	5.8%	0.2%	14.7%	100%
Clondalkin Village	13.3%	12.9%	38.4%	13.8%	6.8%	0.2%	14.6%	100%

Compared with State averages, the local population within the catchment area of Clondalkin Village has a higher proportion of persons classified as non-manual and manual skilled workers. Also of note, is the fact that it has a much lower proportion of persons engaged in farming and agriculture. These patterns are due to the urban nature of the local catchment around Clondalkin Village. In general, however, the socio-economic profile of the local catchment area reveals a largely comparable picture to State averages. In this regard it provides a wide range of potential employee types of various skill levels and professional training for possible new future employers.

5.3.4 Tourism

Fáilte Ireland published its statistics for 2017 in a report called 'Tourism Facts 2017'. The report evaluated Irish tourism and its value to the Irish economy. According to Fáilte Ireland, overseas tourist visits to Ireland in 2017 grew by 3% to 9 million (compared to 2016) which is a decrease on the 9% growth in 2016. Tourism from Britain experienced a 5% decrease from 2016 but other short haul markets from Mainland Europe recorded modest growth of 5%. North America and other long haul markets performed very strongly, increasing by 16% and 14% respectively. Britain remains the biggest source market for overseas tourists, representing 38% of all such visits.

Fáilte Ireland notes that as tourism is characterised by the fact that consumption takes place where the service is available and that tourism activity is often concentrated in areas which lack an intensive industry or other employment base, it is credited with having a significant regional distributive effect. According to the "Regional tourism performance in 2017" the number of tourists visiting Dublin was 5,925,000 with revenue of €2 million.

5.3.5 Human Health

The results of the 2016 Census have been collated to identify the broad health baseline for the State and the Greater Dublin Area and these are summarised in **Table 5.3**.

The CSO reports that life expectancy at birth in Ireland is 78.4 years for males and 82.8 years for females. Within County Dublin mortality rate from cancer has fluctuated over the years, and indicates an increasing trend, but still remains below the national average. Between the years of 2010 and 2013, mortality rate from respiratory diseases within County Dublin has increased but remains consistently below the national average. Mortality rate from circulatory diseases within

County Dublin has decreased over the same time period and remains consistently below the national average. This is contrary to the national trend which continues to increase.

Dublin has the highest number of fatal collisions compared to other counties in Ireland. This figure has increased from 21 in 2016 to 23 in 2017. However, greater increases can be seen in other counties. Overall, the number of fatal collisions on Irish roads has decreased within this period.

2016 Census data for the area indicates that the area around Clondalkin Village has a generally young population, with the majority of people under the age of 40. 88% of the electoral division reported their general health as either “Good” or “Very Good” during the 2016 Census, which is in line with the overall national average also reported 88% of people with “Good” or “Very Good” health.

Table 5.3 Summary of health baseline conditions in County Dublin and Ireland

Indicator	County Dublin	Ireland	Source and date
Life expectancy (males)	N/A	78.4	CSO, 2011
Life expectancy (females)	N/A	82.8	CSO, 2011
Hospital admissions for circulatory disease (per 100,000 population)	N/A	3,794.9	IPH Community Profiles, 2015
Hospital admissions for respiratory disease (per 100,000 population)	N/A	2,712.5	IPH Community Profiles, 2015
Cancer Mortality (per 100,000 population)	189.40	191.90	CSO,2013
Respiratory disease mortality (per 100,000 population)	71.21	77.96	CSO,2013
Circulatory disease mortality (per 100,000 population)	177.99	210.18	CSO,2013
All age all-cause mortality (per 100,000 population)	609.32	653.55	CSO,2013
Hospital admissions for anxiety or depression (per 1,000 population)	N/A	1.8	IPH Community Profiles, 2015

5.4 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no proposed construction phase impacts have been considered and only operational phase impacts have been considered.

The operational phase refers to the imported soil remaining *in situ* subject to no further works.

As the site will continue to operate in the same location with no further import or export of soils, or other significant changes to the site layout, there will be no imperceptible effects on human beings or socio-economic impacts.

Typically for human health, the main aspects with the potential to influence local communities and their health, comprises activities that extend beyond the site boundary, namely:

- Potential change in vehicular nature, number and routes;

- Potential fugitive emissions (noise, dust generation/resuspension); and
- Potential impacts to drinking water supplies.

As noted, none of these activities are proposed and hence no significant human health impact is predicted.

No traffic is proposed as part of the proposed development as the waste material will remain *in situ*. During the restoration phase there will be some local increase of traffic with the importation of virgin topsoil but the local road network is well designed to cater for these additional volumes.

Chapter 6 notes that there will be no significant risk of dust impact on any property given the distances from properties to the waste areas. As a consequence, there is no anticipated health risk from general dusts or fine dusts (such as PM₁₀) associated with the proposed development.

In addition, **Chapter 6** notes that there will be an imperceptible impact from noise and vibration as a consequence of the proposed development as there will be no on site works or material transport proposed. As such, no significant health impact is predicted.

Chapter 9 states that there are no public supplies or source protection areas immediately surrounding the site. The closest public supply zone is the Kiltel supply located approximately 10km to the south west of the site. Groundwater flow across the site will follow the local topography and will flow southeast to west and northwest towards the Grifteen River. As such, there is negligible potential for the proposed development to impact on human health through drinking water.

The continued operation of the adjacent golf club may have minor benefits for the local economy, local employment and tourism.

5.5 MITIGATION MEASURES

There are no mitigation measures required in regard to human beings, human health or socio-economic impacts. The site should be managed as a non-active soils recovery facility as licenced by the EPA to mitigate any potential nuisance from the site.

5.6 REFERENCES

Census of Population 2011 and 2016, available at: <http://airomaps.nuim.ie/id/Census2016/> , Central Statistics Office.

Quarterly National Household Survey (QNHS), Central Statistics Office.

Labour Force Survey, Central Statistics Office.

Quarterly Labour Force Survey (QLFS), Central Statistics Office.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

IPH Community Profiles Tool (CPT) http://www.thehealthwell.info/community-profiles/?utm_source=IPH+Contacts+July+2015&utm_campaign=f4b43aa506-

[IPH Newsletter December 2015 copy 02_9_29_2015&utm_medium=email&utm_term=0_8f6e547325-f4b43aa506-83973317](#)

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6 AIR QUALITY, CLIMATE AND NOISE

6.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of Air Quality, Climate, Noise and Vibration and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

6.2 AIR QUALITY

6.2.1 Assessment Methodology

The air quality assessment for the site was undertaken with specific reference to the following Guidance Document: -

- *'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes, Revision 1,'* NRA, 2011.

The methodology involved a desktop assessment, which included the identification of the nearest sensitive receptors and a summary of the existing air quality in the vicinity of the site. The identification of existing air pollutant trends in the vicinity of the site and compliance with relevant ambient air legislation were also included as part of this assessment.

Existing EPA air quality data has been examined in order to assess the background air quality in the area. It is used to identify the existing pollutant trends in the area and to establish spatial information in order to determine compliance with relevant ambient air legislation.

In May 2008, the European Commission introduced a revised Directive on ambient air quality and cleaner air for Europe (2008/50/EC), which has been transposed into Irish Legislation through the revised Air Quality Standards Regulations (S.I. 180 of 2011).

The Directive and Regulations specify limit values in ambient air for sulphur dioxide (SO₂), lead, benzene, particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO) and nitrogen dioxide (NO₂). These limits are mainly for the protection of human health and are largely based on review of epidemiological studies on the health impacts of these pollutants. In addition, there are limits that apply to the protection of the wider environment (ecosystems and vegetation). These limits are presented in **Table 6.1**.

Table 6.1 Air Quality Standards Regulations (Source: S.I. 180 of 2011)

Pollutant	Criteria	Value
Nitrogen Dioxide	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m ³ NO ₂
	Annual limit for protection of human health	40 µg/m ³ NO ₂
	Annual limit for protection of vegetation	30 µg/m ³ NO + NO ₂
Benzene	Annual limit for protection of human health	5 µg/m ³
Carbon Monoxide	Maximum daily 8-hour running mean	10 mg/m ³
Lead	Annual limit for protection of human health	0.5 µg/m ³
Sulphur Dioxide	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 µg/m ³
	Daily limit for protection of human health - not to be exceeded more than 3 times/year	125 µg/m ³
	Annual limit for protection of vegetation	20 µg/m ³
Particulate Matter PM ₁₀	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m ³ PM ₁₀
	Annual limit for protection of human health	40 µg/m ³ PM ₁₀
Particulate Matter PM _{2.5}	Annual target value for the protection of human health	25 µg/m ³ PM _{2.5}

6.2.2 Receiving Environment

Air quality data available from the EPA monitoring network was assessed. Four air quality zones have been defined for Ireland as follows:

- Zone A - Dublin Conurbation
- Zone B - Cork Conurbation
- Zone C - Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Letterkenny, Celbridge, Newbridge, Mullingar and Balbriggan.
- Zone D- Rural Ireland i.e. the remainder of the state excluding Zones A, B and C.

The site is located within air quality Zone A, the Dublin Conurbation. From the EPA report on ambient air quality in 2018 the most representative monitoring stations in terms of the site are Tallaght or Ballyfrmot. These monitoring stations do not record all ambient air quality parameters outlined in the Directive on ambient air quality and cleaner air for Europe (2008/50/EC) therefore air quality in the receiving environment is described using the average annual mean value concentrations from all measured monitoring stations in Zone A.

Table 6.2 shows the annual mean value concentrations measured for SO₂, PM₁₀, NO₂, CO and benzene in Zone A for 2018. The table compares the annual mean measured levels with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011).

Table 6.2 Air Quality Standards Regulations (Source: S.I. 180 of 2011)

Pollutant	Unit	Annual Mean Concentration in 2018	Annual Limit for Protection of Human Health
Sulphur Dioxide (SO ₂)	µg/m ³	2	20
Particulate Matter (PM ₁₀)	µg/m ³	14	40
Particulate Matter (PM _{2.5})	µg/m ³	8	20
Nitrogen Dioxide (NO ₂)	µg/m ³	25	40
Carbon Monoxide (CO)	mg/m ³	0.2	10
Benzene	µg/m ³	0.3	5

In summary, existing baseline levels of SO₂, PM₁₀, NO₂, CO and benzene based on data from the EPA monitoring network are currently below ambient air quality limit values in Zone A and by extension the levels in the vicinity of the site are also considered to be below the limit values.

A site visit was undertaken in May 2017 to determine the potential for dust risk at the site. While the two areas consist of stockpiles of soil and stone, these have been somewhat colonised by vegetation which helps to bind the materials in place and reduce the risk of dust generation. Notwithstanding this point, there are areas of bare ground noted and, in this regard, it was noted that there is potential for dust generation at the site.

6.3 CLIMATE

6.3.1 Assessment Methodology

Existing climate data for the study area has been derived from the Met Eireann 30 year averages. While it is not possible to apportion the increase in greenhouse gas emissions from this project with specific climate impacts, existing trends in residential and transport related greenhouse gas emissions are noted with reference to the targets outlined in Ireland's National Policy Position on climate action and low carbon development.

6.3.2 Receiving Environment

The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer. The site of the proposed development close to the east coast would experience a higher frequency of easterly winds than more inland locations or those on the west coast.

The nearest meteorological station to the site is the Met Éireann Station is Casement, which lies directly south west of the subject site. The 30-year averages from the station at Casement are presented in **Table 6.3**.

Table 6.3 30-year Average Meteorological Data from Casement (Annual Values from 1981-2010, source: www.met.ie).

Parameter	30-year Average
Mean Temperature (°C)	9.7
Mean Relative Humidity at 0900UTC (%)	83.6
Mean Daily Sunshine Duration (hours)	3.7
Mean Annual Total Rainfall (mm)	754.2
Mean Wind Speed (knots)	10.7

The prevailing wind direction for the area is between west and southwest as presented in the windrose for Dublin Airport Met Station for 1942 to 2014 in **Figure 6.1** (note that no windrose data is available for Casement). Northerly winds tend to be very infrequent (less than 5%) with easterly winds marginally more frequently (5-10%). Wind characteristics are typically moderate with relatively infrequent gales (average only 8.2 days with gales per annum).

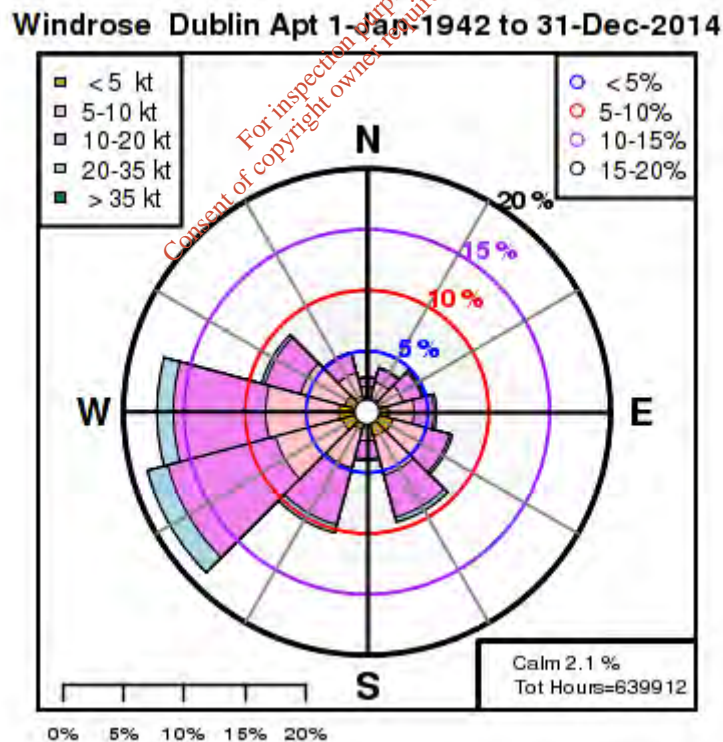


Figure 6.1 Windrose for the Dublin Airport Met Station 1942 to 2014 (source: www.met.ie)

The National Policy Position on climate action and low carbon development was published on the 23rd April 2014. The policy sets a fundamental national objective to achieve transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050. The policy states that greenhouse gas (GHG) mitigation and adaptation to the impacts of climate change are to be addressed in parallel national strategies - respectively through a series of National Mitigation Plans and a series of National Climate Change Adaptation Frameworks.

The National Policy Position envisages that development of National Mitigation Plans will be guided by a long-term vision of low carbon transition based on the following:

- An aggregate reduction in carbon dioxide (CO₂) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors; and
- In parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

With reference to this project, the aggregate reduction emissions of at least 80% from the residential and transport sectors by 2050 are the relevant policy targets.

Further to the National Policy Position, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) was enacted on the 10th of December 2015. The Climate Act sets out the proposed national objective to transition to a low carbon, climate resilient and environmentally sustainable economy by the end of 2050.

In 2017, total emissions of greenhouse gases including indirect emissions from solvent use in Ireland were 60,743ktCO_{2e}, which is 9.6% higher than emissions in 1990. The total for 2017 is 13.8% lower than the peak of 70,555ktCO_{2e} in 2001 when emissions reached a maximum following a period of unprecedented economic growth.

The waste sector currently contributes 1.5% (which consists of landfill, incineration and open burning of waste, mechanical & biological treatment and wastewater treatment) of Ireland's national GHG emissions. Emissions in the waste sector are primarily attributed to methane emissions from landfills, however, the EPA projects the reduction in waste going to landfill, subsequently reducing GHG emissions during this projection.

The EPA estimate emissions to 2035 using two scenarios as follows:

- 'With Existing Measures' – scenario assumes that no additional policies and measures, beyond those already in place by the end of 2017 (latest EPA GHG Emissions Projections Report), are implemented; and
- 'With Additional Measures' – scenario assumes implementation of the 'With Existing Measures' scenario in addition to progressing of renewable and energy efficient targets for 2020.

GHG projections by sector under 'With Additional Measures' projects that waste will contribute to 0.9% of Ireland's total GHG emissions in 2020, this is projected to decrease to 0.7% in 2030. Emissions in the waste sector are projected to decrease 40% to 0.5 Mt CO_{2eq} between 2017 and 2020 and by 53% between 2017 and 2030 (0.4 Mt CO_{2eq}).

6.4 NOISE AND VIBRATION

6.4.1 Assessment Methodology

Currently, no universal statutory noise standards apply in Ireland. The World Health Organisation propose guideline values for the prevention of moderate and serious annoyance in outdoor areas as 50dB $L_{Aeq(16\text{ hour})}$ and 55dB $L_{Aeq(16\text{ hour})}$ respectively although a more appropriate criteria for assessing disturbance or annoyance from noise arising from the site would be related to the significance of changes in noise levels as perceptible to human beings.

The information in **Table 6.4** is taken from the 'Guidelines for Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA). This document replaces the draft guidelines published by the Institute of Acoustics (IOA) and IEMA in April 2002 and shows an appropriate impact rating procedure for noise levels attributable to certain operations based on perception of loudness. It should be noted that the subjective description outlined in **Table 6.4** applies to relatively continuous noise only.

Table 6.4 Likely Impact Associated with a Change in Noise level

Change in Noise Level	Subjective Reaction	Impact Guidelines for Noise Impact Assessment Significance	Impact Guidelines on the Information to be contained in EIARs (EPA)
0 dB	No change	None	Imperceptible
0.1 to 2.9 dB	Barely perceptible	Minor	Slight
3.0 to 4.9 dB	Noticeable	Moderate	Moderate
5.0 to 9.9 dB	Up to a doubling or halving of loudness	Substantial	Significant
10 dB or more	More than a doubling or halving of loudness	Major	Profound

There are generally accepted criteria for vibration levels that would be likely to lead to complaints, and vibration levels that would be likely to lead to structural damage. These levels are outlined in the guidance documents BS6472: 1992 Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz), and BS7385: Part 2 1990: Evaluation and measurement for vibration in buildings - Guide to damage levels from ground-borne vibration.

In the case of nominally continuous sources of vibration, such as traffic, vibration is perceptible at around 0.5 mm/s PPV and may become disturbing or annoying at higher magnitudes. Currently no major sources of vibration exist on the subject site. It would therefore be appropriate to assume that negligible vibration impacts will occur during the operation of the site and no further assessment is deemed to be required.

6.4.1 Receiving Environment

Existing sources of noise in the area would include typical suburban background noises such as wind on trees and rustling foliage, road traffic noise, noise associated with commercial activities in the vicinity, background agricultural noises depending on the time of year and noise from residential

areas. Casement Aerodrome, immediately to the south west of the site, is also a major source of intermittent noise in the area.

The Dublin Agglomeration Environmental Noise Action Plan 2013 - 2018 provides noise mapping from the main noise sources in the Dublin area (includes the road network, rail network and airports). The Grange Castle site is located within the 55-59dB L_{den} and 60-64dB L_{den} contours from the aircraft noise from Casement Aerodrome and from road traffic from the R136 and R134. As a consequence, the existing noise climate in the area is dominated by these road traffic and air traffic sources.

During the site walkover surveys completed by RPS on the 4th April 2018 and the 26th April 2018, there was no evidence to suggest that existing receptors are currently affected by significant environmental vibration.

6.5 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no construction phase impacts have been considered and only operational phase impacts have been considered.

The operational phase refers to the imported soil remaining *in situ* subject to no further works.

There are imperceptible effects on noise and vibration as a consequence of the proposed development as there will be no on site works or material transport proposed.

Greenhouse gas emissions associated with material transport or construction operations are not relevant as these operations are not proposed for the development that forms this application. Furthermore, the waste materials identified on the site in the ERA were grey/brown gravelly clay matrix with a minor waste component comprised of less than 2% extraneous inert materials from construction and demolition developments such as plastic, timber, textiles, brick, concrete and metals. As such, the waste deposited will not biodegrade and there is no potential for landfill gas generation at the site. In this regard, the potential for release of fugitive greenhouse gases (as methane) to atmosphere from the proposed development is not significant.

A slight potential negative impact on the air quality of the surrounding area may be experienced. While there is to be no construction works or expected further soil transfer at the site, due to the presence of the un-vegetated soil, there is a risk that dust may cause an impact at sensitive receptors in close proximity. The risk of dust impact is best described in the NRA Guidelines 2011 and these distances are presented in **Table 6.5**.

Table 6.5 NRA Assessment Criteria for the Impact of Dust Emissions from Construction Activities, (with standard mitigation in place)

Source		Potential Distance for Significant Effects (Distance from source)		
Scale	Description	Soiling	PM ₁₀	Vegetation Effects
Major	Large Construction sites, with high use of haul routes.	100m	25m	25m
Moderate	Moderate Construction sites, with moderate use of haul routes.	50m	15m	15m
Minor	Minor Construction sites, with minor use of haul routes.	25m	10m	10m

The nearest sensitive receptor, Baldonnell House and Orchard, is located outside a 100 metre radius of the unvegetated soil at Phase 3 and thus is not likely to experience any adverse impacts.

6.6 MITIGATION MEASURES

There are no mitigation measures required in regard to climate, noise and vibration. The site should be managed as a non-active soils recovery facility as licenced by the EPA.

In terms of air quality, four dust gauges will be put in place on site to continually monitor levels and ensure monthly dust levels will remain below the guideline of 350mg/m²/day as a 30-day average at sensitive receptors as outlined in the German Government TA Luft guidance. The following locations are proposed for the dust gauges:

- D1 North western corner of Phase 2;
- D2 South eastern corner of Phases 1 and 2;
- D3 Western boundary of Phase 1; and
- D4 South western corner of Phase 3.

These locations are chosen at the eastern and western boundaries of the site to assess the potential for off-site impact to sensitive receptors in the area. Locations will be agreed with the EPA prior to the final determination of the Waste Licence. These locations are shown in **Figure 6.2**.

