The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

ENVIRONMENTAL REPORT FOR BALDOYLE RACECOURSE PARK

Technical Report Prepared For

Park Development Project
Racecourse Park

Technical Report Prepared By

Paul Conaghan, BSc (Hons) MSc,
Environmental Consultant
Teri Hayes BSc. MSc. PGeo
Director (Water)

Our Reference

GR/19/10738R01

Date of Issue

8 April 2021

Document History

Document Reference		Original Issue Date	
GR/19/10493R01		8 April 2021	
Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature		
Name	Paul Conaghan	Teri Hayes
Title	Environmental Consultant	Director
Date	8 April 2021	Thursday 8 April 2021

NON-TECHNICAL SUMMARY

1.0 INTRODUCTION

This is the non-technical summary of an Environmental Report, prepared to identify and address any potential environmental impacts within the park development project area and its surrounding environment.

Figure 1.1 Proposed Baldoyle Racecourse Park Development Footprint

1.1 Proposed Development

The Racecourse Park covered approx. 112 ha, while the proposed park development project covers approx. 84 ha and comprises the following elements.

- 4.5km of new walking and cycling routes including a bridge over the Mayne river and the repair to the railway underpass;
- Public lighting along key walking and cycling routes
- Expanding the existing car park to cater for up to 161 car parking spaces;
- Upgrading and expanding the existing playground;
- A Skate park and Teenage Adventure Playground;
- A Multi use games area;
- A dog run;
- A Bowls green;
- Four grass football pitches
- A viewing platform
- Tracing of circular archaeological feature through soft landscaping and removal of existing fence;
- Extension of existing reedbed south of Mayne river and creation of new brackish grassland north of Mayne river;
- All landscaping works in the park.

The proposed site seeks to serve as a catalyst to meet the demands of the growing population in the nearby vicinity while at the same time it seeks to respect and enhance the biodiversity and character of the site in which it finds itself. A new community centre is envisioned in the southern area of the site, which today already houses a certain number of amenities which the proposal seeks to enhance by the provision of larger play-areas and catering for the needs of a larger range of user by the provision of toddler play areas all the way to the provision of spaces for teenage involvement such as a skate park or MUGAs.

2.0 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

AWN Consulting Ltd. (AWN) has prepared this section of the Environmental Report (ER) which assesses and evaluates the potential impacts of the development on the land, soils, geological and hydrogeological aspects of the Park development project. The assessment considers the importance of the attributes and the predicted scale and duration of the likely impacts. Where an impact is identified, planned mitigation measures are identified and assessed.

Information obtained from the GSI (2021) indicates there are two main lithological groups underlying the Racecourse Park site. As shown in Figure 2.1 the site is underlain by the Tober Colleen Formation to the south which comprises a calcareous shale, limestone conglomerate and is described as dark grey, calcareous commonly bioturbated mudstone and subordinate thin micritic limestones. The Malahide Formation is located to the north of the site compromising argillaceous bioclastic limestones and shales. The lower part of the formation is composed of calcareous shales, siltstones and sandstones, and occasional thin limestones at its base. Underlain by peloidal and oncolitic, peloidal, occasionally nodular micrites and thin intraclastic

Reference to the GSI (2021) on-line mapping indicates five predominant soil types in the general area of the proposed park. *BminDW* which corresponds to deep well drained mineral soil derived from mainly basic parent materials (limestone), *BminPD* poorly drained mineral soils derived from mainly basic parent (limestone) materials*, AlluvMin* mineral alluvium mostly located around the banks of the Mayne River which runs west to east through the centre of the site (see *Section 3 Hydrology* for description of local hydrological environment), *MarSed* marine/estuarine sediments, *AeoUND* aeolian undifferentiated *which are usually associated with estuarine and coastal areas.*

.

The Groundwater Body (GWB) underlying the site is the Dublin GWB (EU Groundwater Body Code: IE_EA_G_008). Currently, the EPA classifies the Dublin GWB as having ‘Good Status’ (based on quality data for the period 2010-2015) and the Water Framework Directive risk score for this GWB is currently rated “not at risk”

The GSI presently classifies the aquifer vulnerability in the region of the subject site as Low (L) which indicates an overburden depth of c. 10 m of low permeability soil is present. This was confirmed in a 2018 Investigation undertaken by OCB Geotechnical, which confirmed an overburden thickness up to c.10.3 metres below ground level (mbgl) (at two locations). GSI maps show a small area of High (H) vulnerability to the east most likely associated with high permeability sands and gravels in this area most likely due to its coastal nature. The site investigation showed no evidence of contamination onsite and soil testing shows the underlying strata is suitable for use as parklands.

Based on the National Roads Authority (NRA)/Institute of Geologists of Ireland (IGI) criteria for rating the importance of hydrogeological features (refer to Tables 2.1 -2.4 of Section 2), the importance of the hydrogeological features at this site is rated as ***Low to Medium Importance***. This is based on the assessment that the attribute has a low-quality significance or value on a local scale. The aquifer is a locally important to poor bedrock aquifer moderately productive only in local zones and is not used for public water supply or generally for potable use.

The majority of the construction/demolition works are to be undertaken at the southern part of the site. Excavated material will be minimal with all material reused onsite with no transportation of soil or stones offsite.

Mitigation measures include;

Rainfall on excavated and stripped soil can lead to runoff with high suspended solids (SS) content during the construction phase. This can pose a potential impact to water bodies in the area. Temporary stockpiles will be subject to an appropriate earthwork handling protocol and it is anticipated that any stockpiles will be formed within the boundary of the site. It should be noted that there will be no direct link or pathway from this area to any surface water body.

All fuel tanks shall be stored in designated areas, and bunded to a volume of 110% of the capacity of the tank within the bund (plus an allowance of 30 mm for rainwater ingress). Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulley's or drains.

It is unlikely that contaminated material will be encountered during construction of the proposed development. Nonetheless, excavation works will be carefully monitored by a suitably qualified person to ensure that potentially contaminated soil is identified and segregated from clean/inert soil. In the unlikely event that potentially contaminated soils are encountered, they should be segregated, tested and classified as hazardous or non-hazardous in accordance with the EPA Guidance Document: *Waste Classification – List of Waste and Determining if Waste is Hazardous or Non-Hazardous* (2015) and *Council Decision 2003/33/EC*. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.

Following implementation of mitigation measures detailed in Section 2 of the Environmental Report, the predicted impact during construction of the proposed parkland development will be ***Long-term***, ***imperceptible*** and ***neutral***.

3.0 WATER AND HYDROLOGY

AWN Consulting Ltd also assessed and evaluated the potential impacts of the proposed Parkland Development on the hydrological aspects of the site and the surrounding area. Hydrogeological impacts are considered in *Section 2 - Land, Soils, Geology & Hydrogeology*

The area is drained by the Mayne River which bisects the site flowing from west to east. The Snugborough and Maynetown Streams (EPA designations) appear to rise within the proposed parkland site flowing south to north. These join the Mayne and then enter Baldoyle Bay. There is stormwater drainage throughout the proposed site primarily on the existing roadways and hardstand areas.

The surface water quality data for the nearest monitoring station to the proposed project site (upstream) for the Mayne shows a Q rating of 2-3 denoting a poor (moderately polluted status) as shown in Figure 3.2. Currently, the EPA classifies the WFD Ecological Status for the Mayne waterbody as having '*Poor Status'* (1st Cycle Status 2010-2015) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status'.* Figure 3.3 presents the river waterbody risk EPA map.

Based on the NRA methodology (refer to Tables 3.1 & 3.2 of Section 3), the criteria for rating the importance of hydrological features, the importance of the hydrological features at this site is rated as having ***a Very High Importance.*** This is primarily based on the fact that part of the Baldoyle Bay SAC is located within the proposed parkland and is fed by the Mayne River.

The potential risk of flooding on the site was also assessed. OPW CFRAM mapping shows the centre and northern part of the proposed parkland area are at risk from medium probability coastal (tidal) flood event. Medium Probability flood events have approximately a 1-in-a-200 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 0.5%.

The flood maps also indicate the park area is at risk from a high probability of fluvial (river) flooding. High Probability flood events have approximately a 1-in-a-10 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 10% (see Figure 3.7). As per *The Planning System and Flood Risk Management Guidelines for Planning* (2009) the Baldoyle site is located in Flood Zone A. The parkland is a "water compatible development" which as per Table 3.2 of the guidelines is appropriate for a site residing in Flood Zone A.

There will be no change to the current regime managed by Fingal county. Hydraulic flood modelling as per Section 50 of the Arterial Drainage Act was undertaken by JBA Consulting to assess if the proposed pedestrian and cycle bridge to the west of the site would increase flood risk in the area by its construction over the River Mayne. Following the assessment which is included as a separate document to this application the bridge and its underlying culvert how the culvert satisfies the requirements of Section 50 being able to safely convey the peak design flows and not increase flood risk.

The potential impacts of construction and operation of the park and mitigation measures proposed have been identified. The mitigation measures include:

- During the construction phase at this site, there is potential for a slight increase in run-off due to the introduction of impermeable surfaces and the compaction of soils. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage.

- Run-off water containing silt will be contained on-site and treated to ensure adequate silt removal. Silt reduction measures on-site will include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks/ponds). The site of the proposed development currently drains all surface water to the Mayne River and Baldoyle Bay by either direct overland flow, surface water drainage ditches or stormwater drains currently located throughout the site primarily in roadways and areas of hardstand. Temporary storage of soil will be carefully managed with excavations remaining open for as little time as possible and weather conditions will be considered when planning construction activities. The majority of construction works will be located to the southern part of the site. Works to enhance the riparian zones around the surface water features will be undertaken including the addition of a number of landscaped ponds (see Landscape Masterplan).

- The proposed development will require site preparation, excavations and levelling for foundations, car parks and access roads, for the installation of services and landscaping. Excavations will not extend to bedrock and is not expected that temporary dewatering will be required based on the clayey nature of the soil. Some removal of perched rainwater from excavations may be required. Volumes will be quite low, and all pumped water will be subject to onsite settlement before release.

- During the construction phase, there is a risk of accidental pollution incidences to local watercourses from spillages or leakages of fuel/oils from a number of onsite activities. There is also a potential risk from the use of concrete and cement.

- To minimise any impact from material spillages, all oils, paints etc. used during construction will be stored within temporary bunded areas. All tanks will be bunded to 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance for 30mm of rainwater ingress). Refuelling of construction vehicles and the use of any hydraulic oils or lubricants will take place in a designated area (or where possible off-site) which will be away from surface water gullies or drains. All contractors will be required to implement a Construction Environmental Management Plan (CEMP).

The implementation of mitigation measures detailed in Section 3 of the Environmental Report will ensure that the potential impacts on the surface water environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***.

During operation, there are limited risks to surface water receptors. There is a potential for leaks and spillages from the fuel tank to occur on-site. In addition to this there is a potential for leaks and spillages from vehicles along access roads, loading bays and in parking areas. Any accidental emissions of oil, petrol or diesel could cause contamination if the emissions enter the water environment unmitigated.