Monitoring is proposed for three months of the year between May to September during the drier months when potential for dust is greatest.

No noise monitoring is proposed given the absence of any site operations.

6.7 REFERENCES

Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (Rev. 1), NRA, (2011).

Technical Instructions on Air Quality Control - TA Luft in accordance with art. 48 of the Federal Immission Control Law (BImSchG) dated 15 March 1974 (BGBl. I p.721), German Federal Ministry for Environment, (1986).

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

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Air Quality in Ireland 2014, 2015, 2016, EPA (2017).

National Policy Position on Climate Action and Low Carbon Development, Department of Communications, Climate Action and Environment, (2017).

National Adaption Framework - Planning for a Climate Resilient Ireland, Department of Communications, Climate Action and Environment, (2018).

Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), EPA, (2016).

ISO 1996-2:2007 Acoustics -- Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels (2007).

Calculation of Road Traffic Noise (CRTN), UK Department of Transport, (1988).

ISO1996-1_2016 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedure.

BS 6472-1 (2008) Guide to evaluation of Human Exposure to Vibration in Buildings - Vibration sources other than Blasting.

BS 7385-1 (1990) Evaluation and Measurement for Vibration in Buildings - Guide for Measurement of Vibration and evaluation of their effects on buildings.

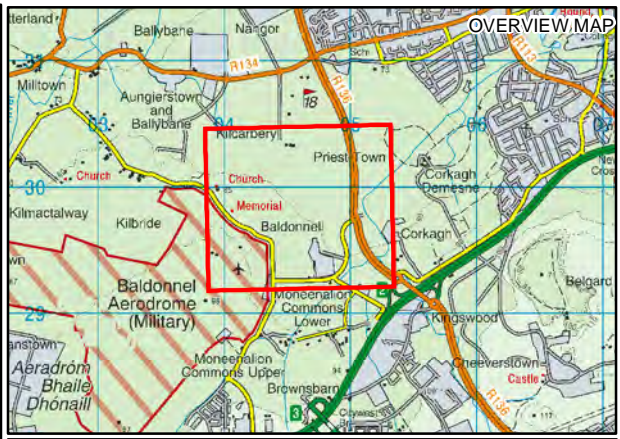
BS 7385-2 (1993) Evaluation and Measurement for Vibration in Buildings - Guide to damage levels from Groundborne Vibration.

BS 5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites. Noise.

BS 5228-2:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Guidelines for Noise Impact Assessment, Institute of Environmental Management and Assessment (IEMA), (2002).

Dublin Agglomeration Environmental Noise Action Plan 2013 – 2018.



Legend
 Site Boundary

N

PROJECT
 Grange Castle Golf Club -
 Waste Soils Recovery Facility

TITLE
 Figure 6.2 Dust Monitoring Locations

	West Pier	T: +353 1 488 2900
	Business Campus	F: +353 1 4620814
	Dun Laoghaire	W: www.rpsgroup.com/Ireland
	Co Dublin	E: Ireland@rpsgroup.com

Drawing No. :	MDR1223Arc0001D01	Drawn By. :	NA
		Checked By. :	CW
		Approved By. :	xxx
		Date :	19/07/2016
			SCALE: 1:7,500 (A3)

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

7 LANDSCAPE AND VISUAL IMPACTS

7.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of landscape and visual impacts and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

7.2 ASSESSMENT METHODOLOGY

The landscape and visual assessment methods are derived from the Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute and Institute of Environmental Management & Assessment, 2002) and the publication by the former DOE and Local Government Landscape and Landscape Assessment Guidelines (June 2000). The landscape has been appraised to allow it to be described and classified into landscape character areas that in turn enable the categorisation of landscape quality. The capacity of a landscape to accept change of the type proposed is then assessed. The key landscape components are landform, vegetation and historical and cultural components. Landform relates to topography, drainage characteristics and geology. Historical and cultural components include historic landscapes, protected structures, conservation areas and historic designed landscapes. Vegetation plays an important role in how the landscape and visual resources of an area are viewed and is an integral component of a landscape character.

Assessment was undertaken through analysis of up to date digital copies of OSI Discovery Series raster and OSI vector maps and aerial photography, in conjunction with drawings of the site layout.

Existing visual resources were established along with sensitive receptors, i.e. residential properties, scenic viewpoints and visitor amenity areas.

7.3 ASSESSMENT CRITERIA

7.3.1 Landscape Assessment Methodology

The following text describes the key criteria and terminology used in the landscape assessment.

Landscape Resource: The combination of elements that contribute to landscape context, character and value.

Landscape Value: The relative value or importance attached to a landscape that expresses national, regional or local consensus because of intrinsic characteristics.

Landscape Character: The distinct and homogenous pattern that occurs in the landscape reflecting geology, landform, soils, vegetation and man's impact.

Landscape Quality: The assessment of the landscape quality assesses the value of the landscape in relation to its rarity, location and landscape character attributes. In

general, the higher the quality of landscape the more sensitive it will be to change.

Based on information gathered as part of the classification of the landscape, it is possible to assess the landscape quality of the study area using the methodology described in the UK DMRB. This has been completed using a 5-point scale as follows:

- a) Highest quality - the landscapes of highest quality are, by definition, landscapes of an 'awe inspiring' or 'sublime' nature and are important on an international and national level.
- a) Very attractive - this definition relates to landscapes which are still of high value nationally and can be defined as highly scenic.
- b) Good landscape - this category contains areas that, although still attractive, have less significant and more common landscape features.
- c) Ordinary landscape - this category contains areas that have only common landscape features and some intrusive elements such as conspicuous infrastructure with scope for improvement in management.
- d) Poor landscape - this category includes areas that contain frequent detracting aspects and/or lack of management and results in a degraded landscape with very few valued features.

Landscape sensitivity is used to establish the capacity of the landscape to accommodate the type of development proposed and is defined as follows:

High: Highest/Very Attractive landscape quality with highly valued or unique characteristics susceptible to relatively small changes;

Medium: Good landscape quality with moderately valued characteristics reasonably tolerant of changes;

Low: Ordinary/Poor landscape quality with common characteristics capable of absorbing substantial change.

Magnitude of Landscape Resource Change: Direct resource changes on the landscape character of the study area are brought about by the introduction of the proposal and its effects on the key landscape characteristics. The following categories and criteria have been used:

High: Total loss or alteration to key elements of the landscape character, which result in fundamental and/or permanent long-term change.

Medium: Partial or noticeable loss of elements of the landscape character and/or medium-term change.

Low: Minor alteration to elements of the landscape character and/or short-term/temporary change.

Significance of Landscape Impact: The level of significance of impact on landscape character is a product of landscape sensitivity and the magnitude of change in landscape resource as indicated in the **Table 7.1**.

Table 7.1 Significance of Landscape Impact

Magnitude of Landscape resource change	Landscape Sensitivity		
	Low	Medium	High
No change	No change	No change	No change
Low	Slight	Slight/moderate	Moderate
Medium	Slight/moderate	Moderate	Moderate/Substantial
High	Moderate	Moderate/Substantial	Substantial

7.3.2 Visual Assessment Methodology

The following text describes the key criteria and terminology used in the visual assessment.

Visual Amenity: is the value of a particular area or view in terms of what is seen by the viewer. This value may be influenced by the physical condition of the landscape viewed and the contribution the characteristics of the view make to the local environment.

Visual Resources: are the overall key elements/features/characteristics that combine to make a view.

Viewer Sensitivity: is a combination of the sensitivity of the human receptor (i.e. resident; commuter; tourist; walker; recreationalist; or worker) and the quality of view experienced by the viewer and is defined using the following categories and criteria:

High sensitivity: - users of an outdoor recreation feature which focuses on the landscape; valued views enjoyed by the community; tourist visitors to scenic viewpoint; occupiers of residential properties with a high level of visual amenity;

Medium sensitivity: - users of outdoor sport or recreation which does not offer or focus attention on landscape; occupiers of residential properties with a medium level of visual amenity; and

Low sensitivity: - regular commuters, people at place of work; occupiers of residential properties with a low level of visual amenity.

Magnitude of Visual Resource Change: the magnitude of change in visual resource or amenity results from the scale of change in the view with respect to the loss or addition of features in the view and changes in the view composition, including proportion of the view occupied by the proposed development. Distance and duration of view must be considered. Other infrastructure

features in the landscape and the backdrop to the development will all influence resource change. The following categories and criteria have been used;

High: - Total loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements considered totally uncharacteristic when set within the attributes of the receiving landscape or view;

Medium: - Partial loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic when set within the attributes of the receiving landscape/view;

Low: - Minor loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape/view; and

No change: - Very minor loss or alteration to key elements/ features/ characteristics of the existing landscape or view and/or introduction of elements that are not uncharacteristic when set within the attributes of the receiving landscape/view.

Significance of Visual Impact: Significance of visual impact can only be defined on a project by project basis responding to the type of development proposed and its location. The principal criteria for determining significance are magnitude of visual resource change and viewer sensitivity. **Table 7.2** illustrates significance of visual impact as a correlation between viewer sensitivity and magnitude of visual resource change.

Table 7.2 Significance of Visual Impact

Magnitude of visual resource change	Viewer Sensitivity		
	Low	Medium	High
No change	No change	No change	No change
Low	Slight	Slight/moderate	Moderate
Medium	Slight/moderate	Moderate	Moderate/Substantial
High	Moderate	Moderate/Substantial	Substantial

7.4 RECEIVING ENVIRONMENT

The surrounding landscape is made up of a patchwork of pasture and arable fields, with grassland being the dominant land cover. The field system is separated by clumps of mixed woodland and sparse hedgerow networks. Dense patches of mixed woodland, playing pitches and landscaped areas dominate the southern part of the area in Corkagh Park. The predominant landscape character type is flat urban fringe farmland.

In recognition of the special environment, the South Dublin County Development Plan (2016-2022) seeks to maintain the rural character, where possible, of these areas and provide an outline of landscape character areas, as well as sensitive views and prospects.

7.4.1 Landscape Character

Landscape Character Assessment (LCA) attempts to describe landscapes in terms of their character in an objective way. The Landscape Character Assessment for South Dublin divides the County into five Landscape Character Areas with the proposed road improvement scheme predominantly located in the Newcastle Lowlands character area. The relevant features of this Landscape Character Area as outlined in the County Development Plan 2016 - 2022 are described as follows:

Newcastle Lowlands Character Area: a low lying agricultural area of high agricultural productivity, long history of human settlement and important landscape setting to the urbanised east. The Newcastle lowlands function as an important agricultural resource but are vulnerable to urbanising pressures. In addition, its character as a rural landscape provides a distinct and important identity to this area of western Dublin. To conserve its sense of place requires measures protecting the integrity of the agricultural landscape by controls on urban expansion, ribbon development and other sources of erosion and fragmentation, and recommends that site planning guidance on the use of appropriate vernacular styles and treatments in new developments be provided in the County Development Plan and Local Area Plans.

7.4.2 Landscape Designations

Areas of High Amenity

It is policy to conserve and enhance existing High Amenity zones and to seek to manage these and other areas to absorb further recreational uses and activity without damaging the amenities that affords them their special character. These areas consist of landscapes of special value where inappropriate development would contribute to a significant diminution of the landscape setting of the County.

None of these High Amenity Areas occur within or in close proximity to the subject site.

Views and Prospects

The County contains many scenic views and prospects (distant objects) of places of natural beauty or interest that are located in the County and in adjoining counties. These include localised views and panoramic prospects of rural, mountain, hill, coastal and urban landscapes such as Dublin City and environs, Dublin Bay, the Liffey Valley and the Dublin and Wicklow Hills and Mountains including the Glenasmole Valley. Views of places of natural beauty or interest are not confined to those that are visible from scenic places but also from and to existing built up areas. No significant views for protection have been identified in the County Development Plan at the site or in the surrounding area.

There are no identified prospects for protection within the site area.

7.5 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no construction phase impacts have been considered and only operational phase impacts have been considered.

As the site will continue to operate in the same location with no further import or export of soils, or other significant changes to the site layout, there will be no changes to the Newcastle Lowlands Character Area attributable to the subject site. There are also no views or prospects identified for preservation in the current County Development Plan in the surrounding site area.

There is a slight negative visual impact from the soil piling. However, this is a short term impact as the soil will be recolonised by the natural vegetation over time.

7.6 MITIGATION MEASURES

The removal of hedgerows and tree lines will be avoided for the ongoing operation of the site. There are no other specific mitigation measures required in regard to landscape and visual impacts. The site should be managed as a non-active soils recovery facility as licenced by the EPA.

7.7 REFERENCES

Guidelines for Landscape and Visual Impact Assessment, Third Edition, The Landscape Institute and Institute of Environmental Management & Assessment, (2013).
South Dublin County Development Plan (2016-2022)

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8 BIODIVERSITY

8.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of Biodiversity and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

An Appropriate Assessment (AA) screening exercise has also been undertaken (RPS, 2018) in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011). The AA screening report is included as **Appendix A**.

8.2 ASSESSMENT METHODOLOGY

8.2.1 Guidance

The surveys and impact assessment have been carried out in accordance with the following guidelines:

- *EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002) (and revised and draft guidelines 2015/2017)*
- *EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003a) (and revised advice notes 2015)*
- *Chartered Institute of Ecology and Environmental Management (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, and Coastal;*
- *Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011);*
- *A Guide to Habitats in Ireland (Fossitt, 2000);*
- *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009a);*
- *Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2. (NRA, 2009b);*
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.) (Collins, 2016);*
- *Bat Surveys: Good Practice Guidelines (Hundt, 2012);*
- *Bat Mitigation Guidelines for Ireland (Kelleher & Marnell, 2006);*
- *Environmental Planning and Construction Guidelines Series (National Roads Authority, 2005 - 2011); and*
- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016).*

The assessment was carried out in two stages, initially through a desktop study, followed by field survey work in order to identify, describe and map areas of known or potential biodiversity value.

8.2.2 Relevant Legislation, Policy and Guidelines

The assessment of the likely significant impacts of the proposed development on ecological features has taken account of the following policy documents and legislation, where relevant:

- EU Birds Directive 2009/147/EEC;
- EU Habitats Directive 92/43/EEC (as amended);
- EU Water Framework Directive (WFD) 2000/60/EC;
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (as amended);
- Planning and Development Act 2010 (as amended);
- Wildlife Acts 1976 and Wildlife (Amendment) Act (2000) (as amended); and
- Flora (Protection) Order, 2015.

8.2.3 Consultation

The following organisations were consulted by email in relation to the proposed this assessment:

- Department of Culture, Heritage and the Gaeltacht (Development Applications Unit (DAU)); and
- Inland Fisheries Ireland (IFI).

8.2.4 Zone of Influence

Following the guidance set out by the (NRA, 2009), the proposed development has been evaluated based on an identified zone of influence (ZoI) with regard to the potential impact pathways to ecological feature (habitats, flora and fauna).

Hydrological linkages between the proposed development and aquatic habitats/species can occur over significant distances; however, the significance of the impact will be site specific depending on the receiving water environment and nature of the potential impact. Adopting a precautionary approach, the distance over which surface water discharges could have a significant impact on receiving watercourses is considered to extend downstream of the proposed development site to the Irish Sea.

The ZoI for significant impacts to breeding birds is considered to extend no more than 100m from the proposed development since there is no construction phase to be accounted for with the proposed development.

The ZoI for mammals such as bats, badgers and otters may extend over larger distances due to the fact that they can commute and forage many kilometers from their breeding sites. Regarding terrestrial habitats, the ZoI is limited to the footprint of the study area.

8.2.5 Desk Study

8.2.5.1 Extent

The National Biodiversity Data Centres (NBDC) online database was searched for records of invasive species, protected flora (the Flora Protection Order 2015), protected fauna (under the EU Habitats Directive 92/43/EEC), Birds Directive (2009/147/EC) and Wildlife Acts (1976 as amended) within 2x2km Grid Squares. The area covered by the mentioned Grid Squares is considered to be adequate to account for the species affected by Phase 2 and Phase 3 fields.

8.2.5.2 Desktop Data Sources

Sources of information that were used to inform the assessment were:

- EPA Unified GIS Application Guide <http://gis.epa.ie/>
- NPWS online maps and data, site synopsis and conservation objectives www.npws.ie (August 2018);
- National Biodiversity Data Centre (NBDC) online maps and data www.biodiversityireland.ie (August 2018);
- Department of Housing, Planning and Local Government - River Basin Management Plan 2018-2021, available at <https://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021-0>
- Geological Survey of Ireland online mapping www.gsi.ie;
- Information on the conservation status of birds in Ireland (Colhoun & Cummins, 2013);
- OSI Map Viewer www.osi.ie; and
- Grange Castle Golf Course Infill Assessment - Environmental Risk Assessment (RPS, 2011, Appendix C).

8.2.5.3 Field Survey

An ecological survey was conducted over 2 days in July 10th and 12th 2018 with the objective of identifying and mapping the habitats present within the GCGC boundary, to note the occurrence/potential occurrence of protected species and to identify associated ecological constraints and any potential impacts.

8.2.5.4 Surveys Scoped Out

Given the nature (i.e. import of inert waste material) and timing (i.e. in 2009) of the study area management activities, the requirement to assess the following ecological features has been scoped out:

- **Winter bird surveys:** Habitats found within the study area are not considered suitable to support any significant wintering bird populations due to their distance from any designated, coastal, or wetland bird habitats, and the absence of potential winter roosting habitats (e.g. reed beds, moorland). Indeed, there are other areas with greater potential to support wintering birds such as the large open areas and wetlands associated with Corkagh Park;

- **Aquatic surveys:** There are two drains that extend from the Golf course through the study area and connect with the Camac River, ca. 100m east of the study area. However, the drains were dry at the time of the survey, and the vegetation is indicative of a lack of permanent water. Hence a water quality survey (e.g. Q-value) at the Camac River would have been inconclusive regarding the GCGC influence on the Camac River water quality. Regarding the Baldonnel stream which flows on the western side of the GCGC, since Phase 2 and Phase 3 areas of GCGC are not hydrologically connected with this waterbody, the aquatic survey of this waterbody was deemed unnecessary;
- **Bat activity survey:** owing to the nature of the project, effectively a regularisation of the existing status of the long disturbed lands with no planned construction or importation of further material, a bat activity survey was not required owing to the fact that the management activities whose effects this report intends to assess have taken place in the past and current effects on bat populations are deemed unlikely;
- **Breeding Bird survey:** Even though there is considerable suitable habitat for breeding birds located throughout the proposed study area including a network of hedgerows, trees, woodland, scrub, rank grassland, wetland and buildings, a detailed bird survey was not carried out as part of the field assessment. The birds that were observed or heard on an *ad hoc* basis during the course of the surveys were recorded and presented in this chapter.
- **Invertebrate survey (terrestrial):** The habitats within the study area are considered unlikely to support protected invertebrate species such as butterflies (e.g. *Euphydryas aurinia*); and
- **Reptile surveys:** Although the GCGC provides habitats that could potentially be used by smooth newt, common lizard and frog, the NBDC database does not have records of their presence. As there is no planned change in the status of the lands and owing to the disturbed nature of much of the ground with small or ephemeral areas of fresh water, a reptile survey was not undertaken.

8.2.5.5 Habitats and Flora Survey

Habitats on site were classified using *A Guide to Habitats in Ireland* (Fossitt, 2000) and mapped in accordance with the *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011). The classification is the standard scheme for identifying, describing and classifying habitats in Ireland. The hierarchical classification operates at three levels, using codes to differentiate habitats based on the plant species present. Species recorded in this report are given both their Latin and common names, following the nomenclature given in the *New flora of the British Isles* (Stace, 2010).

Invasive Alien Plant species including those listed on Schedule 3 of the Birds and Natural Habitats Regulations 2011 (as amended) were also searched for during site visits and findings are discussed in this report.

8.2.5.6 Protected Fauna Survey

The site survey included an assessment of the presence, or likely presence, of a range of rare or protected fauna and bird species. Habitats were assessed for field signs and/or usage by fauna, such as well-used pathways, droppings, places of shelter and features or areas likely to be of particular value as foraging resources.

8.2.5.7 Impact Assessment Methodology and Ecological Valuation

The methodology for the assessment of impacts is derived from CIEEM guidance (2016) and *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009b).

When describing changes/activities and impacts on ecosystem structure and function, reference was made to the parameters as discussed below.

Positive or Negative: Is the impact likely to be positive or negative? Positive impacts merit just as much consideration as negative ones, as international, national and local policies increasingly press for projects to deliver positive biodiversity outcomes.

Extent: 'Extent' should also be predicted in a quantified manner and relates to the area over which the impact occurs. Where the receptor is in an area of a particular plant community for example, Extent = Magnitude.

Magnitude: 'Magnitude' should be predicted in a quantified manner wherever possible and relates to the quantum of an impact, for example the number of individuals of a species affected by an activity or amount of habitat loss.

Duration: 'Duration' is intended to refer to the time during which the impact is predicted to continue, until recovery or re-instatement (which may be longer than the impact-causing activity). This should be quantified wherever possible and interpreted in relation to the ecological processes involved rather than on a human timescale.

Timing and frequency: The timing of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities take place can be an important determinant of the impact on receptors and should also be assessed and described.

Reversibility: 'Reversibility' should be addressed by identifying whether an impact is ecologically reversible (either spontaneously or through specific action) and whether such an outcome is likely.

An informed integration of each of these impact characteristics, for each potentially significant impact is necessary in order to underpin the determination of impact significance. A significant effect can be a positive or negative ecological effect and is "an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general" as defined in CIEEM (2016). In each case, it is important to assess the likelihood that the change will occur as anticipated and that the impact on ecological structure and function will manifest as predicted.

In accordance with NRA guidelines (2009b), ecological features valued as "Local Importance (Higher Value)" or higher as per the NRA evaluation criteria (**Table 8.1**) were considered in the impact assessment. Features of lower ecological value are excluded from the impact assessment.

Table 8.1 Ecological Evaluation Criteria from NRA Guidelines (NRA, 2009b)

Ecological Valuation Criteria
<p>International Importance:</p> <ul style="list-style-type: none"> • 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (pSPA). • Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). • Features essential to maintaining the coherence of the Natura 2000 Network.⁵ • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level)⁶ of the following: <ul style="list-style-type: none"> ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and / or ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. • European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).⁷
<p>National Importance:</p> <ul style="list-style-type: none"> • Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts. • National Park. • Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level)⁸ of the following: <ul style="list-style-type: none"> ○ Species protected under the Wildlife Acts; and/or ○ Species listed on the relevant Red Data list. • Site containing 'viable areas'⁹ of the habitat types listed in Annex I of the Habitats Directive.

⁵ See Articles 3 and 10 of the Habitats Directive.

⁶ It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁷ Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

Ecological Valuation Criteria**County Importance:**

- Area of Special Amenity.¹⁰
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)¹¹ of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)¹² of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

⁸ It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁹ A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

¹⁰ It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

¹¹ It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County importance where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

¹² It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

8.3 RECEIVING ENVIRONMENT

8.3.1 Site Overview

The GCGC is located in Dublin west, ca. 10km north the Wicklow Mountains (**Figure 8.1**). The study area within the GCGC is formed by Phase 1, Phase 2 and Phase 3. Phase 1 has been fully graded, seeded and planted and is now operating as a fully developed golf course. In this regard, Phase 1 has very limited ecological potential.

The Phase 2 and 3 areas, although spatially separated, share several habitat features. Both are widely dominated by recolonising bare ground while treelines and hedges delineate the site boundaries for the most part. Other sparse habitats include scrub, spoil and bare ground, other artificial lakes and ponds and drainage ditches.

8.3.2 Desk Study Results

8.3.2.1 European Sites

There are five Special Areas of Conservation (SACs) and 3 Special Protection Areas (SPAs), collectively referred to as European sites, located within the Zone of Influence (Zoi) of the proposed development. The Zoi constitutes a 15km Buffer of the proposed development site, illustrated in **Figure 8.1** and **Table 8.2**.

SACs are sites of international importance due to the presence of Annex I habitats and/or Annex II species listed under the EU Habitats Directive (92/43/EEC). SPAs are designated for the protection of bird species listed on Annex I of the Bird Directive (2009/147/EC), regularly occurring populations of migratory species and areas of international importance for migratory birds.

The European sites correspond to those that were subject to Screening for Appropriate Assessment (**Appendix A**). The assessment considered the European sites within the Zoi of the proposed development and/or with hydrological connectivity to the proposed development sites and concluded that there is no likelihood of significant effects as a result of the proposed development, either alone or in combination with other plans or projects.



Legend

- Study area
- Zone of Influence
- Special Protection Areas
- Special Areas of Conservation (SAC)

■ Data Source: NPWS (last updated: April 2018)

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

Project **Grange Castle Golf Club, Waste Soils Recovery Facility**

Title **Figure 8.1 European sites within the Zone of Influence**

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Issue Details	
Drawn: JMM	Project: MDR1223
Checked: TR	File Ref:
Approved: BP	MDR1223QG0002D01
Scale: 1:175,000@A4	Projection:
Date: 20/07/2018	IRENET05 / ITM

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Table 8.2 European Sites within the Zone of Influence

Site Name and Code	Qualifying Interest Habitats and Species (*=Priority Habitat)	Distance from Proposed development	Pathway
Special Area of Conservations (SACs)			
Glenasmole Valley SAC (001209)	Generic Conservation Objectives Version 6.0 (21/02/18) Annex I Habitats <ul style="list-style-type: none"> ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (important orchid sites) [6210]* ▪ <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] ▪ Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]* 	ca. 7km	No. Although the European site and the GCGC are located within the Liffey and Dublin Bay catchment, they lie in different subcatchments. The Glenasmole Valley is located within the Dodder subcatchment while the GCGC is located within the Camac subcatchment.
Rye Water Valley/Cartron SAC (001398)	Generic Conservation Objectives Version 6.0 (21/02/18) Annex I Habitats <ul style="list-style-type: none"> ▪ Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]* Annex II Species <ul style="list-style-type: none"> ▪ Narrow-mouthed Whorl Snail (<i>Vertigo angustior</i>) [1014] ▪ Desmoulin's Whorl Snail (<i>Vertigo modiolinsiana</i>) [1016] 	ca. 7km	No. The European site is located on the River Liffey. The Baldonnell stream drains the GCGC area into the Liffey river, intersecting it downstream of the Rye Water Valley/Cartron SAC. For this reason, a pathway between GCGC and the European site is unlikely to be established.
Wicklow Mountains SAC (002122)	Conservation Objectives Series Version 1 (31/07/17) Annex I Habitats <ul style="list-style-type: none"> ▪ Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] ▪ Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojunetea</i> [3130] ▪ Natural dystrophic lakes and ponds [3160] ▪ Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] ▪ Alpine and Boreal heaths [4060] ▪ Calaminarian grasslands of the <i>Violetalia calaminariae</i> [6130] 	ca. 9km	No. Although both the European site and the GCGC are located within the Liffey and Dublin Bay catchment, they are in different subcatchments.

Site Name and Code	Qualifying Interest Habitats and Species (*=Priority Habitat)	Distance from Proposed development	Pathway
	<ul style="list-style-type: none"> ▪ Species-rich <i>Nardus grasslands</i>, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]* ▪ Blanket bogs [7130] (* if active bog) ▪ Siliceous scree of the montane to snow levels (<i>Androsacetalia alpine</i> and <i>Galeopsietalia ladani</i>) [8110] ▪ Calcareous rocky slopes with chasmophytic vegetation [8210] ▪ Siliceous rocky slopes with chasmophytic vegetation [8220] ▪ Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] <p>Annex II Species</p> <ul style="list-style-type: none"> ▪ Otter (<i>Lutra lutra</i>) [1355] 		
South Dublin Bay SAC (000210)	<p>Conservation Objectives Series Version 1.0 (22/08/13)</p> <p>Annex I Habitats</p> <ul style="list-style-type: none"> ▪ Mudflats and sandflats not covered by seawater at low tide [1140] 	ca. 14km	No. The European site has no hydrological connectivity with the GCGC area due to the distance between the sites, the lack of direct hydrological connection between them and the existence of a marine open water buffer between the sites.
Red Bog SAC (000397)	<p>Generic Conservation Objectives Version 6.0 (21/02/18)</p> <p>Annex I Habitats</p> <ul style="list-style-type: none"> ▪ Transition mires and quaking bogs [7140] 	ca. 14km	No. The European Site has no connectivity with the GCGC area due to the distance between the sites and the lack of direct hydrological connection between them..
Special Protection Areas (SPA)			
Wicklow Mountains SPA (004040)	<p>Conservation Objectives Series Version 6.0 (21/02/18)</p> <p>Special Conservation Interest</p> <ul style="list-style-type: none"> ▪ Merlin (<i>Falco columbarius</i>) [A098] ▪ Peregrine (<i>Falco peregrinus</i>) [A103] 	ca. 12km	Yes. Although there is no hydrological connectivity between the European site and the GCGC, Peregrine (<i>Falco peregrinus</i>) has the potential of utilising the study area habitat for feeding, even if

Site Name and Code	Qualifying Interest Habitats and Species (* = Priority Habitat)	Distance from Proposed development	Pathway
			temporarily (SNH, 2016).
South Dublin Bay and River Tolka Estuary SPA (004024)	Conservation Objectives Series Version 1.0 (09/03/15) Special Conservation Interests <ul style="list-style-type: none"> ▪ 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 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 paradisaea</i>) [A194] ▪ Wetlands [A999] 	ca. 14km	No. The European site has no hydrological connectivity with the GCGC area due to the distance between the sites and the existence of a marine open water buffer between the sites.
Poulaphouca Reservoir SPA (004063)	Conservation Objectives Series Version 6.0 (21/02/18) Special Conservation Interest <ul style="list-style-type: none"> ▪ Greylag Goose (<i>Anser anser</i>) [A043] ▪ Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] 	ca. 15km	Yes. The European site has no hydrological connectivity with the GCGC area. However, the study area is located within the average foraging distance for the SCI Greylag Goose (<i>Anser anser</i>) (SNH, 2016).

*indicates a priority habitat under the Habitats Directive

8.3.2.2 Nationally Designated Sites

Natural Heritage Areas (NHAs) are sites deemed to be of national ecological importance and are afforded protection under the Wildlife (Amendment) Act 2000. Many NHA boundaries overlap with European sites. The proposed NHAs (pNHAs) have not been statutorily proposed nor designated under the Wildlife Act 1976 (as amended). However, they are afforded some protection under planning legislation and objectives are included in the current South Dublin County Council Development Plan 2016-2022.

The South Dublin County Council Development Plan 2016-2022 (SDCC, 2016) sets out policies and complimentary protective measures to develop and improve the ecological, visual, recreational, environmental and amenity value of the County's proposed Natural Heritage Areas and associated habitats. It defines as objectives for NHAs and pNHAs the following:

- **Heritage, Conservation and Landscapes Policy 13 Objective 1:**

To ensure that any proposal for development within or adjacent to a proposed Natural Heritage Area (pNHA) is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the pNHA particularly plant and animal species listed under the Wildlife Acts and the Habitats and Birds Directive including their habitats.

- **Heritage, Conservation and Landscapes Policy 13 Objective 2:**

To restrict development within a proposed Natural Heritage Area to development that is directly related to the area's amenity potential subject to the protection and enhancement of natural heritage and visual amenities including biodiversity and landscapes.

There are 16 proposed pNHAs and no NHAs located within 15km of the study area and these are listed in **Table 8.3** and illustrated in **Figure 8.2**.



Legend

- Study area
- Zone of Influence
- proposed National Heritage Area

Data Source: NPWS (last updated: April 2018)

Client:  South Dublin County Council
Atha Cliath Theas

Project: **Soils Recovery Facility**

Title: **Figure 8.2 National Sites within the Zone of Influence**

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Issue Details

Drawn: JMM	Project: MDR1223
Checked: TR	File Ref:
Approved: BP	MDR1223QG0004D01
Scale: 1:175,000 @ A4	Projection:
Date: 16/08/2018	IRENET05 / ITM

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Table 8.3 National Designated Sites within the Zone of Influence

Site Name and Code	Summary Description	Distance from Proposed development	Pathway
Proposed Natural Heritage Areas (pNHA)			
Grand Canal pNHA (002104)	The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.	2km	Yes. The Grand Canal pNHA is hydrologically connected to the study area through the Camac River and the Baldonnel stream.
Liffey Valley pNHA (000128)	This site consists of two separate subsites, one of which is 9.7km to the west of the alignment and the other is 5.7km to the west of the alignment. The rare and legally protected hairy St. John's wort (<i>Hypericum hirsutum</i>) has been recorded on this site, along with the threatened yellow archangel (<i>Lamiastrum galeobdolon</i>). Both are Irish Red Data Book listed species. This site is included in the Liffey Valley Special Amenity Area Order 1990. The diversity of aquatic and terrestrial habitats and the presence of rare and threatened plant species make this site very important.	5km	Yes. Although the GCGC is hydrologically connected to the Grand Canal pNHA through the Baldonnel stream, Phase 2 and Phase 3 areas are located in a zone that, apparently, drains into the Camac River instead (Appendix D). However, a precautionary approach is taken and the connectivity with the Baldonnel stream is considered.
Lugmore Glen pNHA (001212)	Wooded glen habitat with good representation of woodland plants: Hazel (<i>Corylus avellana</i>), Ash (<i>Fraxinus excelsior</i>), Elder (<i>Sambucus nigra</i>) and Blackthorn (<i>Prunus spinosa</i>). It is also notable for the presence of the rare Red Data Book species: Yellow Archangel (<i>Lamiastrum galeobdolon</i>).	5km	No. The Nationally Designated site is hydrologically connected to the study area through the Camac River. However, the Lugmore Glen pNHA is located upstream in the Camac River, relatively to the GCGC. This position hinders the pathway between the study area and the National site.

Site Name and Code	Summary Description	Distance from Proposed development	Pathway
Slade Of Saggart And Crooksling Glen pNHA (000211)	Wooded river valley and a small wetland system. Well-developed ground flora with mostly planted tree species. More natural vegetation higher up in the valley. Rare species previously noted includes Yellow Archangel (<i>Lamiastrum galeobdolon</i>).	5km	No. The National Designated site is hydrologically connected to the study area through the Camac River. However, the Slade Of Saggart And Crooksling Glen pNHA is located upstream the GCGC. This position hinders the pathway between the study area and the National site.
Dodder Valley pNHA (000991)	River habitat, associated bank side vegetation and several bird species. The site represents the last remaining stretch of natural river bank vegetation on the River Dodder in the built-up Greater Dublin Area.	6km	No. Both the National Designated site and the GCGC are located within the Liffey and Dublin Bay catchment, although in different subcatchments. The Dodder Valley pNHA is located within the Dodder subcatchment while the GCGC is located within the Camac subcatchment.
Glenasmole Valley pNHA (001209)	Woodland, herb and orchid rich grasslands, calcareous fens and flushes, rare and protected plant species.	7km	No. Both the National Designated site and the GCGC are located within the Liffey and Dublin Bay catchment, although in different subcatchments. The Glenasmole Valley pNHA is at the Dodder subcatchment while the GCGC is located within the Camac subcatchment.

Site Name and Code	Summary Description	Distance from Proposed development	Pathway
Rye Water Valley/Carton pNHA (001398)	This proposed Natural Heritage Area is included within the confines of Rye Water Valley/Carton SAC	7km	No. Although the National Designated site is located on the River Liffey and the Baldonnel stream drains the GCGC area into the Liffey river, the intersection between the Baldonnel stream and the River Liffey is made downstream the Rye Water Valley/Carton pNHA.
Royal Canal pNHA (002103)	The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.	7km	No. The Royal Canal pNHA crosses the Liffey River upstream the intersection with the Baldonnel stream, which flows west of the GCGC.
Kilteel Wood pNHA (001394)	Grazed, deciduous woodland habitat with heath type plant species. The site is a small heathy wood mostly of oak (<i>Quercus</i> spp.) and Downy Birch (<i>Betula pubescens</i>). Other trees present include Beech (<i>Fagus sylvatica</i>), Sycamore (<i>Acer pseudoplatanus</i>), Ash (<i>Fraxinus excelsior</i>) and Scots Pine (<i>Pinus sylvestris</i>).	10km	No. The National Designated Area habitats and species are not hydrologically connected since they are not aquatic. Given the distance between the Kiteel Wood and the GCGC, any other connectivity pathways for the habitats and species are unlikely.
Fitzsimon's Wood pNHA (001753)	The site consists of an area of birch woodland, very rare in Co. Dublin. Due to this fact, Fitzsimon's Wood is a site of local ecological importance.	14km	No. The National Designated Area habitats and species are not hydrologically connected since they are not aquatic. Given the distance between Fitzsimon's Wood and the GCGC, any other connectivity pathways for the habitats and species are unlikely.

Site Name and Code	Summary Description	Distance from Proposed development	Pathway
Santry Demesne pNHA (000178)	The site comprises the remnants of former demesne woodland. The primary importance of this site is that it contains a legally protected plant species, Hairy St. John's wort (<i>Hypericum hirsutum</i>) whereas the woodland is of general ecological interest as it is an area where little has survived of the original vegetation.	14km	No. The National Designated Area not hydrologically connected. Given the distance between the Santry Demesne pNHA and the GCGC, any other connectivity pathways for the site's habitats and species are unlikely.
South Dublin Bay pNHA (000210)	This Natural Heritage Area is included within the confines of South Dublin Bay SAC.	14km	No. The National Designated Area habitats and species are not hydrologically connected.
Red Bog, Kildare pNHA (000397)	Wetland complex of lake, fen and bog. Is included within the confines of Red Bog, Kildare SAC.	14km	No. The National Designated site is located at some distance of the River Morrell, a tributary of the river Liffey to enable the establishment of a hydrological connectivity.
Poulaphouca Reservoir pNHA (000731)	Reservoir, wet grassland, mosses, ferns, inland waterfowl and birds. This Proposed Natural Heritage Area is included within the confines of the Poulaphouca Reservoir SPA.	14km	Yes. Although there is no hydrological connectivity between GCGC and the Poulaphouca Reservoir pNHA, the study area is distanced within the foraging range for the designated birds (e.g. Greylag Goose [<i>Anser anser</i>]).
North Dublin Bay pNHA (000206)	This site is located within the SAC and, besides its SCIs, is of national importance for another fifteen bird species and three insect species. The site also contains at least seven species of regionally or nationally important invertebrates.	15km	Yes. Although not connected hydrologically with the GCGC, some of the National Designated Site Species of Interest have the potential to occupy the GCGC area, even temporarily.

Site Name and Code	Summary Description	Distance from Proposed development	Pathway
Boosterstown Marsh pNHA (001205)	Formed after the construction of the railway line, the low-lying marsh is located between the Rock Road and the railway line, which is largely responsible for its current shaping. The marsh is the only saltmarsh in south Dublin and supports a wide range of bird species and supports a population of Borrer's Saltmarsh Grass (<i>Puccinellia fasciculata</i>) a Flora Protection Order 2015 species.	15km	No. The National Designated site's habitats and species are not connected with the GCGC.

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8.3.2.3 Ramsar Sites

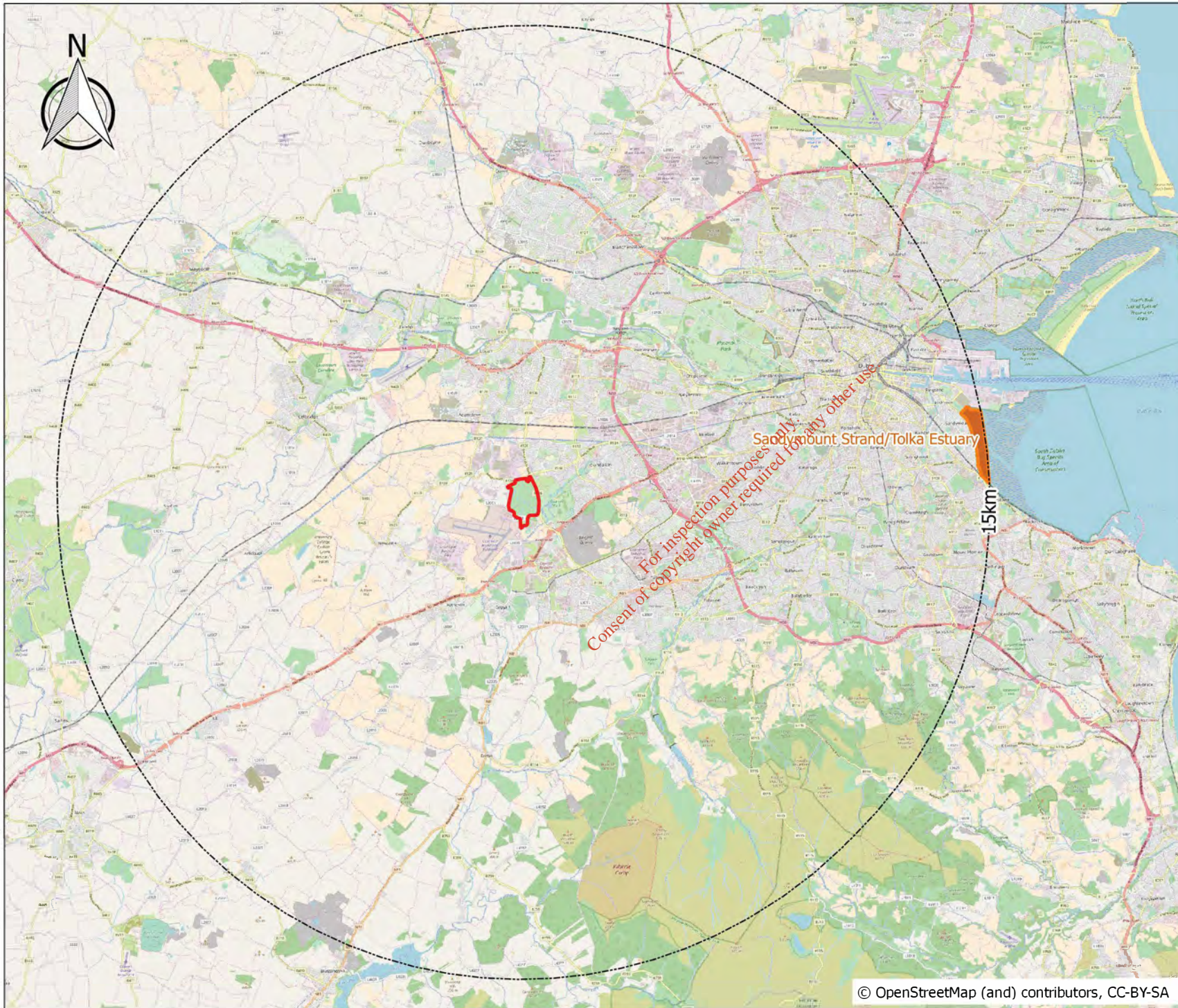
The *Convention on Wetlands* is an intergovernmental treaty adopted on 2 February 1971 in the Iranian city of Ramsar. The official name of the treaty *The Convention on Wetlands of International Importance especially as Waterfowl Habitats* reflects the emphasis on the protection of wetlands primarily as habitat for waterbirds. There are presently 147 Contracting Parties to the Convention, with 1524 wetland sites, totalling 129.2 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance¹³.

The convention entered into force in Ireland on the 15th of March 1985 with 45 sites designated as *Wetlands of International Importance* (Ramsar Sites), with a surface area of 66.994ha.