The adjoining residential site is discharging into a created attenuation/ SUDs pond/ wetland to the west of the proposed parkland site under permission F16A/0412, ABP Ref: PL06F.248970. The existing attenuation pond to the north which was constructed as part of the coastal greenway project will also be integrated into the proposed parklands project. Additional onsite drainage works include

- Removal of the storm water drainage pipe that runs through the land and creating an extended reeds bed area (see project consulting engineers Cora Drawing C501).
- Further creation of a reed bed area to the north side of the Mayne River from the outfall - likely to interface with the stream during construction (see project consulting engineers Cora Drawing C502).
- New pedestrian bridge abutments will be constructed (see drawing C101-C105)
- New culverts to go in where the tributary to the Mayne is crossed by cycle path and haul road - in stream works. JBA report

The implementation of mitigation measures highlighted above will ensure that the potential impacts on the surface water environment do not occur during the operational phase and that the predicted impact will be ***long-term-imperceptible- neutral.***

4.0 ECOLOGICAL IMPACT ASSESSMENT

Scott Cawley Ltd. was commissioned by Bernard Seymour Landscape Architects (BSLA) to undertake an Ecological Impact Assessment (EcIA) for the park development project at the Racecourse Park in Baldoyle.

This Ecological Impact Assessment (EcIA) should be read in conjunction with other documents contained within the planning application, in particular the Natura Impact Statement (NIS) which Scott Cawley Ltd. have also prepared. The purpose of the EcIA is to establish the ecological baseline within the subject lands, evaluate the ecological features present and assess the potential impacts resulting from the proposed development. Following on from this, it is the purpose of the EcIA to recommend measures to address impacts and comply with relevant ecological legislation and policies.

The subject lands currently consist of a mix of diverse habitats including areas of grassland, scrub, buildings and artificial surfaces, hedgerows, agricultural lands and disturbed ground. A number of watercourses flow through the site.

A desk study was carried out on 15th July 2019, and updated on 31st January and 16th October 2020, to collect ecological information pertaining to the subject lands. Sources included the

Ordnance Survey of Ireland, the National Biodiversity Data Centre, and the National Parks and Wildlife Service. A literature review of previous surveys undertaken in the vicinity of the site was also undertaken on the 19th July 2019. This literature review was updated in January 2020 to take into account the findings of specialist surveys undertaken in 2019. Field surveys undertaken by Scott Cawley comprised habitat surveys and overwintering bird surveys, specifically targeting Light-bellied Brent geese *Branta bernicla hrota*. Habitat surveys were undertaken on 18th January, 8th March and 9th April 2019 by Caroline Kelly BSc. MSc. of Scott Cawley Ltd. Overwintering bird surveys were carried out on the 26th February and 6th, 8th, 12th, 15th, 21st, 23rd, 30th March 2019. A range of previous ecological surveys (including habitats, breeding birds, bats and overwintering birds) had also been commissioned on site and these have also informed this EcIA.

Following the completion of the desk study, literature review and field surveys, designated sites, hedgerows, upper saltmarsh, reed and large sedge swamps, depositing/ lowland rivers, dry meadows and grassy verges, wet grassland, drainage ditches, hare and hedgehog, badger, bats, otter, amphibians, breeding birds, wintering birds and rare/protected flora species were identified as key ecological receptors. In the absence of any mitigation/protection measures it was concluded the proposed development will result in significant effects on many of these KERs with the magnitude of such effects ranging from local to international. Measures have been proposed to reduce impacts on all KERs to levels not considered to be significant, and to ensure compliance with Wildlife Law.

5.0 AIR QUALITY AND CLIMATE

AWN Consulting Limited has been commissioned to conduct a qualitative assessment of the likely impact on air quality and climate associated with the proposed development.

In terms of the existing air quality environment, EPA data available from similar environments indicates that levels of nitrogen dioxide, carbon monoxide, particulate matter less than 10 microns and less than 2.5 microns and benzene are generally well below the national and European Union (EU) ambient air quality standards.

The greatest potential impact on air quality during the construction phase is predicted to be from construction dust emissions and the potential for nuisance dust. In order to minimise dust emissions during construction, a series of dust mitigation measures will be prepared which will be incorporated into the CEMP for the development. Provided the dust minimisation measures outlined in the CEMP are adhered to, the air quality and climate impacts during the construction phase will short-term and imperceptible.

Additional traffic associated with the operational phase of the proposed development has the potential to impact ambient air quality at nearby sensitive receptors. As the additional local traffic associated with the proposed development is below the threshold requiring a quantitative assessment using the UK Design Manual for Roads and Bridges (DMRB) screening model, the predicted impact of the operational phase on ambient air quality and climate can be described as long-term and imperceptible. No specific mitigation measures are required for the operational phase of the proposed development.

As the National and EU standards for air quality are based on the protection of human health, and concentrations of pollutants for both the construction and operational stages of the proposed development are predicted to be significantly below these standards, the impact to human health is predicted to be imperceptible in the short and long term.

6.0 NOISE

When considering a development of this nature, the potential noise and vibration impacts on the surroundings must be considered for each of two distinct stages, the short-term construction phase and the permanent operational phase.

During the construction phase the main site activities will include, site clearance, removal of some pathways, road works, and landscaping. This phase has the greatest potential for noise and vibration impacts on the surrounding environment, however, this phase will be of short-term impact.

During the operational phase of the development, no significant sources of outward noise or vibration are expected with the development. The primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network.

The results have shown that the skate park does not exceed the criterion of 55dB L_{Aeq} at the nearest noise sensitive location. It should be noted that the noise result presented is representative of the worst-case instantaneous noise level but that the average noise level over the course of the day would be much lower. It should also be noted that the skate park will not operate at night-time.

The noise level should also be viewed in the context of the existing baseline noise levels, which were found to be <55dB L_{day} due to road traffic noise in the area. Therefore, it is likely that skate park activity may be just audible during lulls in road traffic noise in the area.

If required, the noise levels could be further reduced by the introduction of suitable landscaping e.g. grass mounds or acoustic screening, however, this is not essential as the predicted skate park noise levels are below the noise criterion.

Concerns may be raised over the potential for noise due to anti-social behaviour at the skate park and surrounding play areas. It is proposed to incorporate the following measures into the skate park to reduce the risk of anti-social behaviour:

- Security system including CCTV cameras;
- Lighting design to illuminate areas and avoid dark corners;
- Seating and landscaping design to encourage groups to congregate away from residential areas, and;
- Main bowl illumination on timers to discourage out of hours use.

7.0 ARCHAEOLOGY

The proposed park can be divided into zones, depending on the current level of knowledge of the archaeological potential.

The potential of the zone to the northern perimeter is very high, with a band of enclosures here detected through geophysics. These will be retained in situ, with every effort to avoid disturbance. The minimal intervention in this area reflects the high archaeological potential here, with surface only paths skirting the buffer zone of known archaeological monuments. Therefore in the area of the highest archaeological potential, there will be minimal impact.

Along the shore road, test pits, as part of the proposed 2018 Greenway, indicate that the underlying soils are composed of sands and mud. The SUDS pond has been created as part of the above works. Work here is limited to a new pathway.

The area of the proposed playing pitches, south of the Mayne Road, is unknown in terms of archaeology. Sample areas should have geophysical surveys undertaken, with the proviso for

further survey if there is a high level of identifiable archaeological anomalies. Test excavation to follow to verify findings should be carried out, if any features identified in the geophysics are in the unavoidable location of construction. This is dependent on the requirement for levelling the ground and installation of drainage etc.

The southern part of the park is considered to be low in archaeological potential. Much of this area has been subject to landscaping, and OS historical maps indicate previous sand and gravel quarrying/ extraction here. Archaeological monitoring should be undertaken of groundworks.

All of these recommendations are subject to agreement with the National Monuments Service, Department of Housing, Local Government and Heritage.

CONTENTS

1.0 INTRODUCTION

At the request of Bernard Seymour Landscape Architects (BSLA), AWN Consulting Ltd (AWN) has prepared the following Environmental Report to accompany the planning application for the proposed park development project at Baldoyle, Co. Dublin. The objective of this report is to identify and address any potential environmental impacts of the redevelopment of Baldoyle Racecourse.

The Racecourse Park covered approx. 112 ha, while the proposed park development project covers approx. 84 ha and comprises the following elements.

- 4.5km of new walking and cycling routes including a bridge over the Mayne river and the repair to the railway underpass;
- Public lighting along key walking and cycling routes
- Expanding the existing car park to cater for up to 161 car parking spaces;
- Upgrading and expanding the existing playground;
- A Skate park and Teenage Adventure Playground;
- A Multi use games area;
- A dog run;
- A Bowls green;
- Four grass football pitches
- A viewing platform
- Tracing of circular archaeological feature through soft landscaping and removal of existing fence;
- Extension of existing reedbed south of Mayne river and creation of new brackish grassland north of Mayne river;
- All landscaping works in the park.

The proposed site seeks to serve as a catalyst to meet the demands of the growing population in the nearby vicinity while at the same time it seeks to respect and enhance the biodiversity and character of the site in which it finds itself. A new community centre is envisioned in the southern area of the site, which today already houses a certain number of amenities which the proposal seeks to enhance by the provision of larger play-areas and catering for the needs of a larger range of user by the provision of toddler play areas all the way to the provision of spaces for teenage involvement such as a skate park or MUGAs.

The parkland is ~10km north of Dublin City Centre. The proposed development is included in its Local and Green Infrastructure Objectives as part of Fingal County Councils Development Plan 2017-2023.

The site currently has a derelict marketing suite, playground and carpark and playing field, all located on the southern part of the site. The remainder of the site contains fields and open space presently used for grazing. There are 5 no. residential dwellings along the R123/Moyne Road that cuts through the middle of the site. Traveller accommodation, in the form of a 10-bay site, is located within the middle of the park and is accessed from Moyne Road.

Figure 1.1 Site Boundary

The land use is a mixture of agricultural and amenity land with housing developments to the south and north and the Baldoyle Bay SAC to the east of the site. The main construction works will be taking place to the south of the site with the pedestrian/cycle route going through the entire site in a north to south direction.

1.1 REPORT STRUCTURE

This assessment has been undertaken to assess the potential impacts on the environment from the development of the parkland. As such the scope of the assessment has focused on

the attributes of the environment which could be impacted by the proposed park development project at the Baldoyle Racecourse Park. For each of these environmental attributes, specialists have considered the baseline conditions, any likely impacts (positive and negative) and required mitigation measures (for inclusion in a Construction Management Plan).

The following environmental attributes have been considered:

- Soils (including Waste), Geology and Hydrogeology;
- Hydrology (including flooding);
- Air Quality (Dust);
- Biodiversity.
- Noise

The format of this report has generally followed guidelines for Environmental Impact Assessment Reports (EIAR) where relevant (draft EPA Guidelines 2017).

An Appropriate Assessment (AA) Screening and Natura Impact Assessment (NIS) have also been carried out to assess the potential of the proposal to affect the integrity of the Natura 2000 network. Its findings are provided in an AA Screening & NIS Report which is included in a separately bound document within the planning application document set. The findings of the screening report are referred to in the Biodiversity Section of this environmental report, without duplicating its contents.

Each environmental topic is covered in a separate section. These sections generally cover:

- The proposed development relevant to the attribute;
- The receiving environment;
- Likely significant impacts;
- Mitigation measures; and
- Assessment of residual impacts.

1.2 ENVIRONMENTAL REPORT TEAM

The study team engaged to prepare this report are all appropriately qualified, experienced and expert in their respective fields. The individual specialists are as listed below.

Role	Company
Water and Hydrology	AWN Consulting
Biodiversity and NIS	Scott Cawley Ltd.
Archaeology	Archaeological Projects Ltd.
Land, Soils, Geology and Hydrogeology	AWN Consulting Ltd
Air Quality and Climate	AWN Consulting Ltd
Noise	AWN Consulting Ltd

Table 1.1 Environmental Report Team

1.3 ASSESSMENT OF ENVIRONMENTAL IMPACT

Each specialist has considered the impact of construction and operation in accordance with the Glossary of Impacts contained in the EPA Guidelines unless otherwise stated. This takes account of the quality, significance, duration and type of impact characteristic identified.