There is one Ramsar site within 15 km of the study area. It is listed in **Table 8.4** and illustrated in **Figure 8.4**.

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¹³ *An Introduction to the Ramsar Convention on Wetlands*, 7th ed. Ramsar Convention Secretariat, Gland, Switzerland.



Legend

- Study area
- Zone of Influence
- Ramsar site

Data Source: NPWS (last updated: April 2018)

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15km

Client
 South Dublin County Council
 Atha Cliath Theas
 The Golf Club, Waste
 Soils Recovery Facility

Title
Figure 8.3 Ramsar Sites within the Zone of Influence

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Issue Details	
Drawn: JMM	Project: MDR1223
Checked: TR	File Ref:
Approved: BP	MDR1223QG0005D01
Scale: 1:175,000@A4	Projection:
Date: 16/08/2018	IRENET\$5 / ITM

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Table 8.4 Ramsar Sites within the Zone of Influence

Site Name and Code	Site Description	Distance from Proposed development	Connectivity
Ramsar			
Sandymount Stand/Tolka Estuary (no. 832)	An intertidal system supporting a large bed of eelgrass (<i>Zostera noltii</i>) with extensive areas of sandflats. The site is important for various species of waterbirds, supporting internationally important numbers of Brent Geese and large numbers of roosting gulls and terns. Various species of annelids, bivalves and small gastropods occur.	15km	No. The Designated Area's habitats and species are not hydrologically connected. The Ramsar site distance to the GCGC makes it unlikely the study area to be occupied by any of the designated wetland's species.

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8.3.3 Records of Protected and Invasive Species

The GCGC lies within the O03K and O02P Ordnance Survey 2x2km Grid Squares. Records of rare and protected faunal species and Invasive Alien Plant Species from these grid squares were obtained from the National Biodiversity Data Centre (NBDC) online database¹⁴ (Table 8.5).

Table 8.5 NBDC database records of Protected and Invasive species for O03K and O02P.

Common name	Scientific name	Year of last record	Designation	Grid Square
Birds				
Barn Swallow	<i>Hirundo rustica</i>	2016	BoCCI* - Amber	O03K & O02P
Black-headed Gull	<i>Larus ridibundus</i>	2011	BoCCI - Red	O03K
Common Coot	<i>Fulica atra</i>	2016	BoCCI - Amber	O03K & O02P
Common Starling	<i>Sturnus vulgaris</i>	2011	BoCCI - Amber	O03K
Eurasian Tree Sparrow	<i>Passer montanus</i>	2011	BoCCI - Amber	O03K
Great Cormorant	<i>Phalacrocorax carbo</i>	2011	BoCCI - Amber	O03K
House Sparrow	<i>Passer domesticus</i>	2011	BoCCI - Amber	O03K
Little Grebe	<i>Tachybaptus ruficollis</i>	2011	BoCCI - Amber	O03K
Mute Swan	<i>Cygnus olor</i>	2011	BoCCI - Amber	O03K
Northern Lapwing	<i>Vanellus vanellus</i>	2011	BoCCI - Red	O03K
Sand Martin	<i>Riparia riparia</i>	2016	BoCCI - Amber	O03K & O02P
Tufted Duck	<i>Aythya fuligula</i>	2011	BoCCI - Amber	O03K
Common Swift	<i>Apus apus</i>	2016	BoCCI - Amber	O02P
Mammals				
West European Hedgehog	<i>Erinaceus europaeus</i>	2013	Protected Species: Wildlife Acts	O03K
Eurasian Badger	<i>Meles meles</i>	2016	Protected Species: Wildlife Acts	O02P
European Otter	<i>Lutra lutra</i>	1980	Annex II and IV EU Habitats Directive	O02P
Lesser Noctule	<i>Nyctalus leisleri</i>	2006	Annex IV EU Habitats Directive	O03K & O02P
Common Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	2006	Annex IV EU Habitats Directive	O03K
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	2006	Annex IV EU Habitats Directive	O03K & O02P
White-clawed Crayfish	<i>Austropotamobius pallipes</i>	2013	Annex II and V EU Habitats Directive	O02P
Invasive				

¹⁴ www.biodiversityireland.ie Accessed August 2018

Common name	Scientific name	Year of last record	Designation	Grid Square
Japanese Knotweed	<i>Fallopia japonica</i>	2016	Regulation S.I. 477	O03K
Spanish Bluebell	<i>Hyacinthoides hispanica</i>	2016	Regulation S.I. 477	O03K
Eastern Grey Squirrel	<i>Sciurus carolinensis</i>	2016	Regulation S.I. 477	O03K & O02P
American Mink	<i>Mustela vison</i>	1980	Regulation S.I. 477	O02P
Brown Rat	<i>Rattus norvegicus</i>	2015	Regulation S.I. 477	O02P
European Rabbit	<i>Oryctolagus cuniculus</i>	2017	Medium Risk ¹⁵	O02P

*BoCCI= Birds of Conservation Concern in Ireland

8.3.4 Field Survey Results

An ecological survey was undertaken in July 10th and 12th 2018, at the study area within the GCGC to support environmental assessments. It identified and registered key habitats and species, with special attention to protected and invasive species. The survey was confined to fields limits, although the surrounding landscape was also considered.

8.3.4.1 Habitats

Given the low ecological value of Phase 1, limited habitat surveys have been undertaken at this area of the site. The areas subjected to the detailed ecological survey comprised Phase 2 (15.58 ha) and Phase 3 (8.38 ha) and it was conducted over two days in July 10th and 12th 2018. The habitats were identified were mapped according to Fossitt (2000) classification and shown in **Figure 8.4** and listed below:

- Treelines (WL2);
- Recolonising bare ground (ED3);
- Spoil and bare ground (ED2);
- Hedgerow (WL1);
- Scrub (WS1);
- Drainage ditches (FW4); and
- Other artificial lakes and ponds (FL8).

None of the habitats corresponds to EU Annex I habitats.

Because the study area is formed by two spatially separated units (i.e. Phase 2 and Phase 3), there are slight differences in species composition within same habitats types, whether they are located in Phase 2 or Phase 3. However, these subtle floristic differences do not add a different ecological character to the habitat in question.

¹⁵ Kelly, J., O'Flynn, C., and Maguire, C. 2013. Risk analysis and prioritisation for invasive and non-native species in Ireland and Northern Ireland. <http://invasivespeciesireland.com/wp-content/uploads/2013/03/Risk-analysis-andprioritization-29032012-FINAL.pdf>

Hedgerow (WL1) & Drainage ditches (FW4)

- Phase 2: This habitat type surrounds most of this study area, with the exception of its northern and eastern border. It is characterised mostly by mature, tall trees of Beech (*Fagus sylvatica*), Ash (*Fraxinus excelsior*) and Wild Cherry (*Prunus avium*) with understorey of bramble (*Rubus fruticosus* agg.), Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*), Dogwood (*Cornus sanguinea*), Wild Privet (*Ligustrum vulgare*), Hazel (*Corylus avellana*) and Nettle (*Urtica dioica*). They are densely covered with Ivy (*Hedera helix*) for the most part, which increases the hedgerows potential for bat usage. The Phase 2 field's southern hedgerow is overshadowed by scrub and associated with an apparently dry drainage ditch that flows in an easterly direction, into the River Camac;
- Phase 3: This habitat is characterised by the presence of Ash, Hazel, Hawthorn, Blackthorn, Bramble, Nettle and Broad Dock (*Rumex crispus*). There is a drainage ditch flowing on the west side of Phase 3 area. It has well established mature trees (although younger than in Phase 2) overshadowing the adjoining drainage ditch. Many of these trees are densely covered with Ivy - high potential roost features for bats.

Recolonising bare ground (ED3)

- Phase 2: It is the habitat occupying the greatest area within Phase 2 area. The vegetation cover is higher than 50% but it is apparent that, owing to the absence of topsoil, the disturbed ground displays low diversity with only a low number of occurring herbs. It is mostly dominated by Teasel (*Dipsacus fullonum*) and Coltsfoot (*Tussilago farfara*);
- Phase 3: It is the dominant habitat present at Phase 3. Very similar to the habitat characteristics described for Phase 2 area, but more diverse: beyond Teasel and Coltsfoot which continue to be dominant in Phase 3, there are also Brambles, Thistle (*Cirsium vulgare*), Common Ragwort (*Senecio jacobea*), Rosebay Willowherb (*Chamaenerion angustifolium*), Ribbed Melilot (*Melilotus officinalis*), Gorse (*Ulex europaeus*), Creeping cinquefoil (*Potentilla reptans*) and Soft Rush (*Juncus effusus*). Besides these species, Butterfly-bush (*Buddleia davidii*), which is a medium impact Invasive Species, is locally abundant.

Scrub (WS1)

- Phase 2: In between the areas occupied with ED3 habitat, Scrub develops. It is differentiated from the recolonising bare ground by virtue of its greater species diversity and abundance, displaying higher vegetation cover: Thistle, Hogweed (*Heracleum sphondylium*), Nettle, Bramble and Rosebay Willowherb;
- Phase 3: There are two well developed patches of scrub in this area. They present a wider species and structural diversity than the above ED3 habitat. The species identified in this habitat are: Brambles, Nettle, Rosebay Willowherb, Gorse, Nettle, Great Mullein (*Verbascum thapsus*), Common Ragwort, Hawthorn and Water Dock (*Rumex crispus*). The Invasive Species Butterfly-bush is also occasionally present in this habitat.

Other artificial lakes and ponds (FL8)

- Phase 2: There are three distinct water bodies that consist of accumulated water on poorly draining ground depressions. The absence of distinct vegetation on the surrounding grounds suggests these water bodies are recent and, perhaps, ephemeral.

Spoil and bare ground (ED2)

- Phase 3: This habitat of limited extent covers a narrow man made maintenance track, devoid of vegetation. Although the area occupied by this habitat does not show signs to be different in terms of soil and subsoil composition than *Recolonising bare ground (ED3)*, the absence of vegetation provides it with different nature and features.

8.3.4.2 Invasive Alien Plant Species (IAPS)

None of the species listed in the EU Regulation 1143/2014 of *Species of Union Concern*, European Communities (Birds and Natural Habitats) Regulations 2011 and in the list of *High Risk recorded species* from the Invasive Species in Ireland prioritization risk assessment (Kelly, O'Flynn & Maguire, 2013) was identified in the ecological survey. However, one *Medium Impact Species* was recorded in Phase 3 area - Butterfly bush, *Buddleja davidii*. Even though it is a plant with high spread potential, it is presently constricted to Phase 3 area and its boundaries.

8.3.4.3 Protected Fauna

8.3.4.3.1 Badger

Badgers (*Meles meles*) are legally protected under the Wildlife Act 1976 (as amended). The NBDC database indicates the presence of badger within the study area but no evidence was found during the walkover survey.

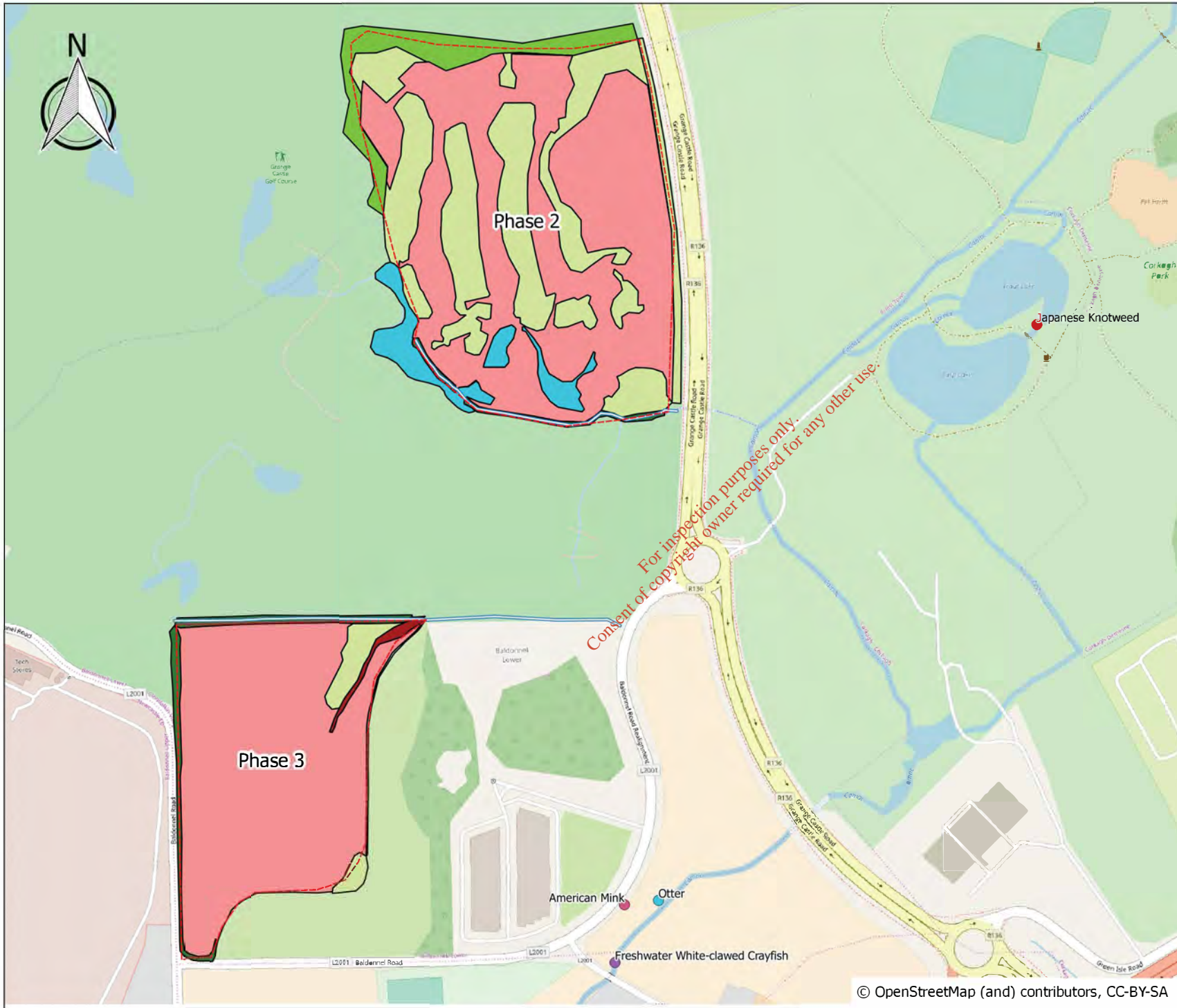
8.3.4.3.2 Otter

Otters (*Lutra lutra*) are protected under the Wildlife Act 1976 (as amended) and are listed on Annex II and Annex IV of the EU Habitats Directive. No holts were identified along the drainage ditches nor there was evidence of otter activity along these water features. The artificial nature of these habitats and the long term lack of permanent water to support aquatic organism that otter might prey upon suggests that otter are not residing in the study area.

8.3.4.3.3 Other mammals

The ecological survey report revealed secondary evidence for the presence of Fox (*Vulpes vulpes*) and European Rabbit (*Oryctolagus cuniculus*). The latter species is classified as *Medium Impact Invasive Species in Ireland*¹⁶ and is highly abundant in the GCGC area, according to local testimony and the profuse evidence of its presence (e.g. droppings, holes).

¹⁶http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Invasives_taggedMediumImpact_2013RA-2.pdf, accessed in August 2018



Legend	
	Site Boundary
	Recolonising bare ground
	Hedgerows
	Treelines
	Spoil and bare ground
	Scrub
	Other artificial lakes and ponds
	Drainage ditches
Species of Note	
	American Mink
	Freshwater White-clawed Crayfish
	Japanese Knotweed
	Otter
<p>Client: South Dublin County Council</p> <p>Project: Grange Castle Golf Club, Waste Soils Recovery Facility</p> <p>Title: Figure 8.4 Phase 2 and Phase 3 Fossitt habitats</p>	
<p>RPS RPS Consulting Engineers West Pier Business Campus Dun Laoghaire Co. Dublin Tel: +353 1 488 2900</p>	
Issue Details	
Drawn: JMM	Project: MDR1223
Checked: TR	File Ref:
Approved: BMcP	MDR1223QG0001D01
Scale: 1:6,500 @ A4	Projection:
Date: 20/07/2018	IRENET \$5 / ITM
<p>Notes:</p> <ol style="list-style-type: none"> This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent. Finance Survey Ireland Licence No. EN0005018 	

8.3.4.3.4 Avifauna

A total of nine bird species were recorded during the ecological survey (**Table 8.6**). It is important to note the potential for a large number of bird species to use the study area as breeding or feeding habitat, as highlighted in the National Biodiversity Data Centre and because a Public Park known to be used by protected species (i.e. Corkagh Park) is located in its immediate vicinity. Local ornithological testimony¹⁷ confirmed the presence of over 60 bird species in Corkagh Park, beyond the ones identified in the present ecological survey.

Table 8.6 Bird species identified during the walkover survey.

Species	Location	Conservation status
Magpie (<i>Pica pica</i>)	Phase 2	Green listed - BoCCI
Mute swan (<i>Cygnus olor</i>)	Phase 2	Amber listed - BoCCI; CMS Appendix II
Woodpigeon (<i>Columba palumbus</i>)	Phase 2 & Phase 3	Green listed - BoCCI
Blackbird (<i>Turdus merula</i>)	Phase 2	Green listed - BoCCI
Blue tit (<i>Parus caeruleus</i>)	Phase 3	Bern Convention Appendix II; Green listed - BoCCI
Buzzard (<i>Buteo buteo</i>)	Phase 2 & Phase 3	Green listed - BoCCI
Starling (<i>Sturnus vulgaris</i>)	Phase 2	Amber listed - BoCCI
Hooded Crow (<i>Corvus cornix</i>)	Phase 2 & Phase 3	Green listed - BoCCI
Grey Heron (<i>Ardea cinerea</i>)	Phase 2	Green listed - BoCCI

*BoCCI= Birds of Conservation Concern in Ireland; CMS= Convention on the Conservation of Migratory Species of Wild Animals

8.3.4.4 Ecological Valuation and Identification of Key Ecological Receptors

Ecological valuation according to NRA guidance (NRA, 2009b) is summarised in **Table 8.7**, along with the corresponding conservation protection. Also in **Table 8.7**, the term 'ecological receptors' is used when impacts upon the ecological feature are likely (NRA, 2009b). European Sites are also listed in and were assessed in a different cover as part of the Appropriate Assessment Screening (refer **Appendix A**).

¹⁷ http://www.timsfotos.com/Corkagh_Park.html, accessed in August 2018

Table 8.7 Summary of Ecological Valuation and Key Ecological Receptors

Ecological Feature	International Protection	Ecological Valuation (NRA, 2009)	Ecological Receptor?
Designated Sites			
<i>European</i>			
Glenasmole Valley SAC (001209)	European Site	International	No (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
Rye Water Valley/Carlton SAC (001398)	European Site	International	No (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
Wicklow Mountains SAC (002122)	European Site	International	No (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
South Dublin Bay SAC (000210)	European Site	International	No (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
Red Bog SAC (000397)	European Site	International	No (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
Wicklow Mountains SPA (004040)	European Site	International	Yes (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
South Dublin Bay and River Tolka Estuary SPA (004024)	European Site	International	No (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
Poulaphouca Reservoir SPA (004063)	European Site	International	Yes (Figure 8.1 European Sites within the Zone of Influence Table 8.2; Appendix A)
<i>National</i>			
Grand Canal pNHA (002104)	No	County	Yes (Table 8.3)
Liffey Valley pNHA (000128)	No	County	Yes (Table 8.3)
Lugmore Glen pNHA (001212)	No	County	No (Table 8.3)
Slade Of Saggart And Crooksling Glen pNHA (000211)	No	County	No (Table 8.3)
Dodder Valley pNHA (000991)	No	County	No (Table 8.3)
Glenasmole Valley pNHA (001209)	No	County	No (Table 8.3)
Rye Water Valley/Carlton pNHA (001398)	No	County	No (Table 8.3)
Royal Canal pNHA (002103)	No	County	No (Table 8.3)
Kilteel Wood pNHA (001394)	No	County	No (Table 8.3)
Fitzsimon's Wood pNHA (001753)	No	County	No (Table 8.3)
Santry Demesne pNHA (000178)	No	County	No (Table 8.3)
South Dublin Bay pNHA (000210)	No	County	No (Table 8.3)
Red Bog, Kildare pNHA (000397)	No	County	No (Table 8.3)

Ecological Feature	International Protection	Ecological Valuation (NRA, 2009)	Ecological Receptor?
Poulaphouca Reservoir pNHA (000731)	No	County	Yes (Table 8.3)
North Dublin Bay pNHA (000206)	No	County	Yes (Table 8.3)
Boosterstown Marsh pNHA (001205)	No	County	No (Table 8.3)
Ramsar			
Sandymount Stand/Tolka Estuary (no. 832)	International Convention on Wetlands	International	No (Table 8.3)
Habitats			
Treelines (WL2)	No	Local (Higher)	Yes
Recolonising bare ground (ED3)	No	Local (Lower)	No
Spoil and bare ground (ED2)	No	Local (Lower)	No
Hedgerow (WS1)	No	Local (Higher)	Yes
Drainage ditches (FW4)	No	Local (Higher)	Yes
Other artificial lakes and ponds (FL8)	No	Local (Lower)	No
Protected Species			
Common Coot	No	Local (Lower)	No
Tufted Duck	No	Local (Lower)	No
Western European Hedgehog	No	Local (Higher)	Yes
Eurasian Badger	No	Local (Higher)	Yes
European Otter	Annex II and IV of EU Habitats and Species Directives	Local (Higher)	No
Bats	Annex IV of EU Habitats Directive	County	Yes
White-clawed Crayfish	Annex II and V EU Habitats Directive	County	Yes
Invasive Species	-	-	No

8.3.4.5 Scoping for Ecological Impact Assessment

In accordance with best practice guidance (NRA, 2009; CIEEM, 2016), the following Ecological Features have been scoped out from further assessment due to the following:

- European Sites: the potential impacts to the European Sites within the ZOI have been analysed in *Screening for Appropriate Assessment (Appendix A)*. The assessment concluded that “...the development has no likely significant effects on any European Sites either alone or in-combination with other plans or projects”. More specifically, there are two European sites with Qualifying Interests/SCIs that could potentially establish a pathway with the study area: Peregrine (*Falco peregrinus*), from Wicklow Mountains SPA, and Greylag Goose (*Anser anser*), from Poulaphouca Reservoir SPA. In the case of the Peregrine, even though the foraging range can reach up to 18km (SNH, 2016), it is mostly seen in estuary areas, where they hunt, or at coastal or mountain cliffs, where they usually breed¹⁸. It is then unlikely this species will use the study area either for feeding or for breeding. Regarding the Greylag Goose, even considering that the distance between the study area and the European site is within the average foraging distances covered by this species, the habitats within the GCGC are neither suitable for the species breeding (the species breeds by lakes and reservoirs) nor wintering (the Icelandic population winters mostly at coastal sites).
- National Sites: some of the pNHAs within the ZOI have the same location as, or overlap in part with, the corresponding European Sites. This is the case for Glenasmole Valley pNHA, Red Bog, Kildare pNHA, Poulaphouca Reservoir pNHA, Rye Water Valley/Carton pNHA, South Dublin Bay pNHA and North Dublin Bay pNHA. The impact potential upon these designated sites is, therefore, considered to be similar to the corresponding European Sites which, in the cases of the current ZOI, was assessed in a different cover (**Appendix A**) and deemed not significant. Therefore, these pNHAs are scoped out from further assessment. Because the location of some Nationally Designated sites within the project ZOI have no connection to, or impact pathway to the study area (e.g. Kiteel Wood pNHA, Fitzsimon’s Wood pNHA, Santry Demesne pNHA and Booterstown Marsh pNHA), or because it is located in a different sub-catchment (Dodder Valley pNHA), these are also scoped out. Finally, a number of pNHAs within the ZOI are located within the same catchment and sub-catchment of the study area but are located upstream the GCGC. Given their relative position and taking into consideration their ecological features, it is unlikely for an impact pathway to be established between the study area and these National Sites (e.g. Lugmore Glen pNHA, Slade of Saggart and Crooksling Glen pNHA and Royal Canal pNHA);
- Ramsar Site: the Ramsar designated wetland Sandymount Stand/Tolka Estuary is not hydrologically connected with the study area and, therefore, it is not considered an Ecological Receptor.
- Habitats: habitats with a valuation below *Local Importance (Higher Value)* do not represent key ecological receptors and detailed assessment is not required.
- Protected species: ecological features with a valuation below *Local Importance (Higher Value)* do not represent key ecological receptors and detailed assessment is not required. The species Common Coot, Common Wood Pigeon, Mallard, Tufted Duck, are not considered to be ‘key ecological receptors’ and do not require detailed assessment.
- Medium risk Invasive species Butterfly bush (*Buddleja davidii*) was recorded within the study area. However, this species’ benefits to pollinators have been observed¹⁹ and, although monitoring is advised, it only becomes problematic when it becomes established along

¹⁸ <https://www.birdwatchireland.ie/IrelandsBirds/Raptors/Peregrine/tabid/399/Default.aspx>

¹⁹ <https://species.biodiversityireland.ie/profile.php?taxonId=40247&taxonDesignationGroupId=26>, accessed August 2018

watercourses or where it voraciously spreads into derelict ground (NRA, 2010). Since this is not the case (i.e. it was found scattered in Phase 3), Butterfly bush is scoped out from further assessment.

- Medium risk Invasive species European Rabbit (*Oryctolagus cuniculus*) is abundant in the study area. Although classed as an invasive species and can compete for the same food resources with the protected species Irish Hare (*Lepus timidus hibernicus*)²⁰ (for which no evidence was confirmed by the ecological survey, although it might occur), it is a well-established species in Ireland (since 1200s) that might favour other protected species like foxes, buzzards, owls, etc. It is, therefore, scoped out from further assessment.

8.4 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The purpose of an Environmental Impact Statement Report (EIAR) is to identify the environmental effects of a development and examine how these impacts can be avoided or reduced during the design process, construction and operational stages of the proposed development. The impacts are evaluated in terms of their significance, nature and magnitude. While normally this assessment is completed in respect to a proposed development, prior to any construction work, in this case the development, i.e. the importation of material onto site, has already occurred. The EPA has instructed that a retrospective assessment is completed at the site, therefore only the environmental effects of the operation stage of the proposed development (i.e. the historic-imported material remaining *in situ*) have been considered.

The operation of the GCGC does not include any management of the areas in Phase 2 and Phase 3 that would involve any change in its habitats. However, if this situation will change in the future, a detailed ecological survey (e.g. breeding birds, bat activity/roosts) would need to be carried out.

Presently, there are no anticipated operational phase impacts on European sites and Ramsar sites.

8.4.1 National Designated Sites

There are two pNHAs with direct hydrological connectivity with the GCGC through the Baldonnell stream: the Grand Canal pNHA and Liffey Valley pNHA (**Figure 8.3** and **Table 8.3**). However, the *Grange Castle Golf Course Environmental Risk Assessment* concluded that the material import into the study area would involve a low risk to human health and to the environment (refer ERA in **Appendix C**), it is then considered unlikely that the retention of the imported inert material has had any significant effect on these two National Designated sites.

8.4.2 Habitats

The study area has a number of habitats ranked as being of *Local Importance (Higher value)* namely: Treelines, Hedgerows and associated Drainage ditches; as these are “sites containing semi-natural habitat types with high biodiversity and a high degree of naturalness ...” (NRA, 2009b). The current lack of active management of the study area (Phases 2 and 3) does not involve any activity with the potential of impacting these ecological features and their environmental value.

²⁰ <https://species.biodiversityireland.ie/profile.php?taxonId=119490&taxonDesignationGroupId=26>, accessed August 2018

8.4.3 Protected Species

The Protected Species Western European Hedgehog, Eurasian Badger as well as bats could be affected if there were any change to the current lack of active management. However, no known change is planned on the site. Therefore, there are no likely effects predicted in respect of these protected species.

As for European Otter and White-clawed Crayfish, the Ecological Survey did not reveal signs of their presence in the study area. A precautionary approach should be taken regarding a definite conclusion on the presence of these two species though as the survey was undertaken at a time when the drains were dry and there was not habitat potential for these species.

8.5 MITIGATION MEASURES

8.5.1 National Designated Sites

No mitigation measures are required.

8.5.2 Habitats

Although it is considered that there have been no likely significant effects from the import of material into the study area, there are some mitigation measures to be considered. All trees, scrub or hedgerows identified under the habitats *Treelines (WL2)* and *Hedgerows (WL1)* in the ecological survey will be retained and protected, following the National Roads Authority guidelines and best practice (NRA, 2005). These habitats provide bat forage and commuting pathways, as well as possibly providing bat roost feature.

8.5.3 Protected Species

In the event of any further development or change of current management regime to Phase 2 and Phase 3, Detailed Ecological Surveys shall be required to be undertaken. Depending on the nature of any change of management, it shall include surveys for bat activity, breeding birds (and wintering birds as appropriate), protected mammals, amphibians and reptiles, and aquatic ecology (for the drainage ditches, other waterbodies within the study area and the Camac River). These surveys should be conducted during the appropriate ecologically period to enable robust impact assessment, conclusions and mitigation measures to be detailed.

8.5.4 Invasive Species

In the absence of any change in the current management, the presence of Butterfly bush (*Buddleja davidii*), which was identified in Phase 3, should be monitored by the Local Authority as the site owners to ensure that uncontrolled expansion does not occur. Where large or monodominant stands become established, control measures shall be considered, in accordance with NRA (2010).

8.6 REFERENCES

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9 HYDROGEOLOGY AND HYDROLOGY

This chapter of the EIAR describes the baseline environment of the site in terms of Hydrogeology and Hydrology and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate. This section should be read in conjunction with **Chapter 10 Soils/Geology**.

9.1 ASSESSMENT METHODOLOGY

The following scope of works was completed by RPS for the purpose of this chapter:

- Site walkover survey, and
- Desk based study reviewing available information on the site.

The assessment was carried out in accordance with the following guidelines:

- Environmental Protection Agency (2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft - Revised Guidelines on the Information to be Contained in Environmental Impact Statements;
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (2002): Guidelines on the Information to be Contained in Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Environmental Protection Agency (2011): BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities; and,
- Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2001.

The following sources of information were consulted in the compilation of this report:

- Online databases of the Environmental Protection Agency (EPA) <https://gis.epa.ie/EPAMaps/>, and www.catchment.ie, for information on:
 - Surface water courses in the area and their respective water quality status;
 - Special Areas of Conservation & Special Protected Areas; and
 - Water Framework Directive (WFD) data.
- Office of Public Works (OPW); www.opw.ie and www.floodinfo.ie for flooding information;
- Ordnance Survey Ireland aerial photographs and historical mapping;
- Met Eireann www.met.ie for historic rainfall data.
- National Parks and Wildlife Services (NPWS) <http://webgis.npws.ie/npwsviewer/> for [designated sites](#)
- Other online databases consulted included:

- www.epa.ie/licensing for Annual Environmental Reports (W0129-02)
- www.fingalcoco.ie for Fingal County Development Plan 2017-2023.

A site walkover survey was completed by RPS on the 4th April 2018 and the 26th April 2018.

9.2 ASSESSMENT CRITERIA

The significance of an impact is defined by first considering the importance of the attribute impacted and secondly the magnitude of the impact. The importance of hydrology attributes (rating criteria) is defined in accordance with the NRA Guidelines²¹. This guidance includes intermediate steps for rating site importance (**Table 9.1**) and magnitude of impact (**Table 9.2**) and then significance (**Table 9.3**).

Table 9.1 Rating Criteria for Site Importance of Hydrogeological and Hydrology Attributes

Importance	Criteria	Typical Examples
Extremely high	Attribute has a high quality or value on an international scale.	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very high	Attribute has a high quality or value on a regional scale.	River, wetland or surface water body ecosystem protected by national legislation - NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale.	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

²¹ NRA (2008), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes

Table 9.2 Rating Criteria for Estimation Magnitude of Impact

Magnitude	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Loss or extensive change to a waterbody or water dependent habitat Increase in predicted peak flood level >100mm Extensive loss of fishery Calculated risk of serious pollution incident >2% annually Extensive reduction in amenity value
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm Partial loss of fishery Calculated risk of serious pollution incident >1% annually Partial reduction in amenity value
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm Minor loss of fishery Calculated risk of serious pollution incident >0.5% annually Slight reduction in amenity value
Negligible	Results in an impact on attribute but not of sufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level Calculated risk of serious pollution incident <0.5% annually
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 9.3 Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Potential Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely high	Imperceptible	Significant	Profound	Profound
Very high	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008)

9.3 RECEIVING ENVIRONMENT

9.3.1 Hydrogeology

According to the GSI, the limestone bedrock underlying the site is classified as a locally important (Li) aquifer, i.e. bedrock which is moderately productive in local zones only. There are no gravel aquifers in the vicinity of the site. **Figure 9.1** presents the aquifer classification for the site according to the GSI.

Figure 9.2 presents the GSI groundwater vulnerability index. Groundwater vulnerability is related to the type and thickness of subsoils in an area. The vulnerability for the majority of the site is classified as “high” and “extreme” for a small section in the southern part of the site.

A review of the GSI online geotechnical data base revealed investigated data from a number of schemes in close proximity to the site. Corkagh Grange Housing located to the east of the site (report ref: 7035) which identified the depth to bedrock ranging between 2.0 and 4.0 metres below ground level. Corkagh Technical park (report ref: 2262) located to the east also confirm a very shallow depth to bedrock between 0.2 and 2.1 metres below ground level. Site investigations as part of the 2010 ERA by RPS did not encounter any bedrock during trial pitting to a maximum depth of 4.7 metres below ground level. This is consistent with the GSI's high vulnerability category for groundwater.

The site is located within the Dublin Groundwater Body (GWB). Groundwater flow within the Dublin GWB occurs along fractures, joints and major faults, with most flow occurring near the surface. In general, the effective thickness of this aquifer is likely to be about 10m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deepwater strikes are commonly found in more isolated faults/fractures at depths of 30 - 50 m.b.g.l. There are also a number of warm springs located within this groundwater body which suggests deep groundwater circulation is possible. Flow path lengths are not considered to be on a regional scale and are typically less than 1km in length. Groundwater discharges to the numerous streams and rivers crossing the aquifer, and to the springs and seeps towards the coast.

The groundwater WFD status of the Dublin GWB is based on overall chemical status and quantities and has been categorised as “Good” (2010-2015). The WFD risk score for the GWB is “not at risk”.

It is expected that the groundwater flow to generally follow the local topography and to flow southeast to west and northwest towards the Griffeen River. It is also expected that regional groundwater flows northward to the River Liffey.

The GSI database shows that there are no public supplies or source protection areas immediately surrounding the site. The closest public supply zone is the Kiltel supply located approximately 10km to the south west of the site.

A small number of wells are located to 1km to the south east and 2km to the north east of the site (refer **Figure 9.3**). The well uses are listed as industrial or unknown and tend to produce ‘good’ well yields.

Groundwater users within the vicinity of the site are Baldonnel House (general domestic purposes and to supply onsite childcare facility) and Castle Bagot House.

Within the 2011 Risk Assessment there were reported two irrigation boreholes GW1 and GW2. These could not be located during this investigation.

During the 2011 ERA groundwater sampling. Elevated levels of arsenic and chloride were detected which were concluded to be as a result from offsite sources.

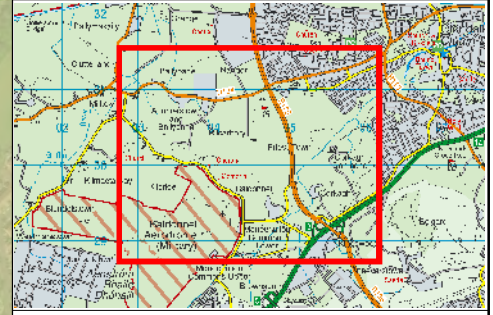
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Legend

-  Site Boundary
(covered by Waste Licence)
-  Grange Castle Golf Club
Boundary
- Aquifer Classification**
-  LI - Locally Important Aquifer -
Bedrock which is Moderately
Productive only in Local Zones

Data Source: Geological Survey of Ireland



Client

Project
**Grange Castle Golf Club
Waste Licence**

Title
**Aquifer Classification beneath
the Site and Surrounding Area**

Figure: 9.1



West Pier Business Campus,
Dun Laoghaire,
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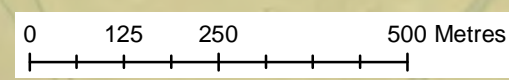
Initial
Golf Course
Development

Phase 1

Phase 2

Phase 3






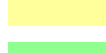


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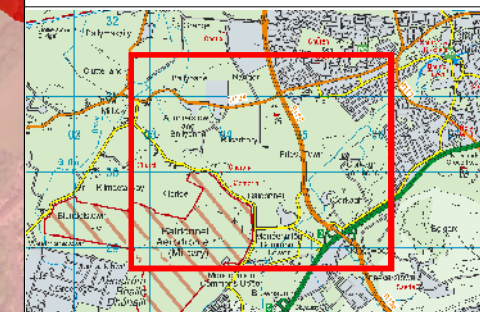
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Legend

-  Site Boundary (covered by Waste Licence)
-  Grange Castle Golf Club Boundary
- Vulnerability Rating**
-  Extreme (Rock Near Surface/Karst)
-  Extreme
-  High
-  Moderate
-  Low
-  Water

Data Source: Geological Survey of Ireland



Client

Project
**Grange Castle Golf Club
Waste Licence**

Title
Groundwater Vulnerability of the Site and Surrounding Area

Figure: 9.2

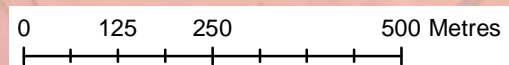


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Figure 9.3 Groundwater wells within the vicinity

9.3.2 Hydrology

9.3.2.1 Rainfall and Climate

The 30-year average annual rainfall measured at Dublin Airport is 757.9mm for the period 1981 to 2010. The annual average values for the period 2010 to 2018 are shown in **Table 9.4** where data is available. The data shows that since 2016 the average rainfall has been lower than the 30-year average. Annual potential evapotranspiration has not changed significantly since 2015. Effective rainfall which is the amount of rainfall available to infiltrate the ground (and not evaporated or taken up by plants) has been notably low in 2018, due to dry summer months in 2018.

Table 9.4 Annual Rainfall and Potential Evapotranspiration measured at Dublin Airport

Year	Rainfall (mm/yr)	Potential Evapotranspiration (mm/yr)	Effective Rainfall (mm/yr)
2018	612.2	565.9	46.3
2017	660.7	552.7	108
2016	713.6	571.0	142.6
2015	878.4	551.3	327.1
2014	927.2	-	-
2013	763.9	-	-
2012	849.5	-	-
2011	671.8	-	-
2010	671.4	-	-

9.3.2.2 Existing Site Drainage

The golf course consists of several artificial ponds which are connected via a series of interconnecting drains. The internal drainage network of the north western half of the site discharges to the Baldonnell Stream and the remainder discharges to the south east towards the Camac River. Both the Baldonnell Stream and the Camac River are tributaries of the River Liffey, which flows into Dublin Bay. A map of the onsite drainage is shown in **Figure 9.3**.

9.3.2.3 Surface Water Catchment and Quality

The site is located within Liffey and Dublin Bay WFD catchment which forms part of the Eastern River Basin District as defined under the EU Water Framework Directive European Communities Directive 2000/60EC.

The Camac River (IE_EA_09C020310) flows along the south and east perimeter of the site and continues north east flowing into the river Liffey. The Baldonnell Stream (IE_EA_09L012100) is located to the east of the site and flows northerly discharging into the river Liffey (**Figure 9.4**).

The WFD requires 'Good Water Status' for all European waters by 2015 or at the latest by 2027, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. The overall objective of the river basin management plans is to restore the status to 'Good' by 2021.

The WFD status for the Camac River (IE_EA_09C020310) was classed as "Poor" for the 2010 to 2015 period. The WFD risk score for the same river is "at risk" of deteriorating or being at less than Good status in the future.

The WFD status for the Baldonnell Stream (aka Liffey_170; IE_EA_09L012100) was classed as "moderate" for the 2010 to 2015 period. The WFD risk score for the same river is "at risk" of not achieving good status in the future.

9.3.2.4 Surface Water Sampling

Sampling of surface water was carried out during the 2011 ERA, the results indicated exceedances of manganese at one location and chloride and suspended soils at another. It was suggested these contaminants were from offsite sources.

A total of four samples were taken on the 26th May 2018 upstream and downstream and flowing into the Griffen and Cammock Rivers and tested for the following parameters;

A total of four surface water samples were collected on the 5th and 11th October 2017 from four locations at a surface water ditch onsite (SW1 - SW4). All sampling locations were located downgradient of the landfill area as no upgradient water courses were located onsite. Access to the surface water ditch was restricted due to site conditions and health and safety concerns. Refer to **Figure 9.4** for sampling locations.

All surface water grab samples were obtained by placing the dedicated laboratory sampling bottles directly into the surface water body. The sample inlet was placed below the surface flow while care was taken not to disturb the base/bed of the surface water body. Surface water samples were analysed for a range of parameters including;

- Temperature;
- pH;
- Electrical Conductivity;
- Biological oxygen demand;
- Ammonia (as N);
- Chloride;
- Sulphate;
- Sodium; and,
- Potassium.

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Field measurements of temperature, electrical conductivity, pH, dissolved oxidation reduction potential (ORP) for surface water samples taken at each of the sites are used as indicators of generic surface water properties.

There are no guideline values for the surface water parameters with the exception of electrical conductivity of 1000 $\mu\text{S}/\text{cm}$ and pH of 6.0-9.0

Reported inorganic concentrations were all below the relevant surface water guidelines with the exception of:

- Ammoniacal Nitrogen as N which ranged from <0.3mg/l to 125.51mg/l and exceeded the guideline value of 0.065mg/l within samples SW2, SW3, Spring 2, Road Run Off and Pipe Outflow.
- BOD (Settled) which ranged from <1mg/l to 30mg/l and exceeded the guideline value of 1.5mg/l within the Road Run Off and Pipe Outflow samples.

- Arsenic which ranged from <2.5µg/l to 86.4µg/l and exceeded the guideline value of 25µg/l within sample Spring 2.
- Nickel ranged from <2µg/l to 8µg/l and exceeded the guideline value of 4µg/l within Spring 2 and Pipe Outflow samples and within SW1 on 25/10/2018.

Reported organic concentrations (volatiles or semi-volatiles) were all below laboratory detection limit with no exceedances of relevant surface water guidelines. The full suite of tabulated surface water results are presented within **Appendix D**.

9.3.3 Flood Risk

The OPW flood mapping website indicates the site is a location of fluvial flooding, which is an area of land that might be flooded by rivers in a severe flood event **Figure 9.5**. The flood mapping website also contains records of historical flooding incidents in the surrounding area. The nearest single flood event listed is approximately 0.8km south of the site which is recorded as Baldonnell Barneys Lane Recurring.

There are currently no OPW flow gauges present within the Ballough sub-catchment or within the Nanny-Delvin Catchment.