In the environmental report, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute. The duration of each impact is also considered. Table 2.1 below summarises the EPA guidelines on impact assessment.

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	A change which does not affect the quality of the environment
	Negative/ Adverse	A change which reduces the quality of the environment
Significance	Imperceptible	An effect capable of measurement but without noticeable consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences
	Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate Effects	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
	Significant Effects	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment
	Profound Effects	An impact which obliterates sensitive characteristics
Extent & Context	Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability	Likely Effects	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented
	Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration
	Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly daily, weekly, monthly, annually.
Type	Indirect Effects (a.k.a. Secondary Effects)	Impact on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many small impacts to create one larger, more significant impact
	'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out
	Worst case Effects	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents

Table 2.1 Glossary of Impacts following EPA Guidance Documents (Draft 2017 Guidelines)

1.4 DIFFICULTIES ENCOUNTERED

There were no significant difficulties encountered in the production of this environmental report. Any issues encountered during assessment of individual factors are noted within the specialist sections.

1.5 REFERENCES

Environmental Protection Agency (EPA) (2015) Advice Notes for Preparing Environmental Impacts Statements Draft.

Environmental Protection Agency (EPA) (2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft.

Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended 2010 (S.I. No. 30 of 2010) and 2015 (S.I. No. 27 and S.I. No. 413 of 2003)

Planning and Development Regulations, 2001 (S.I. No. 600 of 2001)

Fingal County Council (2017) Development Plan 2017-2023.

2.0 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

2.1 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this section of the Environmental Report (ER) which assesses and evaluates the potential impacts of the development on the land, soils, geological and hydrogeological aspects of the Proposed park development project. The assessment considers the importance of the attributes and the predicted scale and duration of the likely impacts. Where an impact is identified, planned mitigation measures are identified and assessed.

2.2 METHODOLOGY

The methodology for rating impacts for the Environmental Report considers following guidelines;

- EPA Draft EIA Report Guidelines 2017;
- Environmental Impact Assessment of Projects - Guidance for the preparation of the Environmental Impact Assessment Report, European Union 2017;
- Institute of Geologists of Ireland (IGI) '*Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements*' (2013); and;
- National Roads Authority (NRA) '*Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'* (2009).

The rating of potential environmental impacts on the land, soils, geology and hydrogeological environment is based on the criteria presented in Tables 2.1 – 2.4 below, which take account of the quality, significance, duration and type of impact characteristic identified. In the (ER), consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the activities on that cited attribute. The impact ratings are in accordance with impact assessment criteria provided in the afore-mentioned EPA/NRA publications.

The NRA (2009) criteria for rating the importance, magnitude and significance of impacts at report stage on the geological related attributes are summarised in Table 2.1 and Table 2.2 respectively, below.

Magnitude of Impact	Criteria	Typical Examples
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit – Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site) Well drained and/or high fertility soils Moderately sized existing quarry or pit

Magnitude of Impact	Criteria	Typical Examples
		– Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale Degree or extent of soil contamination is moderate on a local scale Volume of peat and/or soft organic soil underlying route is moderate on a local scale	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and/or moderate fertility soils Small existing quarry or pit – Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. – Uneconomically extractable mineral resource.

Table 2.1 *Criteria for rating site Attributes – Estimation of Importance of Soil & Geology Attributes (NRA, 2009)*

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table 2.2 *Criteria for rating impact magnitude at EIA stage – Estimation of magnitude of impact on soil/ geology attribute (NRA, 2009)*

The NRA (2009) criteria for estimation of the importance of hydrogeological attributes and estimation of magnitude at the site during the EIA stage are summarised in Table 2.3 and Table 2.4, respectively, below.

Importance	Criteria	Typical Examples
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. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	– Regionally Important Aquifer with multiple wellfields – Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status – Regionally important potable water source supplying >2500 homes – Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	– Regionally Important Aquifer – Groundwater provides large proportion of base flow to local rivers – Locally important potable water source supplying >1000 homes – Outer source protection area for regionally important water source – Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	– 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	– Poor Bedrock Aquifer – Potable water source supplying <50 homes

Table 2.3 *Criteria for rating Site Attributes - Estimation of Importance of Hydrogeology Attributes (NRA, 2009)*

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. – Calculated risk of serious pollution incident >2% annually.

Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. – Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impaction integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. – Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	– Calculated risk of serious pollution incident <0.5% annually.

Table 2.4 Criteria for Rating Impact Significance at EIA Stage – Estimation of Magnitude of Impact on *Hydrogeology Attribute (NRA, 2009)*

The principal attributes (and impacts) to be assessed include the following:

- Geological heritage sites near the perimeter of the subject site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves;
- The quality, drainage characteristics and range of agricultural uses of soil around the subject site;
- High yielding water supply springs/ wells near the site to within a 2km radius and the potential for increased risk to these sources presented by the proposed development;
- Classification (regionally important, locally important) and the extent of aquifers underlying the site perimeter area and increased risks presented to these by the proposed development associated with aspects such as removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, or change in groundwater quality;
- Natural hydrogeological/ karst features in the area and the potential for increased risk presented by the activities on site; and

2.2.1 Sources of Information

Available information on the land, soils, geology and hydrogeology for the site has been compiled from accessing national databases and archives where available. The collection of baseline regional data was undertaken by reviewing the following sources:

- Geological Survey of Ireland (GSI) - on-line mapping (www.gsi.ie), Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) - on-line mapping (www.epa.ie) and database information;
- National Parks and Wildlife Services (NPWS) on-line mapping (www.npws.ie) Protected Site Register;
- Fingal County Council - illegal landfill information; and
- Department of Environment, Heritage and Local Government (DoEHLG).
- Office of Public Works (OPW – www.opw.ie);

Site-specific data was derived from the following sources:

- Baldoyle to Portmarnock Greenway Site Investigation, OCB Geotechnical, September 2018 (Ref. OCB18-066)
- Relevant landscape plans for the Park development project at the Racecourse Park.

2.3 RECEIVING ENVIRONMENT

The receiving environment is discussed in terms of geomorphology, superficial and solid geology and site history including potential for contamination. The outline of the proposed development within the regional and local setting is described below.

2.3.1 Site Setting

The site is a partially developed greenfield site located to the north of Baldoyle. The site is located between Baldoyle and Portmarnock and comprises of the area between Grange Road and Station Road, segmented by the Moyne road. It is in an area that is a mixture of residential, open space, green belt and high amenity land use. A section of the Baldoyle Bay SAC is located to the east of the site (brackish wetlands). There are residential housing estates to the south, southwest and north west of the site.

2.3.2 Land Use

The site currently has a derelict marketing suite, playground and carpark, community garden and playing field, all located on the southern part of the site. The remainder of the site contains fields and open space and presently partially used for grazing. There are 5 no. residential dwellings along the R123/Moyne Road that cuts through middle of the park. Traveller accommodation, in the form of a 10-bay site, is located within the middle of the park and is accessed from Moyne Road.

2.3.3 Summary of Site-Specific Conditions

The land use is a mixture of agricultural and amenity land with housing developments to the south and north and the Baldoyle Bay SAC to the east of the site. The main construction works will be taking place to the south of the site with the pedestrian/cycle route going through the entire site in a north to south direction. The project is described in more detail in Section *1 - Introduction*.

2.3.4 Bedrock Geology

Information obtained from the GSI (2020) indicates there are two main lithological groups underlying the Racecourse Park. As shown in Figure 2.1 below, the site is underlain by the Tober Colleen Formation to the south which comprises a calcareous shale, limestone conglomerate and is described as dark grey, calcareous commonly bioturbated mudstone and subordinate thin micritic limestones.

The Malahide Formation is located to the north of the site compromising argillaceous bioclastic limestones and shales. The lower part of the formation is composed of calcareous shales, siltstones and sandstones, and occasional thin limestones at its base. Underlain by cyclical, peloidal and oncolitic, peloidal, occasionally nodular micrites and thin intraclastic formations.

Figure 2.1 Bedrock Geology Map (GSI. 2021)

There are no indications of bedrock outcrops at the site. The GSI database presently lists no karst features in the immediate vicinity of the planned parkland and significant karstification would not be expected in this type of limestone.

2.3.5 Superficial Geology

Reference to the GSI (2020) on-line mapping indicates five predominant soil type in the general area of the proposed Park. These include;

- *BminDW* which corresponds to deep well drained mineral soil derived from mainly basic parent materials (limestone),
- *BminPD* poorly drained mineral soils derived from mainly basic parent (limestone) materials,
- *AlluvMin* mineral alluvium mostly located around the banks of the Mayne River which runs west to east through the centre of the site (see *Section 3* for description of local hydrological environment),
- *MarSed* marine/estuarine sediments; and
- *AeoUND* aeolian undifferentiated *which are usually associated with estuarine and coastal areas.*

Figure 2.2 presents the Soil Map for the general area surrounding the subject site.

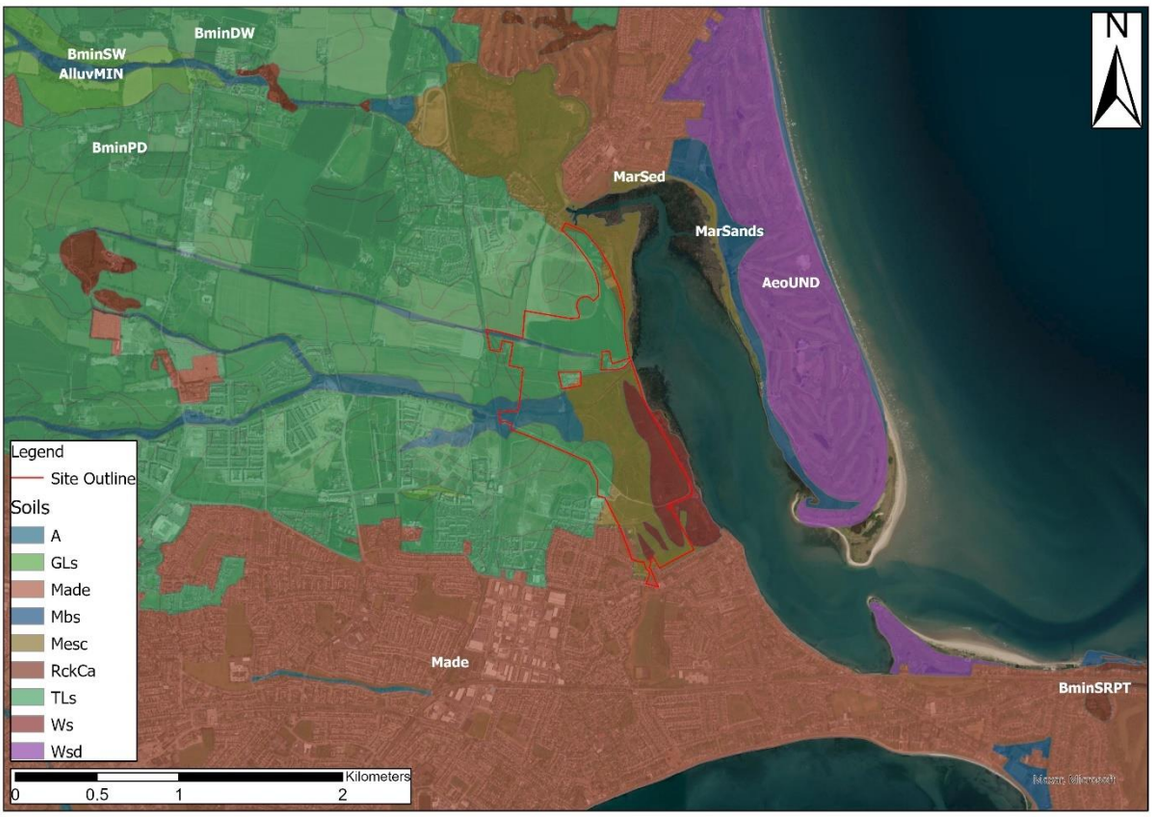


Figure 2.2 Soil Map (GSI, 2021)

The GSI/ Teagasc quaternary sediment mapping database indicates the overlying soils are made up of the following;

- Quaternary Glacial Till (TLs) (source: GSI soil mapping). The Glacial Tills are derived from limestone and are a common soil cover in this region. The south-western section of the subject area has Alluvium deposits
- Alluvium (A). Alluvium which are deposits associated with flowing floodwaters in river courses, this is located in the area around the Mayne River.
- Estuarine silts and clays (Mesc)
- Marine beach sands (Mbs)

- Windblown Sands (WS)

Figure 2.3 presents the Subsoil Map for the general area surrounding the subject site.

Figure 2.3 Subsoil Map (GSI, 2021)

<u>Depth to Bedrock</u>

Information obtained from works undertaken by OCB Geotechnical in September 2018 as part of the Baldoyle to Portmarnock Green Way site investigation to the east of the proposed site encountered bedrock at 10.30 to 10.40 metres below ground level (mbgl).

Site investigation drilling and trial pit locations can be viewed in Figure 2.8 with trial pit logs from the September 2018 investigations included in Appendix 2.1.

2.3.6 <u>Aquifer Classification</u>

The GSI (2010) classifies the principal aquifer types in Ireland as:

<u>Bedrock Aquifer</u>

- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Rkd - Regionally Important Aquifer (karstified diffuse)

Gravel Aquifer
- Lg - Locally Important Aquifer - Sand & Gravel
- Rg - Regionally Important Aquifer - Sand & Gravel

Reference to the GSI (2020) National Bedrock Aquifer Map for the site (see Figure 2.4 below) indicates that the site is underlain by both an (LI) Locally Important Bedrock Aquifer, which is moderately productive, only in local zones to the north of the site and a (PI) Poor Aquifer which is generally unproductive except for Local Zones.

The limestones are the greater Dublin area are generally dominated by low permeability, fine grained and argillaceous limestones and shales. They are generally unproductive but there are certain strata in the South Dublin area that are more permeable and are classified as minor aquifers.

Figure 2.4 presents the GSI (2020) Aquifer Classification for the region

Figure 2.4 Aquifer Classification (GSI, 2021)

2.3.7 Aquifer Vulnerability

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely/ or of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI (2010) Vulnerability Map (see Figure 2.5 below) presently classifies the aquifer vulnerability in the area of the subject site as predominantly Low (L) on the basis of approximately 10 metres of overburden overlying the bedrock as confirmed by onsite investigations covering the majority of the site with a small area of high (H) vulnerability to the east probably associated with high permeability sands and gravels in this area.

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Table 2.5 Vulnerability Mapping Guidelines (GSI, 1999).

Figure 2.5 presents the GSI (2021) Aquifer Vulnerability Map for the region.

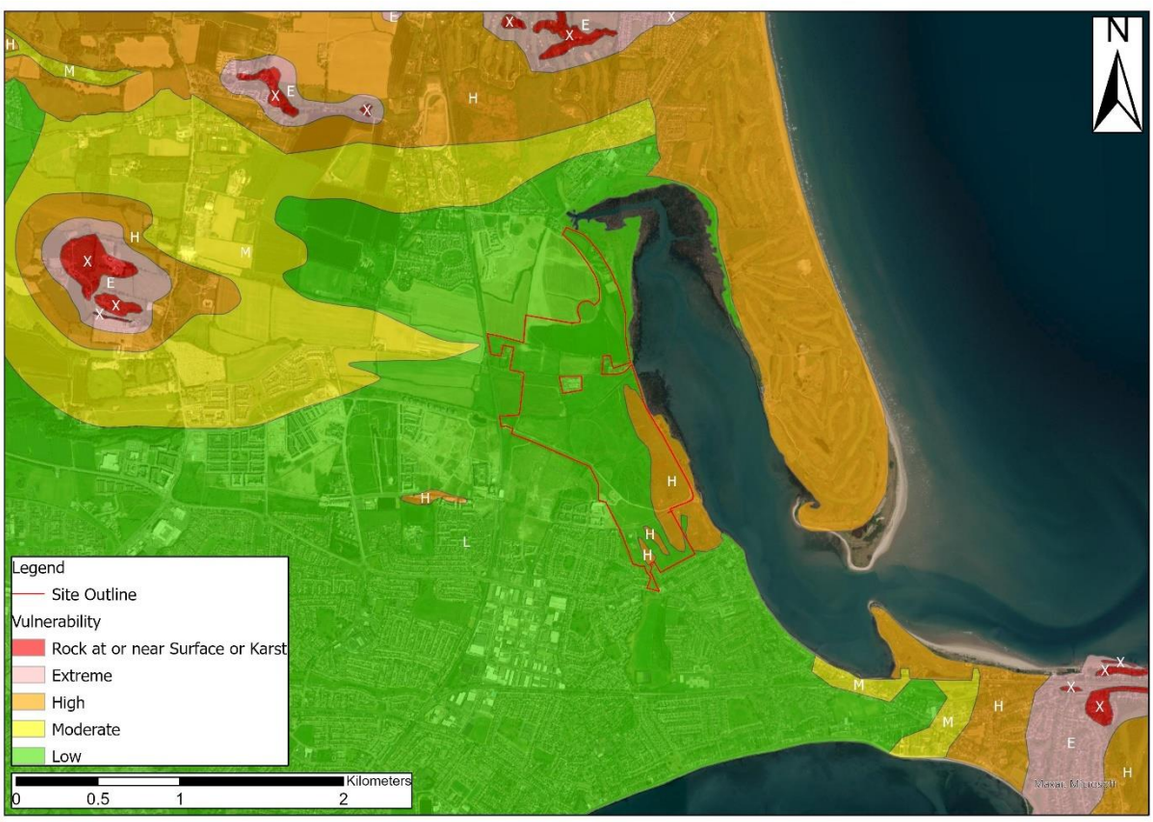


Figure 2.5 Aquifer Vulnerability Map (GSI, 2021)

The regional area surrounding the Baldoyle Racecoure Park site is predominantly Low (L) to Moderate (M).

2.3.8 Groundwater Wells (Off-site Wells)

There is no licencing system for wells in Ireland at present and as such no complete data set. The GSI (2020) Well Card data search included the nearest approximate wells to the park site; these are presented in Figure 2.6 below.

Figure 2.6 GSI well search (GSI, 2021)

This current GSI Well Card Index does not show any wells or springs at the site or surrounding area with the nearest recorded wells located over 1km to the west of the proposed park. The area is serviced by public mains therefore it is unlikely that wells are widely used for potable supply in this area.

The site is not located near any public groundwater supplies or group schemes. The GSI (2021) database identifies no groundwater source protection zones (SPZ) in the immediate vicinity of the subject site. The nearest SPZ is 16 km north of the proposed development. Furthermore, there is no evidence of public supply wells within 2 km of the site.

2.3.9 Areas of Conservation

According to the NPWS (2021) on-line database, the closest nationally designated sites are the Baldoyle Bay special area of conservation (SAC) (00199) and Special Protected Area (SPA) which is partially located within the racecourse park. Waters from the Mayne River discharge into the Baldoyle Bay SAC. Designated sites are discussed further in The Ecological

Impact Statement and Natura Impact Statement (NIS) both prepared by Scott Cawley Consultant Ecologists .

2.3.10 Geological Heritage

The Geological Survey of Ireland (GSI) Public Viewer www.gsi.ie/mapping was reviewed to identify sites of geological heritage for the site and surrounding area. There are no recorded sites on the development site. There are a number of sites to the north (Malahide Coast) and south of the site (North Bull Island, Hill of Howth, Claremount Strand etc). Due to the characteristics of the proposed development, there will be no impact to nearby geological heritage sites.

2.3.11 Economic Geology

The Extractive Industry Register (www.epa.ie) and the GSI mineral database was consulted to determine whether there were any mineral sites close to the proposed development. There are no active quarries located in the immediate vicinity with the nearest quarry is located approximately 4.8 km to the northwest which is classified as Feltrim Quarry. The EPA mapping website also confirmed that there are no mines on or near the site.

2.3.12 Radon Mapping

Information provided from the EPA (2018) radon map shows the proposed development is not predicted to be in a 'High Radon Area'. A High Radon Area is an area where it is predicted that 10 per cent or more homes will exceed the reference level of 200 becquerels per cubic metre (Bq/m^3). Reference to the radon map for the area around the subject site shows between 1-5 per cent of the homes in this 10km grid square are estimated to be above the Reference Level.

2.3.13 Groundwater Body Status

The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy (commonly known as the Water Framework Directive [WFD]). The WFD required '*Good Water Status'* for all European water by 2015, 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 Groundwater Body (GWB) underlying the site is the Dublin GWB (EU Groundwater Body Code: IE_EA_G_008). Currently, the EPA (Online Mapping 2021) classifies the Dublin GWB 'with a Waterbody Risk score of *'Under* Review' meaning more information is required before a current correct status can be awarded to the GWB Figures 2.7 and 2.8 below present the most recent data from the EPA website.