From reviewing all available data, it is concluded that site is an appropriate development within this area, and there are no flooding or surface water management issues related to the site.

9.3.4 Areas of Conservation

The NPWS database lists no areas of conservation in the immediate vicinity of the site. The sites designated for nature conservation within a 15km radius are as follows:

Special Areas of Conservation (SAC)

- Glenasmole Valley (001209)
- Rye Water Valley/Carton (001398)
- Wicklow Mountains (002122)
- South Dublin Bay (000210)
- Red Bog (000397)

Special Protected Areas (SPA)

- Wicklow Mountains (004040)
- South Dublin Bay and River Tolka Estuary (004024)
- Poulaphouca Reservoir (004063)

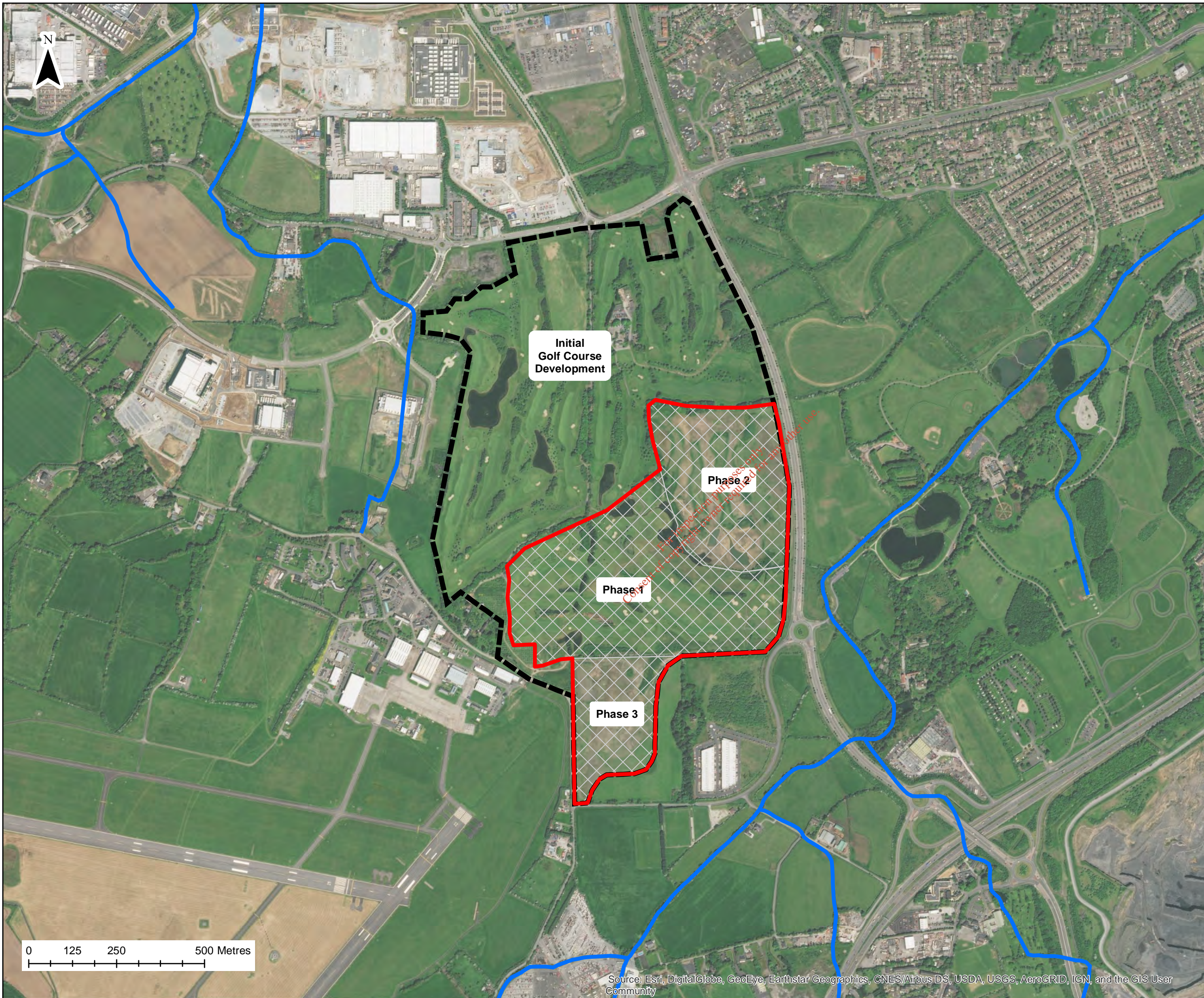
Proposed National Heritage Areas (pNHA);

- Grand Canal (002104)
- Liffey Valley (000128)

- Lugmore Glen (001212)
- Slade Of Saggart And Crooksling Glen (000211)
- Dodder Valley (000991)
- Glenasmole Valley (001209)
- Rye Water Valley/Carton (001398)
- Royal Canal (002103)
- Killeel Wood (001394)
- Fitzsimon's Wood (001753)
- Santry Demesne (000178)
- South Dublin Bay (000210)
- Red Bog, Kildare (000397)
- Poulaphouca Reservoir (000731)
- North Dublin Bay (000206)
- Booterstown Marsh (001205)

Further details on the above designated sites and their distance from the site are presented in **Chapter 8 Biodiversity**.

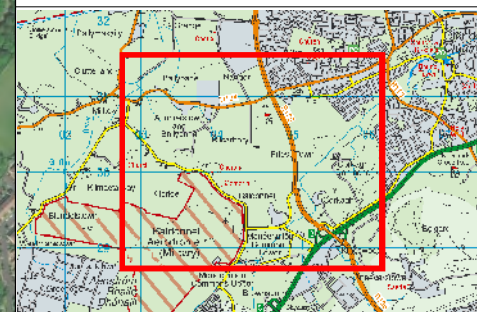
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Legend

- Site Boundary
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- Grange Castle Golf Club
Boundary
- Watercourse

Data Source: EPA (River Waterbodies)



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Watercourses within the
vicinity of the Site

Figure: 9.4



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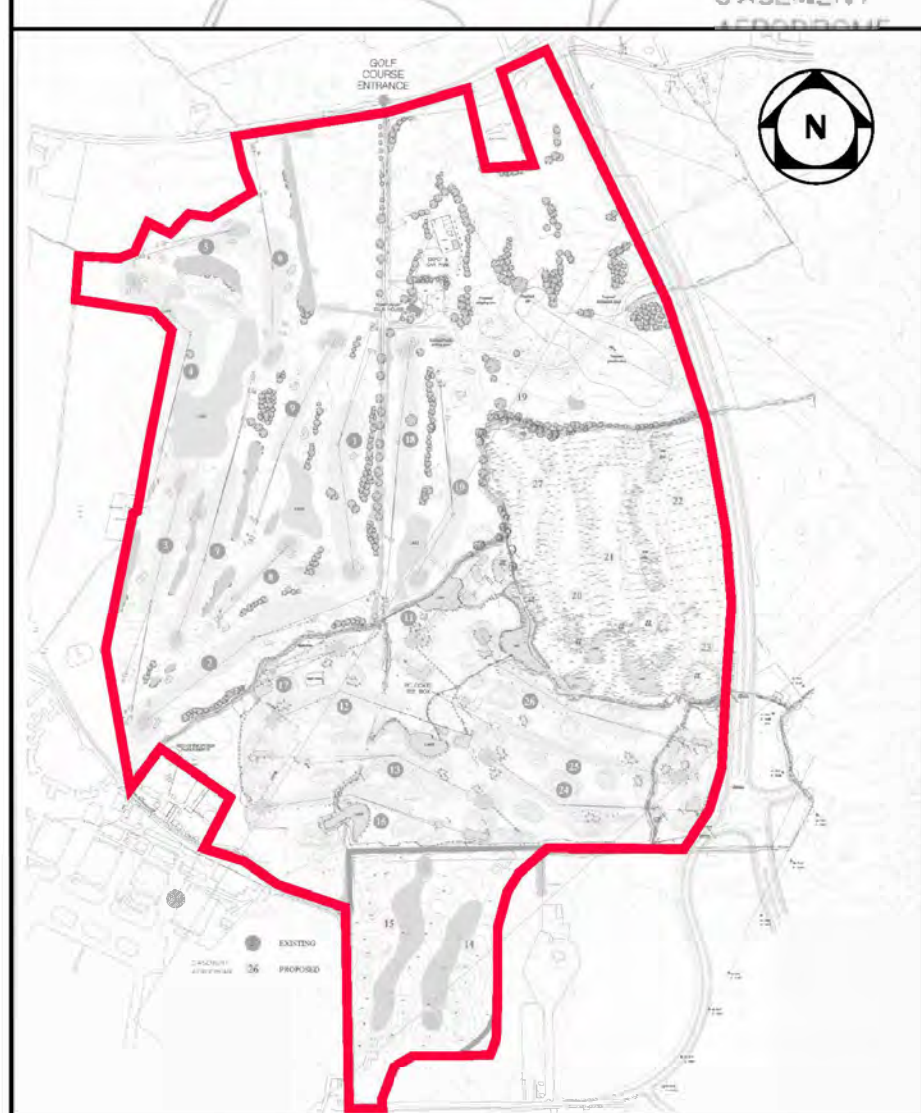
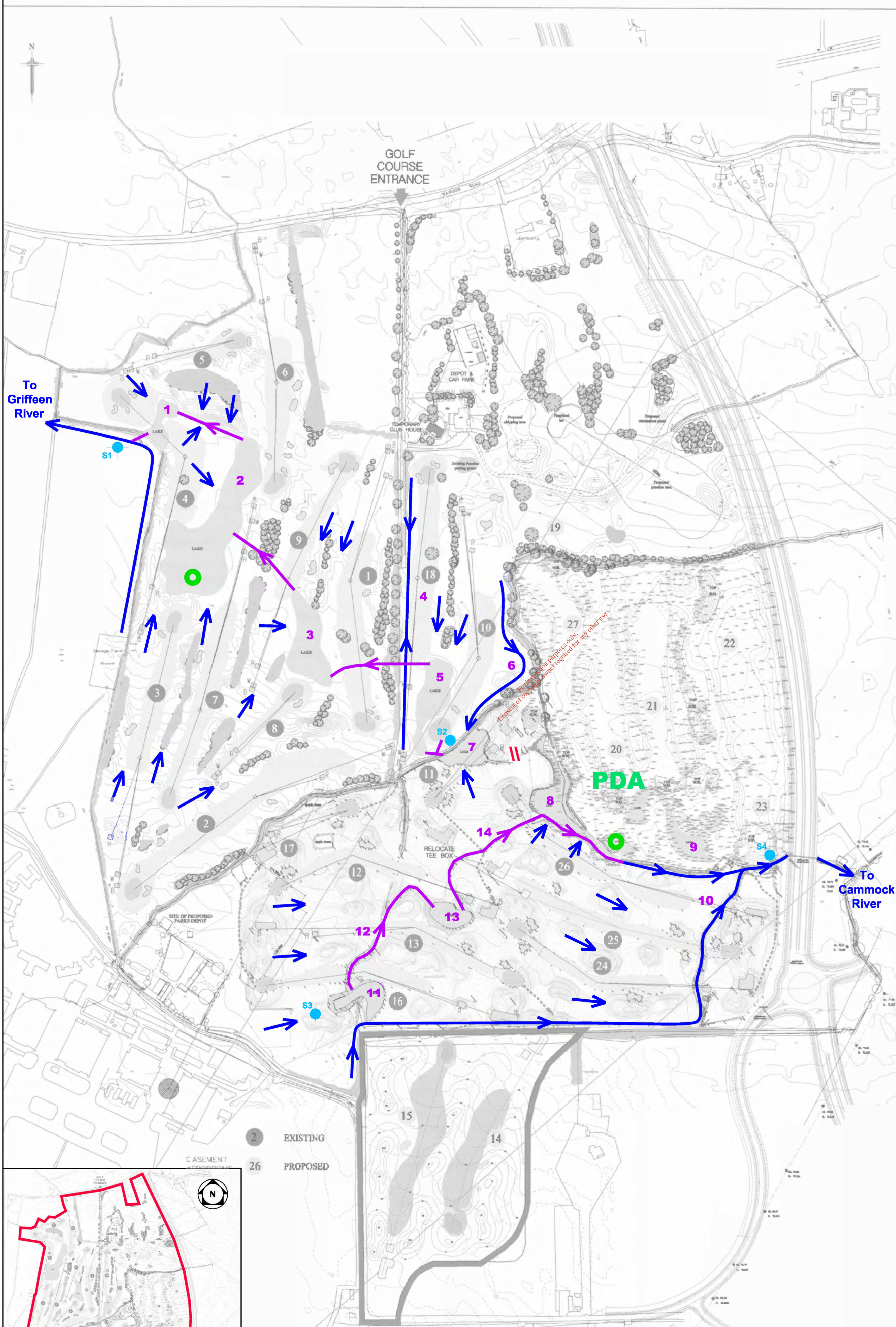


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LEGEND

- Algal Blooms
- Interconnecting Drain
- Drainage Ditch
- Surface Water Sample
- Change in Flow Direction
- Partially Developed Area
- Artificial Ponds
- Site Boundary



F01	10.05.11	Final Issue	✓
A01	April '11	Issue for Approval	✓
No.	Date	Amendment / Issue	App

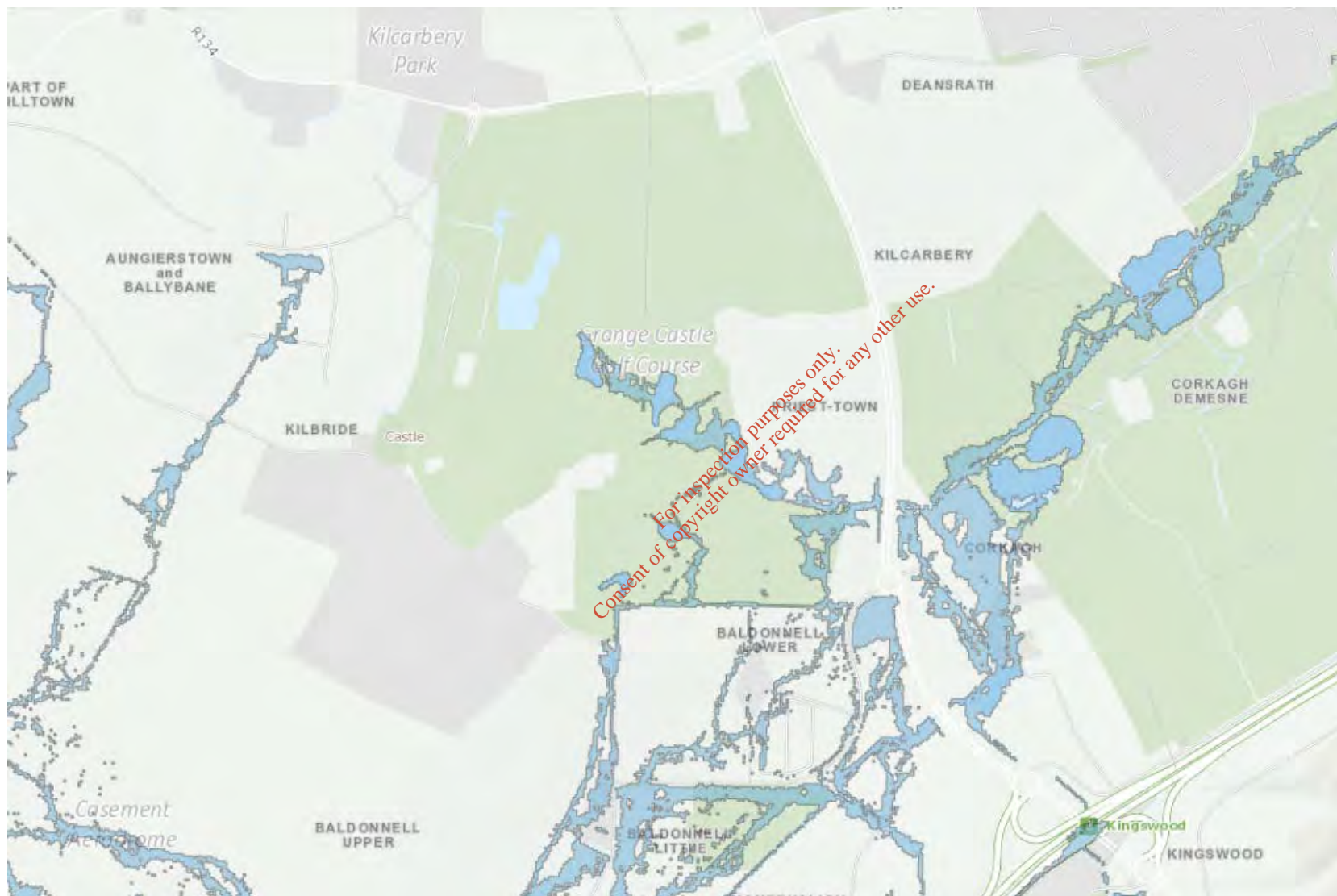
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Client			
Project			
Grange Castle Golf Club ERA Proposal			
Title			
Figure 9.4 Onsite Drainage and Sampling Locations			
Drawing Status	Sheet Size	Drawing Scale	
Final	A1	NTS	
Drawing Number	Rev		
MDR0813/Figure 10	F01		
Drawn By	Checked By	Approved By	Date
RH	LD	CC	Apr. 2011

Figure 9.5 Flood Risk Map (source OPW Flood Maps)



9.4 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no Construction Phase impacts have been considered as no construction works are taking place. Operation Phase impacts have only been considered. The operational phase refers to the imported soil remaining *in situ* subject to no further works.

There is no predicted significant impact on hydrogeology in the area.

There is a slightly negatively/unperceivable effect on the hydrology. However, the imported soil comprises mainly stiff clays this would prevent the silt run off into water courses and vegetation has been established which would also prevent run off.

9.5 MITIGATION MEASURES

In relation to hydrogeology, given the low potential for impact, no operational mitigation is proposed but a monitoring regime is proposed. Given that the two irrigation boreholes GW1 and GW2 employed in the 2011 Risk Assessment could not be established in the 2018 site assessment, it is proposed that four further wells are installed on site (GW3 to GW6) as follows:

Given that the groundwater flow is generally from the southeast to the west and northwest it is proposed that the following locations are pertinent:

- GW3 (upstream) at the south eastern corner of Phase 1;
- GW4 (downstream) at the north western corner of Phase 2;
- GW5 (upstream) at the south eastern corner of Phase 3;
- GW6 (downstream) at the north western corner of Phase 3;

These locations are shown in **Figure 9.6**. All locations will be agreed with the EPA prior to installation and all wells will be installed in accordance with the following guidance:

- EPA Guidance on the Authorisation of Discharges to Groundwater, 2011
- BS 5930:2015, Code of practice for ground investigation

Periodic sampling intervals will be agreed with the EPA and all sampling will be carried out to demonstrate compliance with the demonstrate compliance with the European Communities Environmental Objectives (Groundwater) Regulations 2010.

In relation to hydrology, it is proposed that ongoing surface monitoring will be undertaken at the following four locations under the Waste Licence:

- SW1 downstream of Baldonnel Stream
- SW2 upstream of Baldonnel Stream
- SW3 downstream of Cammock River
- SW4 upstream of Cammock River

These locations are shown in **Figure 9.7**. Monitoring will be undertaken to demonstrate compliance with the European Communities Environmental Objectives (Surface Water) Regulations 2009. Monitoring intervals will be agreed with the EPA under the Waste Licence.

9.6 REFERENCES

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive).

Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (daughter to 2000/60/EC) (Groundwater Daughter Directive).

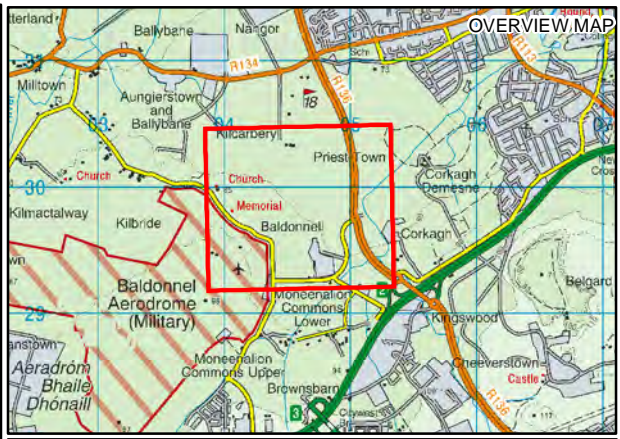
Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013, amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy.

The Groundwater Directive (80/68/EEC)

European Communities Environmental Objectives (Groundwater) Regulations 2009 (S.I. No. 9 of 2010)

National Roads Authority (NRA, 2009). 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'

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Legend

Site Boundary

N

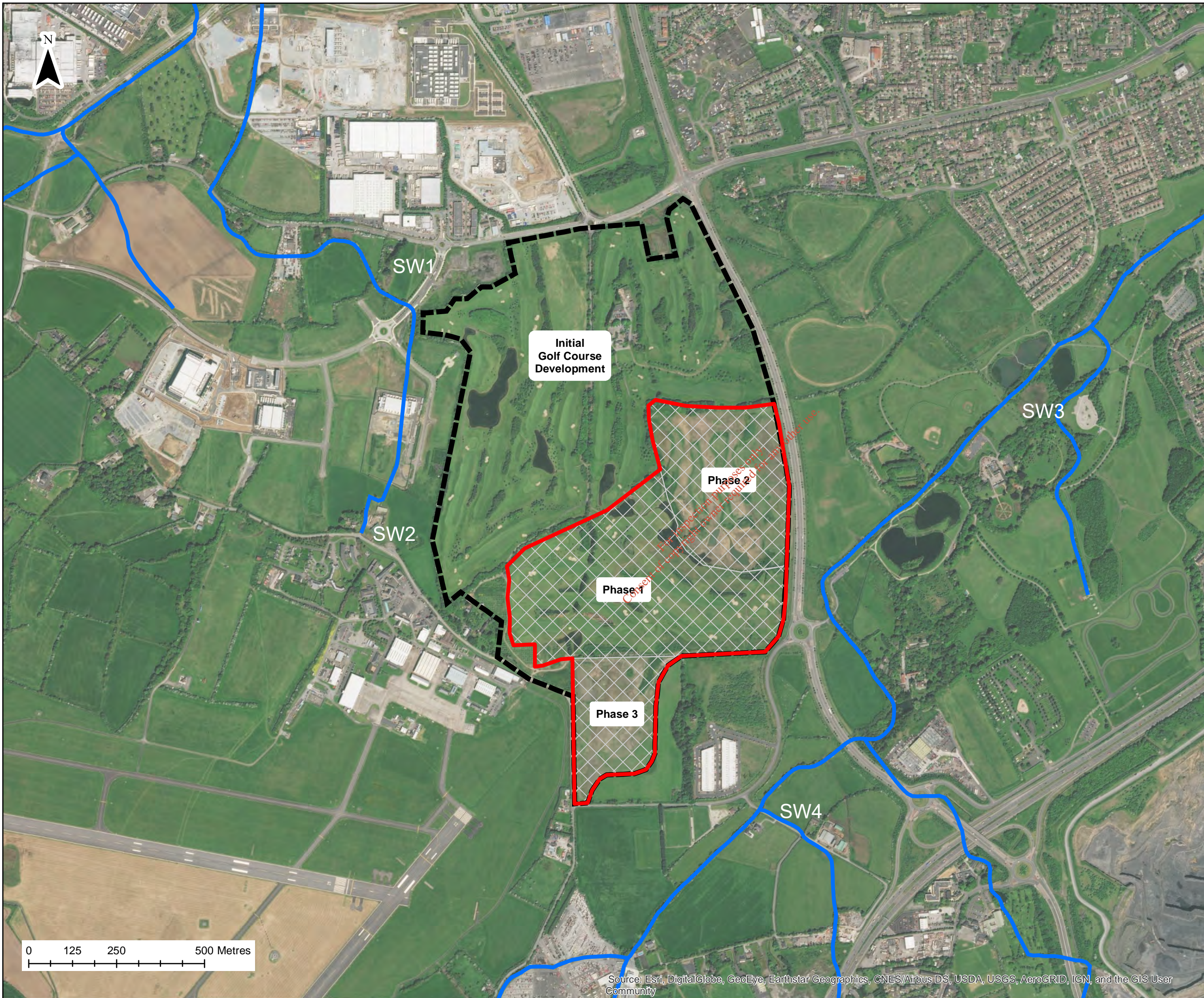
PROJECT Grange Castle Golf Club - Waste Soils Recovery Facility

TITLE Figure 9.6 GW Monitoring Locations




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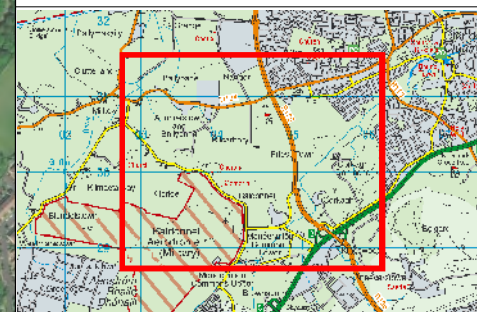
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Legend

-  Site Boundary (covered by Waste Licence)
-  Grange Castle Golf Club Boundary
-  Watercourse

Data Source: EPA (River Waterbodies)



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Surface Water
Monitoring Locations

Figure: 9.7



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10 SOILS/GEOLOGY

10.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of Soils and Geology and assesses the potential impact of the imported soil on these environmental attributes. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

10.2 ASSESSMENT METHODOLOGY

The following scope of works was completed by RPS for the purpose of this chapter:

- Site walkover survey; and
- Desk based study reviewing available information on the site.

The assessment was carried out in accordance with the following guidelines:

- Guidelines on the information to be contained Environmental Impact Assessment Reports Draft August 2017 (EPA);
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (Institute of Geologists of Ireland (IGI) 2013); and
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009).

The following sources of information were consulted in the compilation of this report:

- EPA online datasets;
- Geological Survey of Ireland (GSI) online datasets;
- Aerial Photography;
- Discovery Series Maps (1:50,000) and Orthophotography available from the Ordnance Survey Ireland (OSI).

A site walkover survey was completed by RPS on the 4th April 2018 and the 26th April 2018.

The significance of an impact is defined by first considering the importance of the attribute impacted and secondly the magnitude of the impact. In accordance with the IGI Guidelines²², the importance of geological and hydrogeological attributes (rating criteria) is defined in accordance with the NRA Guidelines²³. This guidance uses the same significance terminology as the EPA²⁴ and includes intermediate steps for rating site importance **Table 10.1** and then significance in **Table 10.2**.

²² Institute of Geologists of Ireland (2013), Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements

²³ NRA (2009), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes

²⁴ EPA (2015), Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements

Table 10.1 Rating Criteria for the Geological and Hydrogeological Attributes (NRA, 2009)

Importance	Criteria	Geology	Hydrogeology
Extremely high	Attribute has a high quality or value on an international scale.		Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. cSAC or SPA status.
Very high	Attribute has a high quality or value on a regional scale.	Geological feature rare on a regional or national scale (NHA).	Groundwater supports river, wetland or surface water body ecosystem protected by national legislation - NHA status.
High	Attribute has a high quality or value on a local scale.	Geological feature of high value on a local scale (County Geological Site).	Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes.
Medium	Attribute has a medium quality or value on a local scale	Small existing quarry or pit. Sub-economic extractable mineral resource.	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poorly drained and/or low fertility soils.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

Table 10.2 Assessment Criteria

Significance of Impact	Topic Specific Criteria
Imperceptible	An impact capable of measurement but without noticeable consequences, e.g. increased soil exposure.
Not Significant	An impact that alters the character of the environment without affecting its sensitivities, e.g. excavating previously exposed rock face.
Slight Effects	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities e.g. slight change in local groundwater levels.
Moderate Effects	An impact that alters the character of the environment in a manner that is consistent with existing or emerging trends, e.g. loss of moderate proportion of local high fertility soils.
Significant Effects	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment, e.g. removal of small proportion of aquifer.
Very Significant Effects	An impact, which by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment, e.g. introduction of greater volumes of groundwater.
Profound Effects	An impact which obliterates sensitive characteristics, e.g. removal of rock at a groundwater dependent ecosystem.

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)

10.3 RECEIVING ENVIRONMENT

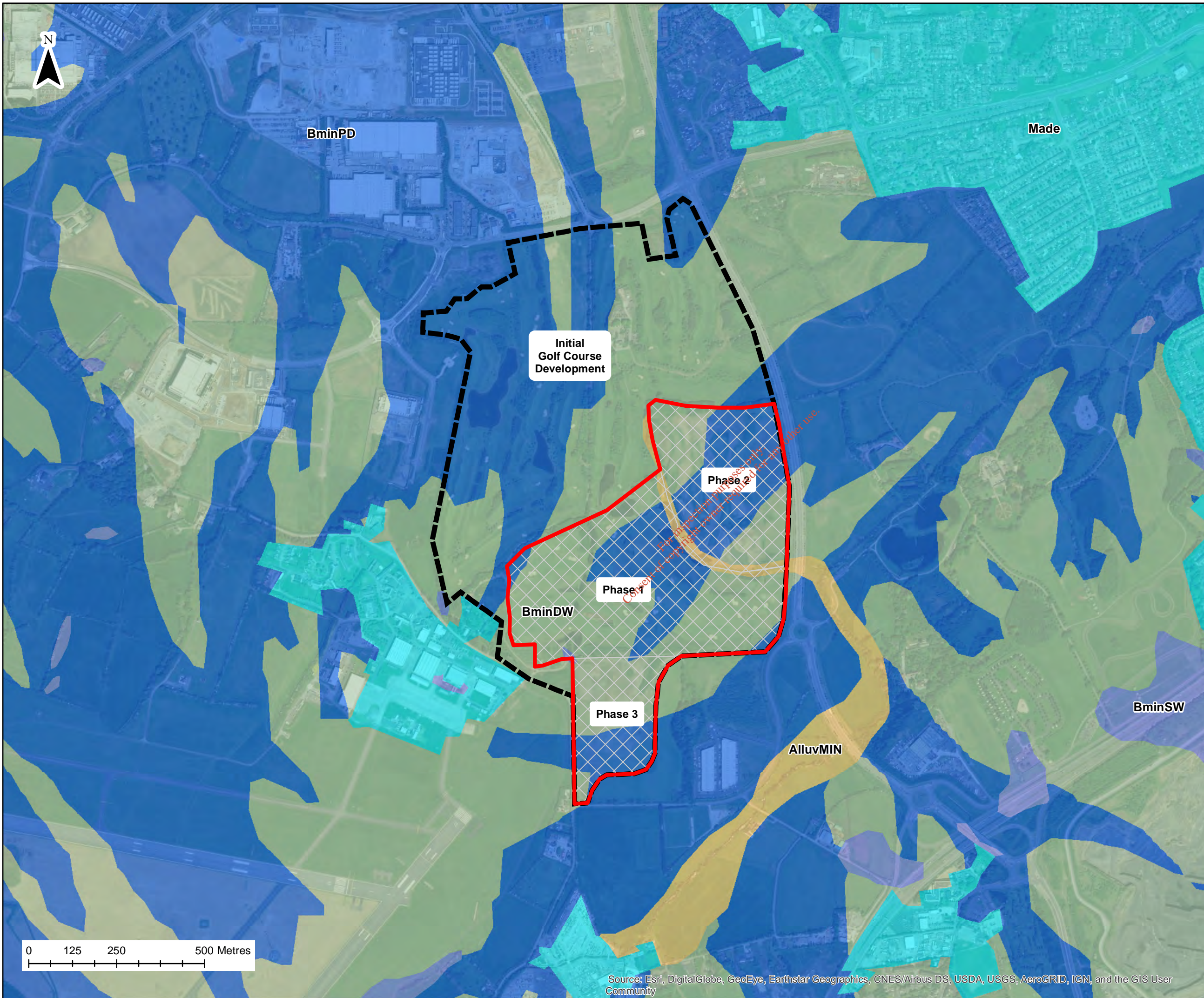
10.3.1 Soils and Subsoils

According to the GSI the majority of the site is underlain by till derived from limestone. A thin band of Alluvium to the east of the site. Site conditions encountered during the ERA completed by RPS in 2011 reported infill material within Phase 2 and Phase 3 which comprised light brown slightly gravelly clay with some cobbles. The 2011 ERA calculated the volume of infill material was 90,230m³ for Phase 2 and 126,726 m³ for Phase 3. The material comprised of grey/brown gravelly clay matrix with a minor waste component comprising materials such as plastic, tarmac, textiles, timber, brick, concrete and metals.








10.3.2 Bedrock Geology

According to the GSI the bedrock geology beneath the site comprises the Lucan Formation which consists of Carboniferous Dinantian Dark Limestone and Shale (Calp).which comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. There are no karst features on the site or within the general vicinity of the site.

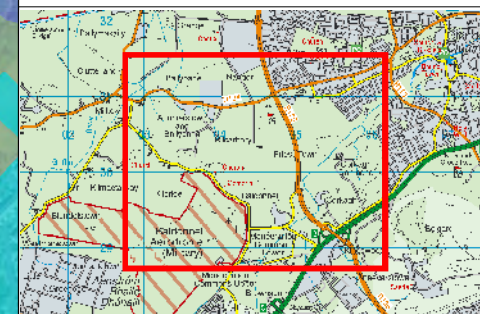
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-  Grange Castle Golf Club Boundary
- Soil Description**
-  AlluvMIN - Mineral Alluvium
-  BminDW - Grey Brown Podzolics/Brown Earths Basic
-  BminPD - Surface Water/GroundwaterGleys Shallow Basic
-  BminSW - Rendzinas/Lithosols
-  Made Ground

Data Source: EPA (Soils)



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Soils Map of the Site
and surrounding area

Figure: 10.1



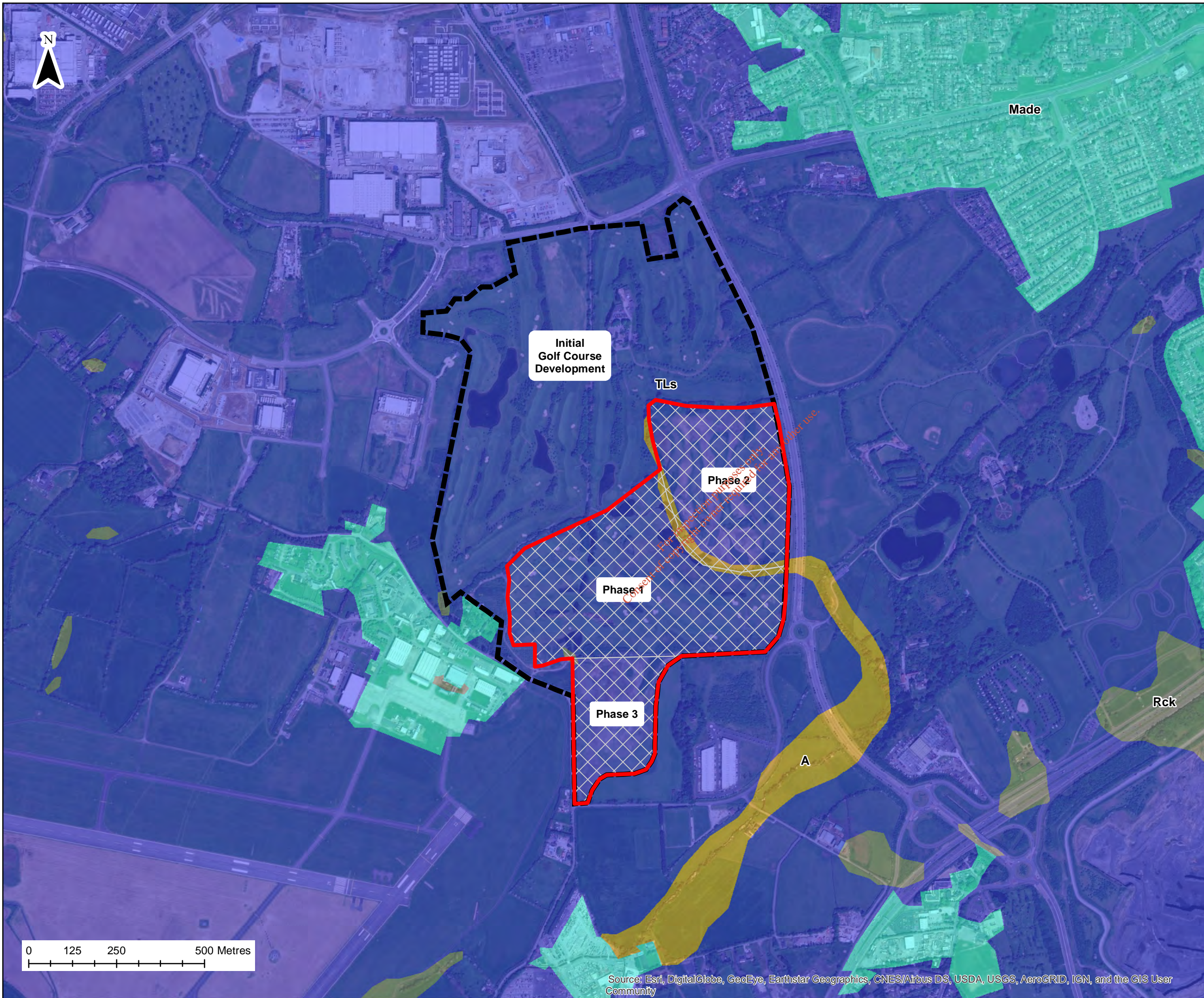
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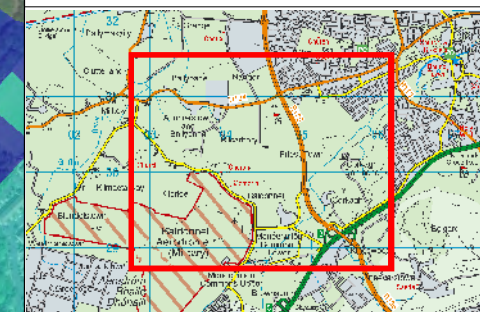
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Legend

- Site Boundary
(covered by Waste Licence)
- Grange Castle Golf Club
Boundary
- A - Alluvium
- Rck - Bedrock at surface
- TLs - Limestone till
(Carboniferous)
- Made Ground

Data Source: EPA (Subsoils)



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Soils Map of the Site
and surrounding area

Figure: 10.2



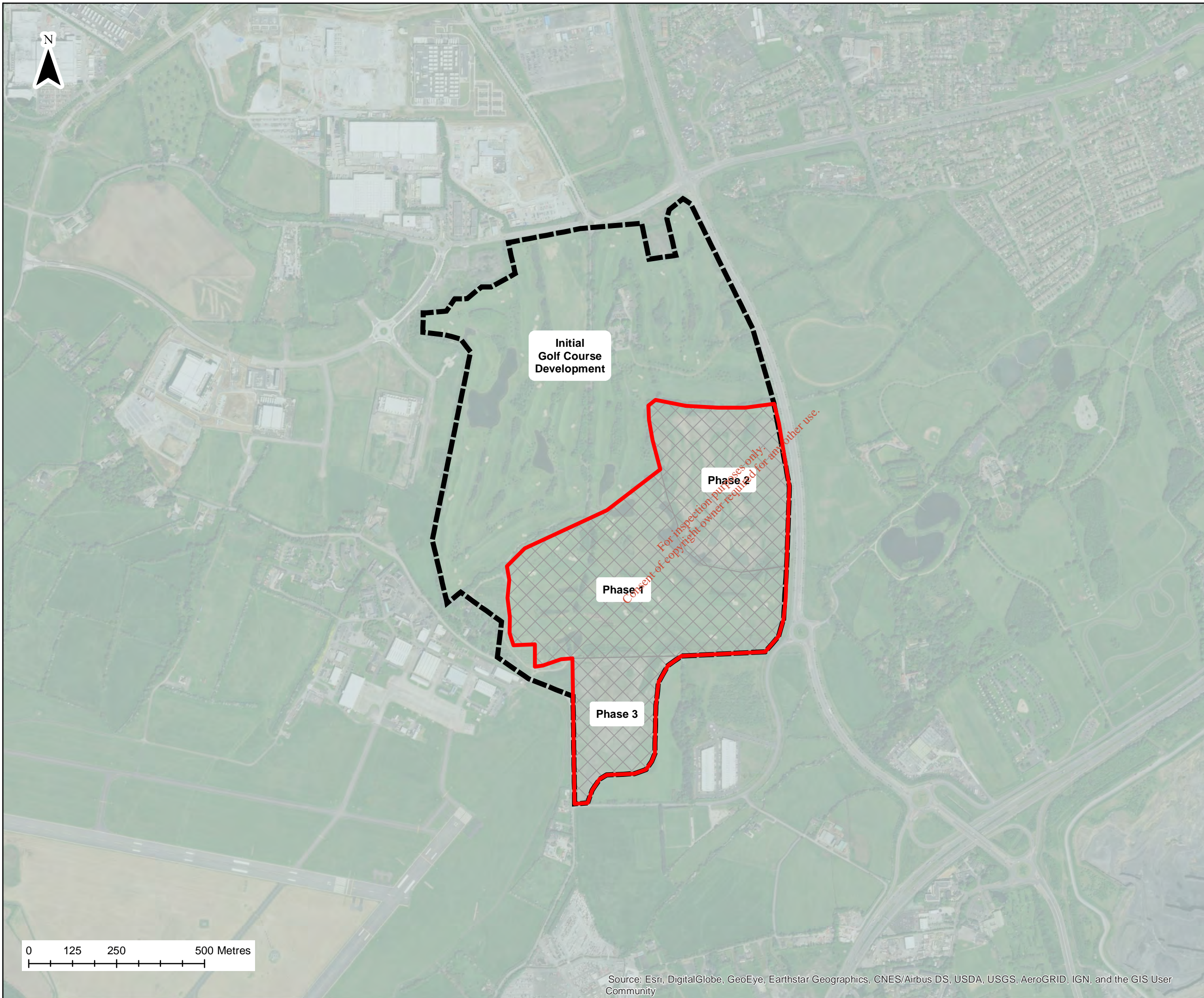
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Issue Details



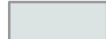
Drawn By: HF	Project No. MDR1223	
Checked By: BMcP	File Ref:	
Approved By: BMcP	MDR1223Arc1009D01	
Scale: 1:10,000 @ A3	Drawing No.	Rev:
Date: 09/08/2018	Arc1009	D01

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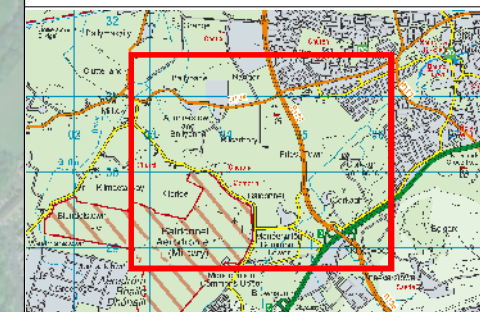
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

-  Site Boundary
(covered by Waste Licence)
-  Grange Castle Golf Club
Boundary
- Bedrock Units (1:100k)**
-  Lucan Formation

Data Source: Geological Survey of Ireland



Client

Project
Grange Castle Golf Club
Waste Licence

Title
Bedrock Geology of the Site
and surrounding area

Figure: 10.3

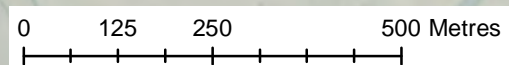


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Issue Details

Drawn By: HF	Project No. MDR1223	
Checked By: BMcP	File Ref:	
Approved By: BMcP	MDR1223Arc1010D01	
Scale: 1:10,000 @ A3	Drawing No.	Rev:
Date: 09/08/2018	Arc1010	D01

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10.4 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no Construction Phase impacts have been considered as no construction works are taking place. Operation Phase impacts have only been considered. The operational phase refers to the imported soil remaining *in situ* subject to no further works.