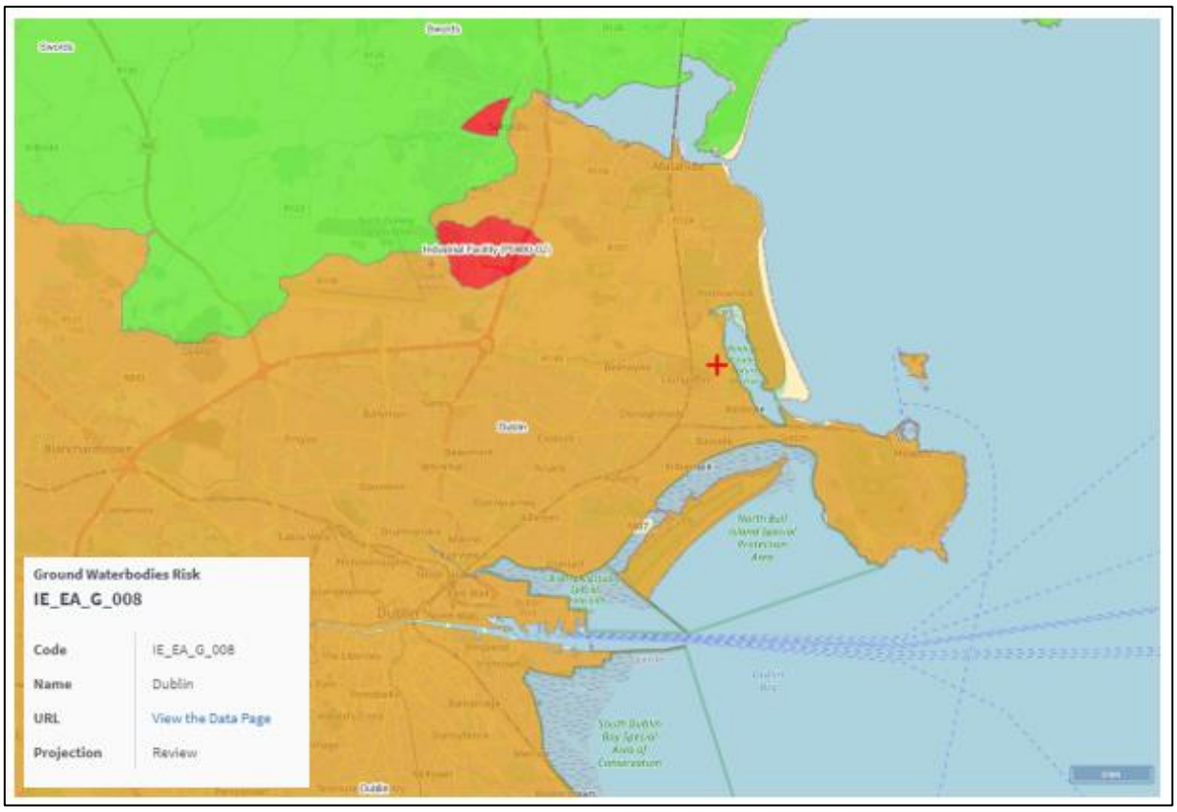


Figure 2.7 GWB Risk Score is 'Under Review'- Site is shown with a red cross

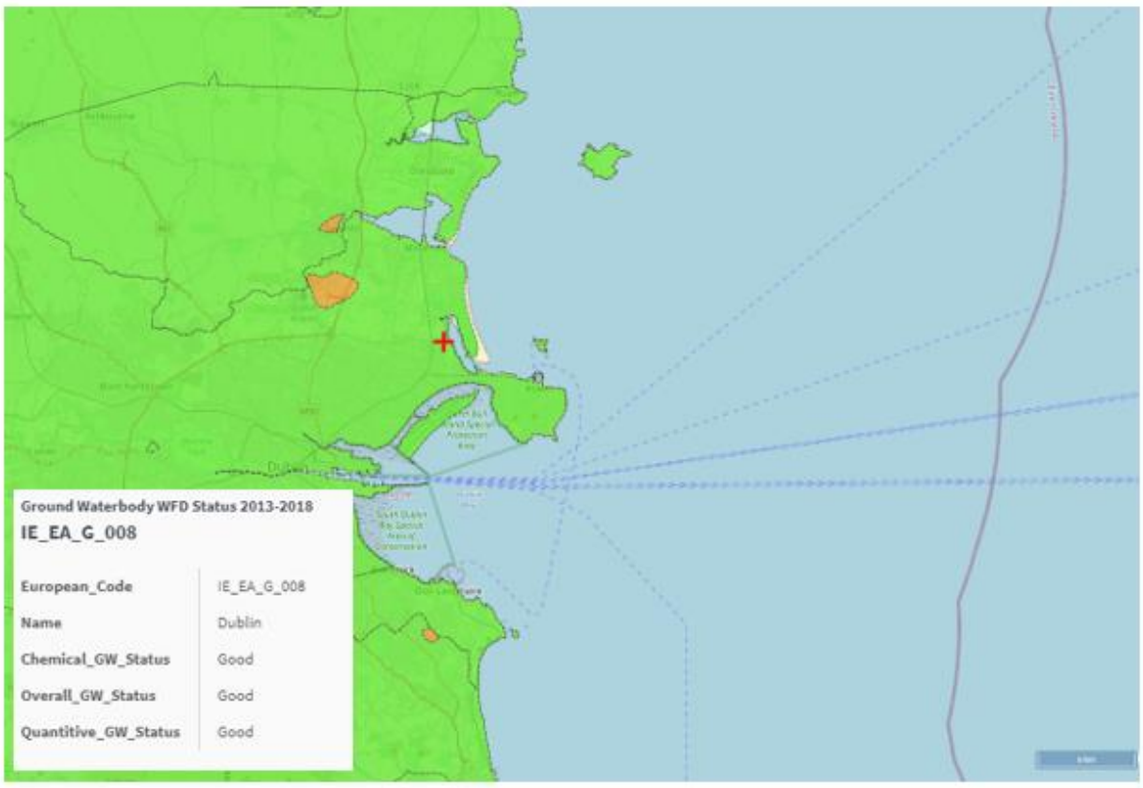


Figure 2.8 GWB WFD Status (period 2013-2018). Green = Good Status.- Site is shown with a red cross

During the site investigation carried out in September 2018 (see Section 2.3.15), shallow groundwater seepage (perched groundwater within the overburden) was encountered at the two locations, BH/RC1A (3 mbgl) and BH/RC2 3.2 mbgl). Groundwater wells were installed at both locations (see Figure 2.9). It does not appear standing water levels were recorded following installation of the borehole wells. Depths and construction details of the wells are included in the logs (see Appendix 2.1). It is presumed that groundwater flow is west to east towards Baldoyle Bay.

Extensive excavations do not form part of the proposed park development works so considerable dewatering works will not be required.

No groundwater samples were sampled for analysis as part of the September 2018 investigation. However, based on the lack of historic development on the site and the observed natural composition of the clays recorded during the geotechnical investigations by OCB Geotechnical it is unlikely there is a source for groundwater contamination at the proposed parkland site. Additionally, leachate samples were analysed for metals from four trial pit location TP2, TP3, TP5 and TP6 with all levels below their relevant levels of detection (LOD) (see Appendix 2.2 & 2.3).

2.3.14 Rating of Site Importance of Geological/ Hydrogeological Features

Based on the NRA methodology (Table 2.1 &Table 2.3 above), and criteria for rating site importance of hydrogeological features, the importance of the hydrogeological features at this site is rated as 'Low to Medium' based on the fact that the bedrock underlying the site is a Locally Important (LI) to Poor (PI) aquifer with limited use for public water supply/ potable use. This assessment is also based on the fact that the attribute has a medium quality significance or value on a local scale.

2.3.15 Soil Quality

The site investigation works undertaken in September 2018 by OCB Geotechnical included the following relevant investigation and sampling works;

- 3No. Cable Percussion Boreholes
- 2No. Follow on rotary boreholes
- 9No. Trial pits

The samples were sent for analysis to an INAB accredited laboratory (ELS, Blackrock, Cork). The soil (leached and solid samples) was tested for a broad range of potential contaminants of concern including Volatile Organic Compounds (VOCs,), Polyaromatic Hydrocarbons (PAHs), Polychlorinated Biphenols (PCBs), Hydrocarbons (EPH) and Metals. The results can be viewed in appendix 2.2 with results of the solid soils compared against with the Land Quality Management/Chartered Institute of Environmental Health (UK) Suitable for Use Levels (LQM/CIEH S4UL's) for public open space (parklands) in Appendix 2.3. All solid soil samples (Suite I) tested were below the LQM/CIEH S4UL's for public open space parks lands. Levels were also below the more conservative residential thresholds (see Appendix 2.3). Additionally, all samples were below their corresponding level of detection (LOD) for BTEX compounds

Locations of the soil samples taken can be seen in Figure 2.9 below.

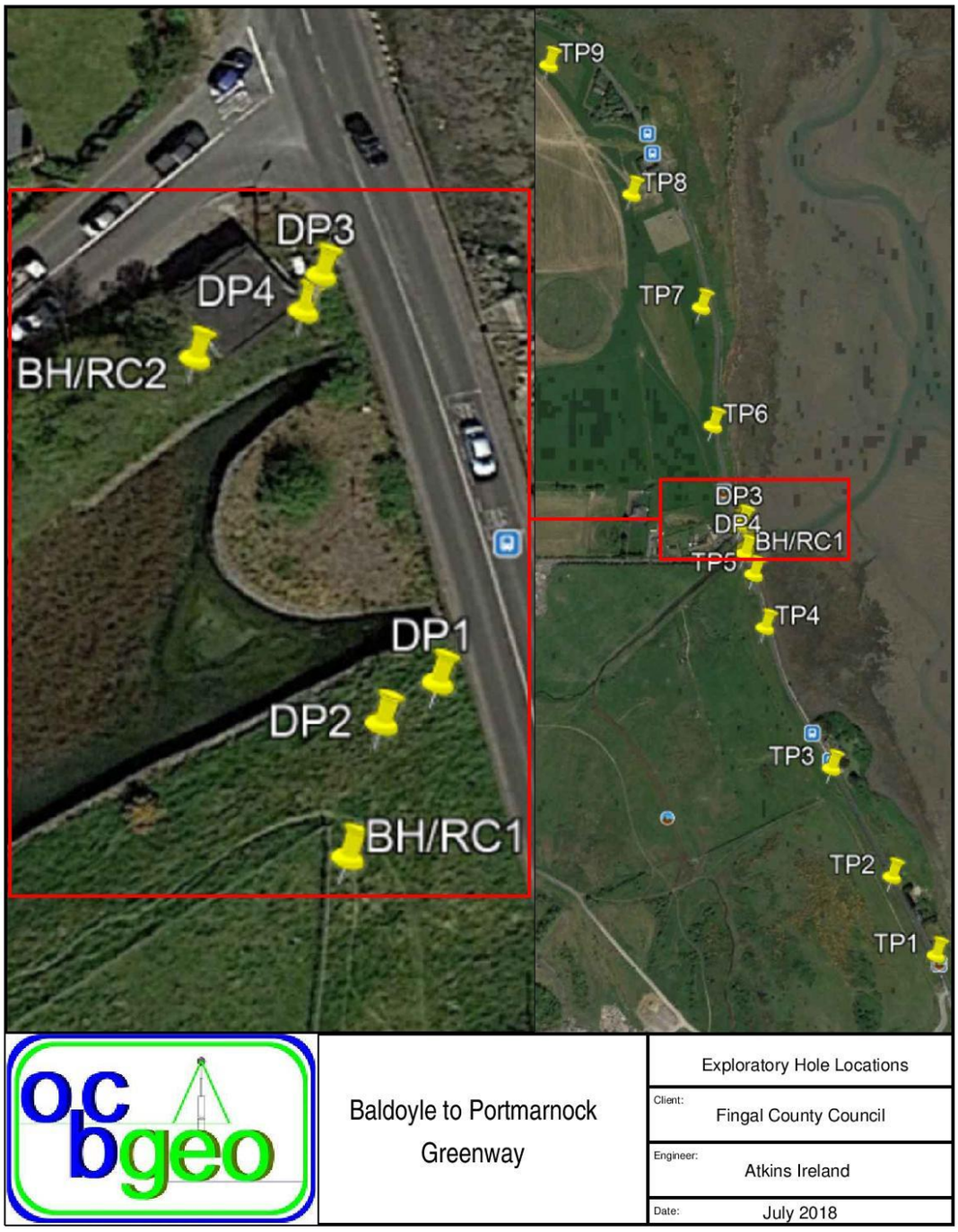


Figure 2.9 *Sample Locations (OCB Geotechnical, 2018)*

Overall, the soil quality for the proposed for the parklands is considered good and suitable for use.

2.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The general description of the proposed development is presented in detail in *Section 1 Introduction*. The key characteristics of the proposed development which relate to Land, Soils, Geology and Hydrogeology are discussed below.

Reprofiling of the shallow soil however the proposed works are envisaged to not require any importation or removal of soil/stones from the site. All material will be reused for the development.

-Reprofiled soil will be overlain by topsoil to facilitate the landscaping of the proposed park development. There will be a negligible increase in hardstand hardstand from the carpark to the south and part pathways.