There is a slightly negatively/unperceivable effect on the soils. There is a slight disruption to the natural lithology of the site. The imported soil comprises mainly stiff clays this would slightly reduce the soil quality and reduce water infiltration rate, this is evident in the slow rate of vegetative recolonization.

10.5 MITIGATION MEASURES

There are no mitigation measures required in regard to soils and geology. The site should be managed as a non-active soils recovery facility as licenced by the EPA. Reseeding of the soils would increase the rate of recolonisation.

10.6 REFERENCES

Institute of Geologists of Ireland (September 2002). 'Geology in Environmental Impact Statements – a Guide'.

National Roads Authority (NRA, 2008). 'Environmental Impact Assessment of National Road Schemes – A Practical Guide'.

National Roads Authority (NRA, 2009). 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'

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11 CULTURAL HERITAGE

11.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of cultural heritage impacts and assesses the potential impact of the imported soil. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

11.2 ASSESSMENT METHODOLOGY

The study involved detailed interrogation of the archaeological and historical background of the area containing the Grange Castle site. This included information from the Record of Monuments and Places of Dublin, the South Dublin County Development Plan 2016 -2022, the topographical files of the National Museum of Ireland and cartographic and documentary records. Aerial photographs of the study area held by Google Earth and Ordnance Survey of Ireland were also consulted.

11.3 RECEIVING ENVIRONMENT

The site is located in the townlands of Kilcarberry, Prieststown and Balldonnell Lower. There were a number of castles, large houses and demesnes historically in the area. Nangor Castle was situated to north of the facility and Kilbride Castle to the west. There is no surface evidence for either of these castles.

Corkagh Demesne is situated to the east. The house associated with this demesne was demolished in the 1960s Kilcarberry House, which is still in existence, is a feature within the golf course.

While there are a number of interesting cultural heritage features in the vicinity of this site, there are no Recorded Monuments or Places (RMP) sites within the facility or golf course boundaries. Kilbride House is situated within the boundary of the golf course.

11.3.1 Archaeological and Historical Background

11.3.1.1 Prehistoric Period (c. 7000-AD400)

The Mesolithic Period (c. 7000-4000BC) is the earliest time for which there is clear evidence for prehistoric activity in Ireland. During this period people hunted, foraged and gathered food and appear to have had a mobile lifestyle. The most common evidence found to show the presence of Mesolithic communities at a site consists of scatters of worked flint material, a by-product from the production of flint implements. The current archaeological evidence suggests that the environs of the proposed scheme were first inhabited towards the later part of the Mesolithic period. At this time people made crude flint tools known as Larnian (or Bann) Flakes.

In the Neolithic period (c. 4000-2400BC) communities became less mobile and their economy became based on the rearing of stock and cereal cultivation. The transition to the Neolithic was marked by major social change. Communities had expanded and moved further inland to more permanent settlements. This afforded the development of agriculture which demanded an altering

of the physical landscape. Forests were rapidly cleared and field boundaries constructed. Pottery was also being produced, possibly for the first time. The advent of the Neolithic period also provided the megalithic tomb. There are four types of tomb; court cairn, portal, passage and wedge. The court, portal and passage style tombs are of pure Neolithic date, while the wedge tomb straddles the Neolithic to Bronze Age transition.

None of these forms of tomb are represented in the immediate vicinity of the site; however, there are a number in the wider area. The nearest of these are the two cairns (DU021-047, DU021-049) located c. 5km south of the site. DU021-047, in the townland of Coolmine is a semi-circular denuded cairn north west of Lugg henge in a forest clearing bordering a forest track in Slievethoul Wood. There is a hollow in the centre of this overgrown cairn which may be the remains of a large cist or chamber (Kilbride-Jones, 1950). The other in the townland of Crooksling, DU021-049, is situated on the east side of the Slade Valley but with no visible surface remains above ground. There is also a portal tomb located c. 10km south east of the site in the townland of Woodtown.

The Bronze Age (c. 2400-800BC) in Ireland was marked by the use of metal for the first time. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. Megaliths were replaced in favour of individual, subterranean cist or pit burials that were either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often, but not always, accompanied by a pottery vessel. Different forms of burial barrows were also being constructed during this period, as well as ceremonial monuments such as henges. Pit burials have been identified c. 7.5km to the south east (DU025-057002) and c. 9km to the north east in Kilmainham (DU018-112). Unenclosed cemeteries are also known from this period and are termed 'flat cemeteries'. An example of a flat cemetery occurs c. 6km to the east of the proposed (DU022-002). These burials were first uncovered in 1892 during the quarrying of a sand and gravel ridge. The remains comprised a burial with a bowl food vessel and a vase food vessel. In 1898 there were further discoveries of two cists with two pit burials and two other possible pit burials (Plunkett 1898). One contained an urn, the other a food vessel/urn (Waddell 1970).

Evidence for settlement during the Bronze Age is often indicated in the landscape by the presence of burnet mounds known as fulachta fiadh. A common site, they are normally interpreted as temporary cooking sites or industrial sites, possibly used on a seasonal basis. These sites survive as low mounds of charcoal-enriched soil mixed with an abundance of heat-shattered stones. Several of these monuments are known from the vicinity of the proposed scheme indicating that the area was populated during the Bronze Age. A fulacht fiadh is known c. 600m to the north of the site (DU017-084).

11.3.1.2 Early Medieval Period (AD400-1100)

During this period Ireland was not a united country but rather a patchwork of competing family and clan groups organised into numerous kingdoms of various degrees of scale and cohesion. Territorial boundaries were fluid and changed to reflect the shifting political landscape. Kingdoms represented confederations of agrarian familial clans with the basic territorial unit known as a túath. The most common indicator of settlement during the early medieval period is the ringfort. Ringforts, (also known as rath, lios, caiseal, cathair and dún) are a type of defended homestead comprising of a central site enclosed by a number of circular banks and ditches. Ringforts are most commonly located at sites with commanding views of the surrounding environs which provided an element of security. While raths, for the most part, avoid the extreme lowlands and uplands, they also show a preference for the most productive soils (Stout 1997, 107). There are hundreds of early medieval

enclosures or raths within County Dublin. There is evidence of a ringfort c. 5.5km to the north, located on a south facing slope overlooking the River Liffey. An aerial photograph shows cropmark evidence for a circular enclosure (c.40m diam) with an opening in the east.

Another ubiquitous feature within the early medieval landscape in Ireland was the ecclesiastical enclosure. These large circular/oval enclosures surrounded monastic foundations, which were established across the country to administer to the needs of a dispersed, rural population. Foundations were often set up by a local ruler in order to increase the prestige of his territory. These foundations followed the rule of what has been termed the Gaelic or Celtic Church (O'Sullivan *et al* 2014) as distinct from the continental monasticism, which followed in the 12th century. Most were dedicated to an Irish Saint and many such foundations have roots in the 6th or 7th centuries. The remains of an early ecclesiastical enclosure at the church of Kilbride (DU021-005003) directly bordering the south west of the Grange Castle golf course site.

The establishment of the settlement of Dublin by the Vikings in the 9th century was a transformative event for the area. While Viking settlement focused on the Liffey near modern Woodquay, Islandbridge and also at nearby Clondalkin, rural Viking settlement in the south of the county has been inferred from the presence of Rathdown Slabs. The Scandinavian controlled hinterland around Dublin in this period reached to the foothills of the Dublin Mountains and suspected Viking rural settlement has been identified at Cherrywood c.20km to the southeast (Ó,Néill 1999) and as far west as Brown's Barn (Bradley 1995) c. 2km to the south of the site.

11.3.1.3 Post Medieval Period (AD1600-1900)

The 18th century saw a dramatic rise in the establishment of large residential houses around the country. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be located nationwide. Lands associated with the large houses were generally turned over to formal gardens, which were much the style of continental Europe. Gradually this style of formal avenues and geometric gardens designs was replaced during the mid-18th century by the adoption of parkland landscapes - to be able to view a large house within a natural setting. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable constructional effort went into their creation. Earth was moved, field boundaries disappeared, streams were diverted to form lakes and quite often roads were completely diverted to avoid travelling anywhere near the main house or across the estate. A review of the National Monuments Service list of 16th/17th century houses and 18th/19th century houses indicates that there are none present within the immediate vicinity of the site. At a distance of c. 2.8km to the north east of the site is evidence of 16th/17th century houses (DU017-032002) believed to be associated with the old castle nearby (DU017-032001). These houses may be the 'three or four cabins' which are mentioned in the Civil Survey (1654-6). The area has since been built on and no longer visible at ground level.

11.3.2 County Development Plan

11.3.2.1 Archaeology

The South Dublin County Council Development Plan (2016-2022) recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930-2004). The development plan lists a number of aims and objectives in relation to archaeological heritage. The South Dublin

County Council Development Plan contains the following policies with regard to the archaeological resource:

- HCL 1** To favour the preservation in-situ of all sites, monuments and features of significant historical or archaeological interest in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999), or any superseding national policy document.
- HCL 2** To ensure that development is designed to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features and objects.
- HCL 3** 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.
- HCL 4** To protect and preserve the archaeological value of underwater archaeological sites including associated features and any discovered battlefield sites of significant archaeological potential within the County.
- HCL 5** To protect historical burial grounds within South Dublin County and encourage their maintenance in accordance with conservation principles.

The development plan lists four RMP designations recorded within 500m of the site as outlined in **Table 11.1**. The closest of these is a site which likely represents a Leacht Cuimhne, or memorial stone, (DU021-006) located c. 50m south west of the site.

Table 11.1 Recorded Archaeological Sites (RMP) within a 500m radius of the site

RMP No.:	Location	Classification	Distance from Site
DU017-037	Nangor, Clondalkin	Castle Site	c. 250m north
DU017-082	Nangor	Field System	c. 300m north
DU021-004	Kilbride, Baldonnell	Castle 'Site Of'	c. 170m south west
DU021-006	Kilbride/Kilcarbery (Also in Baldonnell Lower)	Leacht Cuimhne	c. 50m south west

11.3.2.2 Built Heritage

A review of the plan has shown that there are thirteen entries on the Record of Protected Structures (RPS) within the immediate vicinity of the proposed scheme outlined in **Table 11.2**. The closest of these being Kilcarbery House (RPS Ref: 173), a detached three-bay two-storey Georgian House (c. 1810) maintained as part of the golf course site's aesthetic.

Table 11.2 Protected Structures within a 500m radius of the site

RPS Ref:	Location	Classification	Distance from Site
173	Kilcarbery House	House	On site
184	Kilbride	Stone Church (Ruin) & Graveyard, Ringfort (Rath / Cashel), Earthwork(s) (RM)	c. 50m south west
187	Corkagh	Mill Pond & Mill-Race	c. 400m south east
188	Casement Aerodrome	Detached Multiple Bay Single Storey Officers Mess	c. 350m south west
189	Casement Aerodrome	Detached Two Storey T-Plan Airbase Administration Block	c. 180m south west
190	Casement Aerodrome	Detached Concrete-Framed Basilica-Plan Roman Catholic Church	c. 220m south west
192	Baldonnell House	Three Storey House	Immediately adjacent south west
195	Former Corkagh Mills, Kilmateed	Mill	c. 400m south east
196	Former Corkagh Mills, Kilmateed	Mill	c. 400m south east
198	Kilmateed House	Two Storey House, Out-Offices & Grounds	c. 400m south east
199	Former Powder Mills, Kilmateed	Stone Two Storey Mill	c. 400m south east
202	Baldonnell House	Two Storey House	c. 220m south
205	Corkagh	Former Gun-Powder Store	c. 400m south east

All protected structures are subject to statutory protection under the Planning and Development Act of 2000. Protection extends not only to the protected structure itself but also to relevant structures within the curtilage and to specified features in the attendant grounds of such structures.

11.4 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no Construction Phase impacts have been considered as no construction works are taking place. Operation Phase impacts have only been considered.

The operational phase refers to the imported soil remaining in situ subject to no further works. As such, there is an imperceptible effect on the cultural heritage of the site and the surrounding area.

11.5 MITIGATION MEASURES

No properties, structures or features considered to be of archaeological heritage merit, architectural heritage merit or of a cultural heritage merit will be directly, i.e. physically, impacted by the proposed development area. Therefore, no mitigation measures are necessary. The site should be managed as a non-active soils recovery facility as licenced by the EPA.

The attention of the applicant is also drawn to National Monuments legislation (1930-2004), which states that in the event of the discovery of archaeological finds or remains, the National Museum of Ireland should be notified immediately.

11.6 REFERENCES

South Dublin County Council Development Plan (2016-2022)

Record of Monuments and Places of Dublin

Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999)

Online Resources:

www.archaeology.ie

www.downsurvey.tcd.ie

www.excavations.ie

www.map.geohive.ie (OSi historic maps)

www.heritagemaps.ie

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12 TRAFFIC IMPACT

12.1 INTRODUCTION

This chapter of the EIAR describes the baseline environment of the site in terms of traffic impacts and assesses the potential impact of the imported soil. Mitigation measures are recommended to minimise any adverse impacts where appropriate.

12.2 ASSESSMENT CRITERIA

The significance of effects has been based on changes in prevailing travel conditions which has regard to the draft EPA guidelines (Revised Guidelines on the Information to be Contained in Environmental Impact Statements, 2015). The assessment criteria used are outlined in **Table 12.1**.

Table 12.1 Assessment Criteria

Significance of Effects	Topic Specific Criteria
Imperceptible	No perceived impact on prevailing travel conditions
Not Significant	A small change in traffic flows without causing a real change in travel conditions
Slight Effects	A change in traffic flow resulting in a minor change in travel conditions
Moderate Effects	A change in traffic flows resulting in a modest change in travel conditions
Significant Effects	A marked change in travel conditions resulting in long delays to traffic
Very Significant Effects	A significant change in travel conditions resulting in very long delays to traffic
Profound Effects	A major change in travel conditions resulting in the breakdown in traffic flow and significant delays to traffic

12.3 RECEIVING ENVIRONMENT

The Grange Castle site is located along and accessed from the New Nangor Road / R134. The New Nangor Road is a two-way single-lane carriageway road, with a single footway and cycleway heading west from the entrance roundabout, and footways, cycleways and bus lanes along both sides heading east.

The New Nangor Road / R134 travels east - west and connects with the Long Mile Road / R110, which leads into Dublin city centre.

Other roads in the vicinity of the site include the N4 / M4, which runs to the west of the country; the N7 which runs to the south and south west of the county; and the M50 Dublin orbital motorway to the east.

12.3.1 Existing Public Transport

Rail

The site is located approximately 4km (walking distance) from Clondalkin / Fonthill train station. The Clondalkin / Fonthill Station is a stop along the Dublin Heuston - Cork, Dublin Heuston - Waterford, and Grand Canal Dock - Portlaoise lines.

The site is also located at a walking distance of approximately 4km from the Cheeverstown Park & Ride Luas Stop. This light rail system connects Saggart to Dublin city centre and operates approximately every 50 minutes (Luas Red Line).

Bus

The site is well served by Dublin Bus operating a number of routes at stops 4545 and 4576 approximately 150m to the north of the entrance and stops 2167 and 3417 approximately 120m to the north west of the entrance.

These bus routes include the No. 13 - Harristown to Grange Castle; No. 68 - Hawkins St. to Newcastle / Greenogue Business Park; and the No. 151 - Docklands (East Rd.) to Foxborough (Balgaddy Rd.).

12.3.2 South Dublin County Council Transport & Mobility Strategy

The Transport Strategy for South Dublin County seeks to ensure an integrated strategy for transport and mobility that enhances access and movement within and through the County, while promoting change, in favour of sustainable modes. The strategy addresses all types of traffic including pedestrian, cyclist, public transport, private vehicle and economic through traffic. The settlement, employment and transport strategies are aligned with the aim of strengthening the integration between employment, population and transport services.

Specifically, this strategy sets out a six-year road programme that includes recommendations for the upgrade/realignment of the existing New Nangor Road to provide improved access to the Grange Castle employment lands from Clondalkin and the R120 with further links to the proposed Western Orbital Route.

12.4 POTENTIAL IMPACTS

Due to the retrospective nature of this EIAR no Construction Phase impacts have been considered as no construction works are taking place. Operation Phase impacts have only been considered.

No truck movements are predicted for this Soil Recovery Facility as the facility has ceased importing or exporting material. A level of maintenance will be required on the facility and will require the movement of machines such as hedge or grass cutters to and from the facility.

It is predicted that the potential impacts of these machinery movements associated with the Waste Soils Recovery Facility will be imperceptible / not significant.

12.5 MITIGATION MEASURES

There are no mitigation measures required in regard to traffic. The site should be managed as a non-active soils recovery facility as licenced by the EPA.

12.6 REFERENCES

Traffic and Transport Assessment Guidelines, Transport Infrastructure Ireland's (TII) (2014).
Project Appraisal Guidance, Transport Infrastructure Ireland's (TII) (2017).
Road Collision Database, Road Safety Authority (RSA).
Rural Road Link Design DN-GEO-03031, Transport Infrastructure Ireland's (TII).
Traffic Signs Manual, Department of Transport, Tourism and Sports, (2010).

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13 INTERACTIONS AND CUMULATIVE IMPACT

13.1 INTRODUCTION

This chapter considers the likely impact interactions between the various environmental factors as a result of the imported soil remaining in situ with no further works. While direct and indirect impacts have been assessed within the relevant chapters of this EIAR, the overall purpose of this chapter is to highlight the main areas of interrelated impacts identified for the proposed development.

Furthermore, it considers the potential cumulative effects arising from the imported soil remaining in situ with no further works with reference to other golf course activities and operation and other relevant projects in the vicinity of the golf course.

13.2 ENVIRONMENTAL INTERACTIONS

The Draft Advice notes for preparing Environmental Impact Statements (EPA, 2015) state that:

'All environmental factors are inter-related to some extent. This heading draws attention to significant interaction and interdependencies in the existing environment'.

This advises of the importance of checking and cross-referencing environmental effects and impacts against all environmental topics. To support this, the Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2017) advise that:

'It is general practice to include a matrix to show where interactions between effects on different factors have been addressed'.

A matrix method has been used to explore the potential for impact interactions. Table 13.1 addresses interactions between the various environmental disciplines with regard to the development. Where a tick exists within the matrix table, this indicates that a relationship exists between the two environmental areas. The purpose of the table is to allow interaction between various disciplines to be recognised, although the level of interaction will vary in each case.

A number of factors have influenced the consideration of impact interactions including the limited environmental impact of the imported soil and the lack of future plans to implement any further works.

Table 13.1 Matrix of Potential Environmental Interactions

	Human Beings/Socio Economic	Air Quality	Noise	Landscape and Visual	Biodiversity	Hydrogeology	Hydrology	Soils/Geology	Cultural Heritage	Traffic Impact
Human Beings/Socio Economic	-	-	-	-	-	-	-	-	-	-
Air Quality	-	-	-	-	-	-	-	✓	-	-
Noise	-	-	-	-	-	-	-	-	-	-
Landscape and Visual	-	-	-	-	✓	-	-	✓	-	-
Biodiversity	-	-	-	-	-	✓	✓	✓	-	-
Hydrogeology	-	-	-	-	-	-	✓	✓	-	-
Hydrology	-	-	-	-	-	-	-	✓	-	-
Soils/Geology	-	-	-	-	-	-	-	-	-	-
Cultural Heritage	-	-	-	-	-	-	-	-	-	-
Material Assets - Traffic Impact	-	-	-	-	-	-	-	-	-	-

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13.3 POTENTIAL CUMULATIVE IMPACTS

The approach to the assessment of cumulative effects has adhered to the most recent 2017 Environment Protection Agency (EPA) guidelines, which identifies that cumulative effects are “*the addition of many small effects to create one larger, more significant, effects*”. The guidelines identify that in relation to the cumulation of the effects with the effects of other existing and/ or approved projects the EIAR should provide a: description of the cumulative effects; and consideration of cumulative effects due to cumulation of effects with those of other projects that are existing or are approved but not yet built or operational.

The guidelines outline the importance of considering cumulative effects and highlight that it is an integral part of the EIA process. It defines cumulative effects as:

Cumulative effects arise when a number of projects gradual increase the pressure on the environment (each new premises on an industrial estate will gradually increase pressure on the nearby drainage and road network).

Cumulative impacts may arise from the combined effects of a number of existing or proposed developments, in combination with the proposal to change operations being evaluated, on a single receptor or multiple receptors. The EPA guidelines identify that assessors need to be mindful of “*pathways, direct and indirect that can magnify effects through the interaction or accumulation of effects*”. In addition, consideration of multiple non-significant effects arising to cumulative significant effects should also be recognised.

The cumulative impact for each environmental factor is expected to be minimal for the site.

13.4 REFERENCES

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

APPENDIX A
APPROPRIATE ASSESSMENT SCREENING REPORT

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APPENDIX B
CLOSURE RESTORATION AND AFTERCARE MANAGEMENT PLAN

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APPENDIX C
ENVIRONMENTAL RISK ASSESSMENT REPORT (MAY 2011)

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APPENDIX D
TABULATED SURFACE WATER RESULTS

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