2.4.1 Conceptual Site Model

A descriptive summary of the current Conceptual Site Model (CSM) for the site is provided as follows:

- The geological profile on site predominantly comprises primarily low permeability limestones and calcareous shales.
- Depth to bedrock is relatively deep throughout the site (circa 10 mbgl) based on onsite investigations undertaken in September 2018 (OCB Geotechnical, 2018).
- Regional bedrock groundwater gradient is believed to flow from west to east towards Baldoyle Bay SAC.
- Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development.
- There will be no soil or stone material imported or moved off site for the development on the Baldoyle Racecourse Park.
- No evidence of any soil contamination present.

2.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

Potential impacts associated with the Parkland Development works during construction and operation are outlined below. The implementation of the mitigation measures outlined in Section 2.6 below however will ensure that the potential impacts are minimised. These measures will ensure that the proposed development does not impact on the receiving soil or groundwater quality. Impacts considered are summarised as follows:

2.5.1 Construction Stage

Soil Reprofiling and Movement

Development of the park site will require soil reprofiling. No large excavations within the proposed site area are required. As there will be no removal of soil from the site the intrinsic

vulnerability of the underlying bedrock (and groundwater) will not be affected. Apart from the removal of the top layer of tarmacadam on some of the current footpaths all material will remain onsite for reuse. Excavated tarmacadam will be removed by a licenced waste haulier and disposed of and disposed of appropriately at a licenced facility.

Accidental Fuel Spillages and Leakages

Potential impacts arising from construction activities if not adequately mitigated could include accidental leakage of hydrocarbon fuels and/or oils from on-site diesel-fuelled equipment, vehicles and/or machinery which may be used within the application site during normal proposed operations.

2.5.2 Operational Stage

Surface Water Runoff

Following construction, the primary drainage will be as current as the park is primarily green and permeable with only minor footpaths. Pathways are all to be self draining to their edges without any drainage pipes required. There are to be soakage trenches being constructed as part of the new car parking A network of surface water drainage ditches currently onsite will be retained aiding in surface water drainage (see Section 3). All existing drains/sewers have been designed in accordance with DoEHLG '*Recommendations for Site Development Works'.* Surface water drainage is covered in *Section 3 Water & Hydrology*

2.6 REMEDIAL AND MITIGATION MEASURES

2.6.1 Construction Stage

The following is an outline of the mitigation measures proposed to address the potential impacts outlined in section 2.5 above.

Soil Reprofiling and Redistribution

- Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment (silty run-off or dust blow) and the material will be stored away from any open surface water drains. Double handling of material during transport will be minimised in order to reduce degradation of soil structure and generation of dust.

- Although there is no evidence of historical contamination in the area, and the likelihood of contamination in the material is very low, soil will be visually assessed for signs of possible contamination during excavation and transport. Should any potential contamination be identified, the soil will be assessed and analysed for potential contaminants. Should any contaminated material be confirmed this will be removed from site by an authorised waste contractor to a suitable waste facility.

Fuel and Chemical Handling

- To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and other liquids used during construction (i.e. soil moving and landscaping) will be stored on hardstand and within temporary bunded areas, or other suitable

containment. Alternatives which collect and contain small spillages (drips etc.) will also be used. These storage areas shall be rendered impervious with appropriate signage and security in place. The amount of fuels/ chemicals stored will be kept to a minimum. All chemical containers will be labelled and copies of SDS sheets shall be maintained for ease of access and reference.

- In the event of a spillage, drainage shall be inspected and diverted for collection and safe disposal if required. The integrity and water tightness of all containment structures shall be tested and demonstrated. All fuel oil areas will have an appropriate spill apron.

- All ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated stormwater to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

- With respect to portable equipment containing fuel oil, drip trays or approved equipment shall be used. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in the works area and made available at all times. Guidelines such as 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors', (CIRIA 532, 2001) will be complied with.

- Training programmes (in the safe handling of hazardous fuels) will be put in place for all relevant personnel which will also be trained in the implementation of site procedures.

- Management of surface water runoff will be enabled through the implementation appropriate measures as outlined in Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors – C532 CIRIA Report (Masters-Williams et al, 2001). See *Section 3 Hydrology* for more detailed information.

2.6.2 Operational Stage

During the operational phase of the proposed development site there is limited potential for site activities to impact on the land, geological and hydrogeological environment of the area. There will be no emissions to ground or the underlying aquifer from operational activities.

Increase in Hardstand

There will be minimum changes to the current amount of hardstanding at the parkland development so the impact to local recharge will be minimal. As the area of aquifer is large any slight modification in local recharge will have no significant change in the natural hydrogeological regime.. The majority of the hardstand surface to be used will be permeable in nature ensuring maximum recharge to ground where possible.

2.7 PREDICTED IMPACTS OF THE DEVELOPMENT

2.7.1 Construction Phase

The implementation of mitigation measures outlined in Section 2.6.1 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the impact will be ***short-term-imperceptible-neutral***. Following the NRA Guidelines on Procedures for the Assessment and Treatment of Geology Hydrology and Hydrogeology for National Road Schemes (2009) criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

2.7.2 Operational Phase

The implementation of mitigation measures highlighted in Section 2.6.2 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral.*** Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

2.8 RESIDUAL IMPACTS

There will be no residual impact from the proposed development.

There are no likely significant impacts on the geological or hydrogeological environment associated with the proposed development of the site. It is not anticipated that any impacts will arise following the implementation of the mitigation measures discussed above. As such the impact (EPA 2017) is considered to have a long term-imperceptible significance.

The proposed redevelopment is included in its Local and Green Infrastructure Objectives as part of Fingal County Councils Development Plan 2017-2023.

2.9 REFERENCES

CIRIA, (2001). *'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors'*, (CIRIA 532, London, 2001)

CIRIA, (2011). *Environmental good practice on site;* Construction Industry Research and Information Association publication C692 (3rd Edition - an update of C650 (2005); (I. Audus, P. Charles and S. Evans), 2011

CIRIA, (2012). *Environmental good practice on site –pocketbook;* Construction Industry Research and Information Association publication C715 (P. Charles, and G. Wadams), 2012

CIRIA, (2015) *Environmental good practice on site guide* (4th Edition – an update of C92 (2010); (P. Charles), 2015

EPA, (2003). *Towards Setting Guidelines for the Protection of Groundwater in Ireland*; Interim Report; Environmental Protection Agency, 2003

EPA, (2011). *Guidance on the Authorisation of Discharges to Groundwater,* Version 1, Dec 2011, Guidance Document; Part 2 - Appendices, Table E.1, p.82; Environmental Protection Agency

EPA, (2017). EPA *Revised Guidelines on the information to be contained in Environmental Impact Assessment Reports Draft;* (August 2017)*;* Environmental Protection Agency, Co. Wexford, Ireland

EPA, (2015). EPA *Advice Notes For preparing Environmental Impact Statements Draft*; (September 2015); Environmental Protection Agency, Co. Wexford, Ireland

EPA, (2017b). Environmental Protection Agency, Available on-line at: http://gis.epa.ie/Envision/

GSI, (2021). Geological Survey of Ireland; Available on-line at: http://www.gsi.ie

IFI, (2016). '*Guidelines on protection of fisheries during construction works in and adjacent to waters*'; Inland Fisheries Ireland, Ref. IFI/2016/1-4298

IGI, (2013). *Guidelines on the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*, (April 2013); Institute of Geologists of Ireland

LQM/CIEH (2015). *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham

NPWS, (2021). National Parks and Wildlife Service; Available on-line at: http://webgis.npws.ie/npwsviewer

NRA, (2009). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*; June 2009. National Roads Authority, Dublin, Ireland.

OSI (2021). Ordnance Survey of Ireland; Available online at: www.geohive.ie/mapviewer

3.0 WATER AND HYDROLOGY

3.1 INTRODUCTION

AWN Consulting Ltd (AWN) has prepared this section of the Environmental Report (ER) which assesses and evaluates the potential impacts of the proposed park development project on the hydrological aspects of the site and the surrounding area. Hydrogeological impacts are considered in *Section 2 - Land, Soils, Geology & Hydrogeology*.

In assessing likely potential and predicted impacts on the water environment, an account has been taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

The proposed development is for new park features in the Racecourse Park A more detailed description of the development is presented in *Section 1: Introduction.*

3.2 METHODOLOGY

The methodology for rating impacts complies with the EPA '*Guidelines on the information to be contained in Environmental Impact Assessment Reports'* Draft (2017).

The rating of potential environmental impacts on the water environment is based on the matrix for impact assessment presented within the 2017 draft guidelines. which considers the quality, significance, duration and type of impact characteristic identified. In the environmental report, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the activities on that cited attribute.

In addition, due significance is also given to the document entitled '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'* by the National Roads Authority (NRA, 2009) where appropriate. The NRA criteria for estimation of the impacts at the site from the proposed development during the EIA stage are summarised in Table 3.1 below.

Magnitude of Impact	Criteria	Typical Examples*
Large Adverse	Results in loss of attribute and/ or quality and integrity of attribute	*Loss or extensive change to a water body or water dependent habitat*
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	*Calculated risk of serious pollution incident >1% annually*[2]
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	*Increase in predicted peak flood level >10mm*[1]
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	*Negligible change in predicted peak flood level*[1]

Magnitude of Impact	Criteria	Typical Examples*
Minor Beneficial	Results in minor improvement of attribute quality	*Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually*[2]
Moderate Beneficial	Results in moderate improvement of attribute quality	*Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually*[2]
Major Beneficial	Results in major improvement of attribute quality	*Reduction in predicted peak flood level >100mm*[1]

Table 3.1 *Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on hydrology attributes (NRA, 2009)*

The NRA criteria for estimation of the importance of hydrological attributes at the site during the EIA stage are summarised in Table 3.2.

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 or national 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

Table 3.2 *Criteria for rating impact significance of hydrological attributes (NRA, 2009)*

All relevant data was compiled and collated by AWN Consulting & Waterman Moylan Engineering Consultants

The following sources of information were consulted:

- Current EPA on-line database – EPA Maps/Catchments.ie water quality monitoring data for watercourses in the area;
- National River Basin Management Plan (2018);
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie);
- Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council;
- 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001).
- Fingal Development Plan 2017-2023

The attributes (and impacts) to be assessed include *inter alia* the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from proposed development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

3.2.1 Characteristics of the Proposed Development

The characteristics of the proposed development which specifically relate to surface water are summarised below:

- landscaping and construction of the park will reslt in water high in suspended solids during construction works if not adequately mitigated.
- A slight increase in hardstanding with the construction of a car park, bikeways and walking paths.
- Management of drainage from the proposed park development once constructed.
- The construction of new cycle and pedestrian bridge over the Mayne river to the west of the site.

3.3 THE RECEIVING ENVIRONMENT

3.3.1 Hydrology

The proposed development is located within the previously defined Eastern River Basin District (ERBD), now the Ireland River Basin District, in Hydrometric Area No. 09 of the Irish River Network. It is within the River Liffey catchment. The River Liffey catchment encompasses an area of approximately 1,369 km^2. The river extends from the mountains of Kippure and Tonduff in County Wicklow to the sea at Dublin Bay. The main channel covers a distance of approximately 120 km west to east. Maynetown Stream (EPA designation) appears to raise within the proposed parkland site flowing south to north. The Snugborough rises further south and is culverted between Seagrange park and the Red Arches road. Both join the Mayne and then enter Baldoyle Bay.

Figure 3.1. Site location showing local surface water drainage (EPA, 2021)

The Sluice River is located to the north of the site and enters Baldoyle Bay to the north of the proposed parkland site. It is proposed to incorporate the existing Mayne River and its tributaries within a wildlife area as part of the overall development. There will be no change to any surface water feature's course current directional of volumetric flow.

The Baldoyle Bay SAC (000199) is located directly to the east of the proposed parkland site with the North Dublin Bay SAC located circa 1km to the south (000206). Nearby protected sites are discussed further in *Section 4 Ecological Impact Assessment*

3.3.2 Surface Water Quality

The proposed development is located within the former ERBD (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the

Water Framework Directive (WFD). It is situated in Hydrometric Area No. 09 of the Irish River Network. It is located within the Liffey & Dublin Bay catchment.

The WFD requires *'Good Water Status'* for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both *'Good Ecological Status'* and *'Good Chemical Status'.* In 2009 the ERBD River Management Plan (RMP) 2009-2015 was published. In the ERBD RMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle river basin management plan for Ireland is currently in place and will run between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD).

This second-cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). In more general terms, three key lessons have emerged from the first cycle and the public consultation processes. These lessons have been firmly integrated into the development of the second-cycle Plan. Firstly, the structure of multiple RBDs did not prove effective, either in terms of developing the plans efficiently or in terms of implementing those plans. Secondly, the governance and delivery structures in place for the first cycle were not as effective as expected. Thirdly, the targets set were too ambitious and were not grounded on a sufficiently developed evidence base. The second cycle RBMP has been developed to address these points.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011).

Figure 3.2 below presents the EPA quality monitoring points in the context of the site and other regional drainage settings.

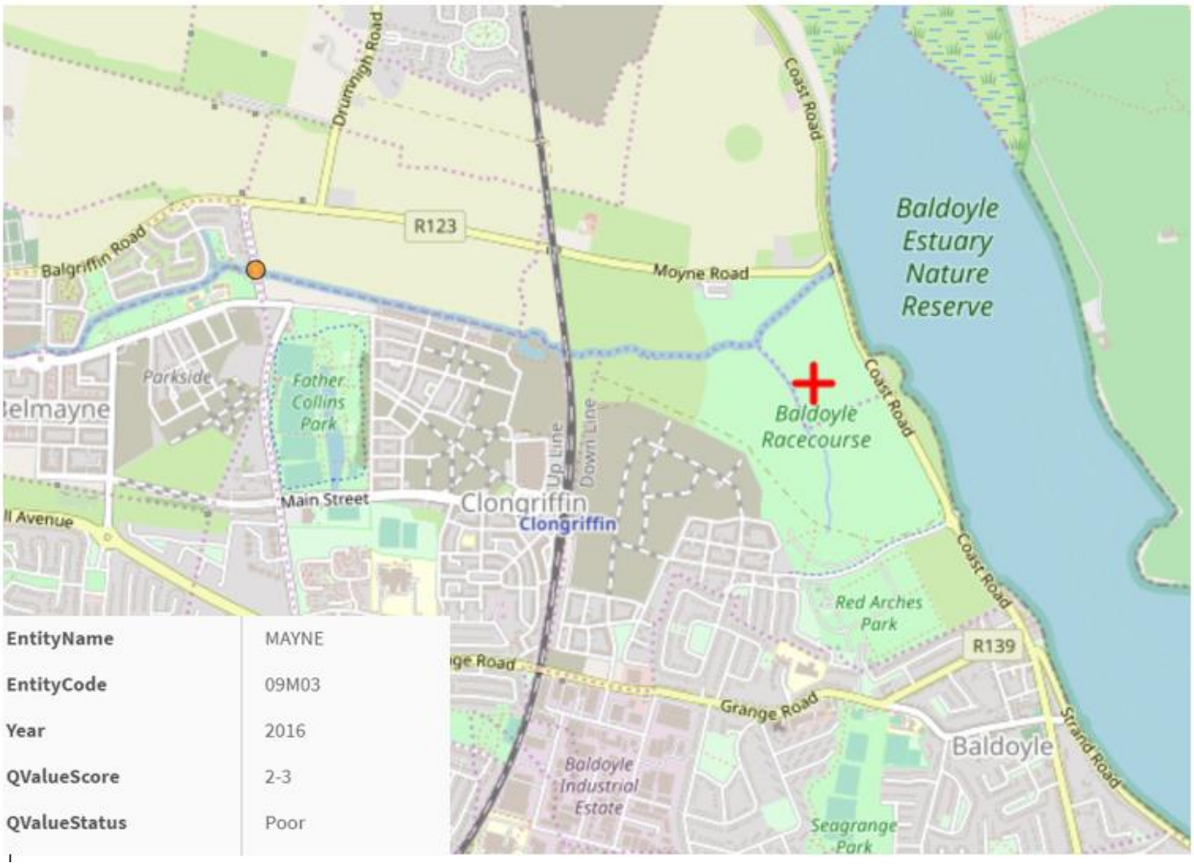


Figure 3.2 *Surface Water Quality Station RS09M030500 Hole-in-the-wall Road Bridge (orange dot) Site is highlighted with a red cross (EPA, 2021)*

Surface water quality is monitored periodically by the EPA at various regional locations along principal and other smaller watercourses. With reference to the site setting, the nearest EPA monitoring station is situated upstream at the Hole-In-Wall Bridge to the west of the site. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality. The surface water quality data for the nearest monitoring station to the proposed parkland site (upstream) for the Mayne shows a Q rating of 2-3 denoting a poor (moderately polluted status) as shown in Figure 3.2.

In accordance with the WFD, each river catchment within the former ERBD was assessed by the EPA and a water management plan detailing the programme of measures was put in place for each. Currently, the EPA classifies the WFD Ecological Status for the Mayne waterbody as having '*Poor Status'* (1st Cycle Status 2010-2015) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status'.* Figure 3.3 presents the river waterbody risk EPA map.

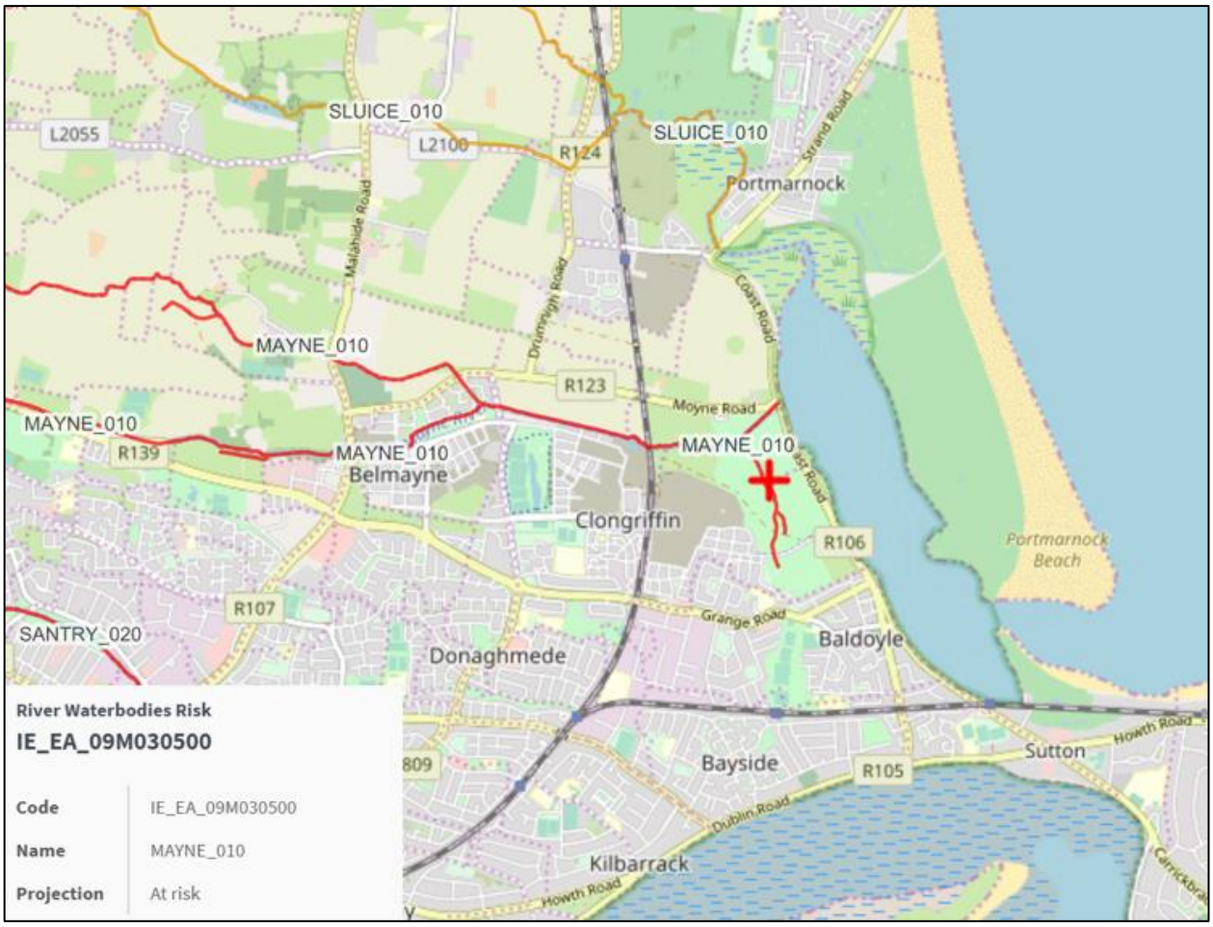


Figure 3.3 River Waterbody Score - 1a 'At risk of not achieving good status, WFD Ecological Status: Poor. (Site location indicated with red cross).

The WFD risk score for the Sluice is under review. This may be due to a lack of information being available to correctly categorise the water body by the EPA or that additional information is required to suitable categorise this river.

The current WFD risk score for the Baldoyle Bay (Mayne Estuary) is also under review. This waterbody was not assigned a "Transitional Waterbody Status" during the first phase WFD programme (2013-2018). However, The Irish Sea Dublin (HA 09) and Dublin Bay coastal water bodes which border Baldoyle Bay are categorised as currently "Not at Risk".

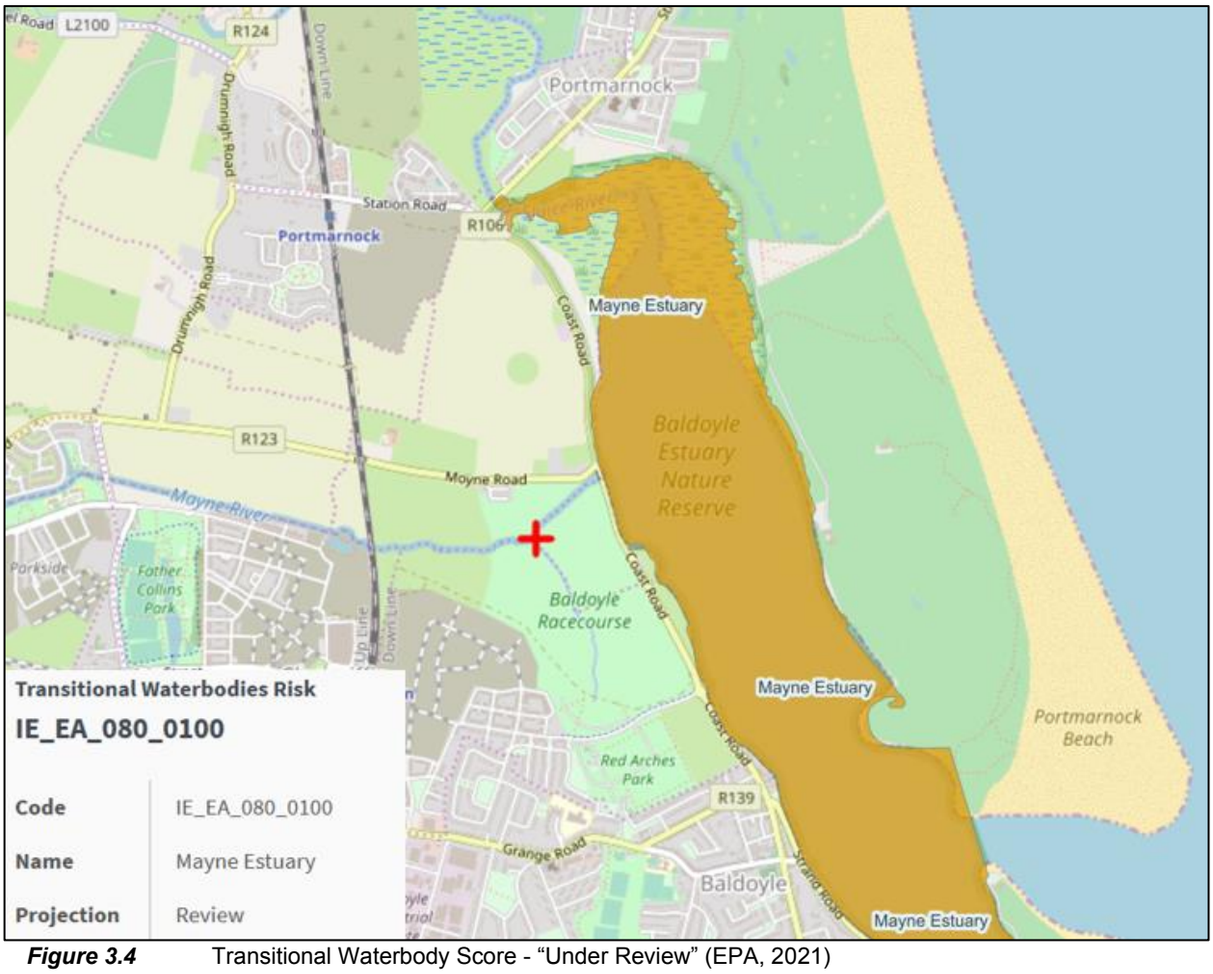


Figure 3.4 Transitional Waterbody Score - "Under Review" (EPA, 2021)

3.3.3 Surface/Stormwater drainage

The majority of the current and proposed Baldoyle Racecourse Park area is drained into the Mayne and its two smaller tributaries. All natural drainage enters the Mayne and subsequently Baldoyle Bay.

Run-off from the proposed site currently drains to the existing drainage channel/ ditches located within and around the site. There is a network of existing surface water sewers located throughout and on the roads located in and around the site currently. It is proposed to remove 25 metres of surface water outfall pipe and redevelop that area as a reedbed located towards the centre of the site. The existing outfall pipe of 1.3 m internal diameter is to be excavated out and disposed of, off site over a length of 25 m. The land around will be recontoured, using the existing contours as guide such that a greater area will be below the 1.5 m OD contour thus encouraging a more expansive area of reeds. The land to the north side of the Mayne will also be recontoured similarly respecting the existing contours as much as possible and working with them to form a reduced level area of brackish grassland (See project engineers Cora's drawing (C501) with the aim to improve the quality of the surface water discharging into the Mayne river

3.3.4 Rating of Site Importance of Hydrological Features

Based on the NRA methodology (refer to Tables 3.1 & 3.2), the criteria for rating the importance of hydrological features, the importance of the hydrological features at this site is rated as ***Very High Importance.*** This is based on the assessment that the Attribute has a high quality or value on a regional or national scale. Within the parkland site is a River/ wetland or surface water body ecosystem protected by national legislation – the Baldoyle Bay SAC.

3.4 Surface Water Flooding/Flood Risk Assessment

Flood risk assessments are to be undertaken in accordance with the guidelines produced by the Department of the Environment, Heritage and Local Government (DoEHLG) - The Planning System and Flood Risk Management - Guidelines for Planning Authorities (2009)[1], hereafter referred to as the FRM Guidelines.

As per the FRM Guidelines a tiered approach has been taken. This usually begins with a Stage 1 Assessment which aims to quantify the risk posed to the development and to the surrounding environment. The main aim of this FRA is to determine the effect any landfilling will have on the floodplain, upstream and downstream levels and any mitigation measures necessary.

This hierarchy of assessment ensures that flood risk is taken into account at all levels of the planning system but also that the right level of detail is considered, avoiding the need for detailed and costly assessments prior to making strategic decisions.

In terms of the FRA and Management Study the scope of works incorporates three stages:

- ***Stage 1: Flood Risk Identification -*** to identify whether there may be any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation.

- ***Stage 2: Initial Flood Risk Assessment -*** to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. The extent of the risk of flooding should be assessed which may involve preparing indicative flood zone maps. Where existing river or coastal models exist, these should be used broadly to assess the extent of the risk of flooding and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures; and

- ***Stage 3: Detailed Flood Risk Assessment -*** to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model of the river or coastal cell across a wide enough area to appreciate the catchment-wide impacts and hydrological processes involved.

As described in the FRM Guidelines, flood risk is a combination of the likelihood of flooding and the potential consequences arising, and is normally expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

Likelihood of flooding is normally expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A

1% probability indicates the flood level that is expected to be reached on average once in 100 years, i.e. it has a 1% chance of occurring in any one year. Therefore:

- 100-year flood = 1% Annual Exceedance Probability (AEP);
- 1000-year flood = 0.1% AEP.

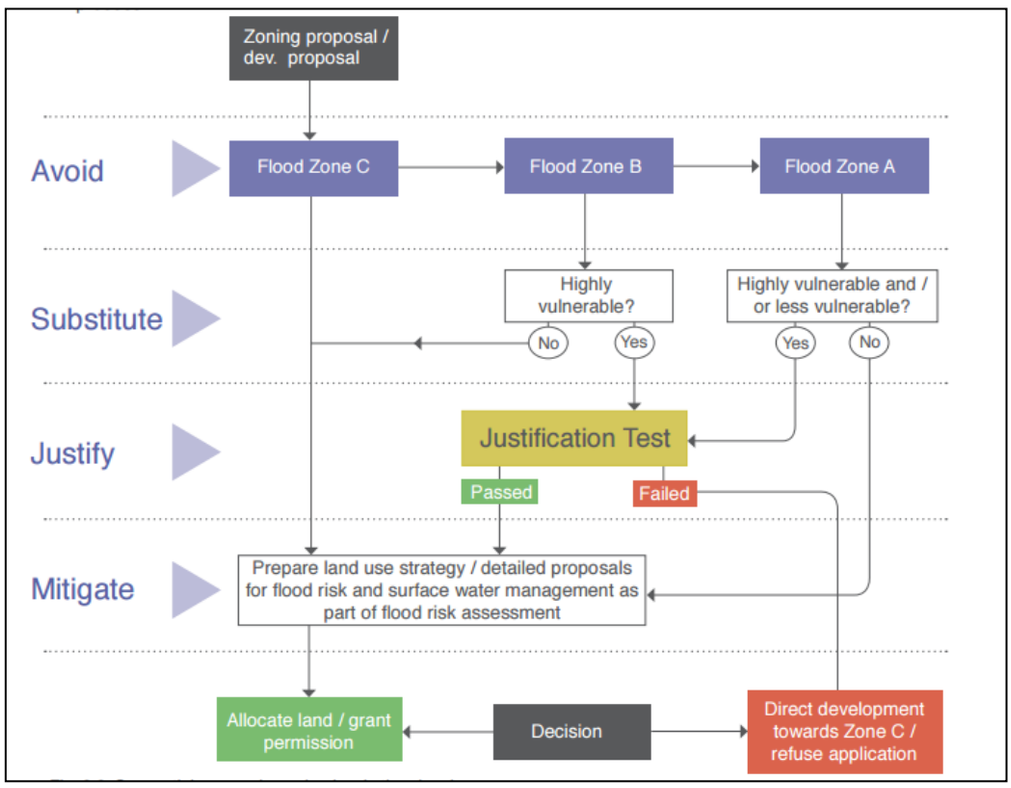
In the FRM Guidelines, the likelihood of a flood occurring is established through the identification of Flood Zones which indicate a high, moderate or low risk of flooding from fluvial or tidal sources, as defined as follows:

- *Flood Zone A* - Where the probability of flooding is highest (greater than 1% AEP or 1 in 100 for river flooding and 0.5% AEP or 1 in 200 for coastal flooding) and where a wide range of receptors would be vulnerable;

- *Flood Zone B* - Where the probability of flooding is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 for coastal flooding); and

- *Flood Zone C* - Where the probability of flooding is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding).

Potential impacts of the proposed parkland were considered within the study area. This is defined as the area within the proposed development site boundary (i.e. the proposed development site); and the wider hydrological setting of the area. A sequential approach was undertaken for this risk assessment under guidance from the local planning authorities (2009). Specifically, a sequential approach is first and foremost directed towards land that is at low risk of flooding. The underpinning philosophy of the sequential approach is highlighted in the illustration below. Based on the OPW online mapping tools, parts of the proposed parkland site resides in Flood Zone A (subject to fluvial and coastal flood risk).



Insert 1 Sequential approach mechanism in the planning process

Under the sequential approach and within section 3.5 under the FRM guidelines (2009) any building that is used for: "Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms" has a vulnerability class "Water Compatible Development" (see Table 3.3 below). Given the nature of the proposed development i.e. parkland with minimum modification to the present state, it is therefore regarded as being a 'Water Compatible Development' and is appropriate for a development which resides in **Flood Zone A**

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Table 3.3 Classification of the vulnerability class of different types of developments.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.4 Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

3.4.1 Existing Flood Records & CFRAM Data

Historical flood data was reviewed for the area. Existing reports and any other previous assessments (including any assessments carried out by the OPW was reviewed). The Baldoyle Racecourse has been subject to fluvial and coastal/estuarine flooding events particularly along the coast road to the east and where the Mayne enters Baldoyle Bay (see Figure 3.5).

Figure 3.5 Locations of previous flood events at Baldoyle. Approximate site outline in red (OPW, 2021)

3.4.2 Catchment Flood Risk Assessment and Management (CFRAM) Mapping

The EU Floods Directive (2007/60/EC) required the Member States to undertake a national preliminary flood risk assessment by 2011 to identify areas where significant flood risk exists or might be considered likely to occur. Members States were also required to prepare catchment-based Flood Risk Management Plans by 2015 that would set out flood risk management objectives, actions and measures. The OPW, in co-operation with various Local Authorities have produced a large number of CFRAMs. These CFRAMs aim to map out current and possible future flood risk areas and develop risk assessment plans. They will also identify possible structural and non-structural measures to improve the flood risk of the area. The OPW have now made the data collected during these studies available through online mapping tools.

The OPW flood maps indicate the Baldoyle Racecourse Park site is at risk from a medium probability coastal (tidal) flood event. Medium Probability flood events have approximately a 1-in-a-200 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 0.5% (see Figure 3.6).

The flood maps also indicate the park area is at risk from a high probability of fluvial (river) flooding. High Probability flood events have approximately a 1-in-a-10 chance of occurring or

being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 10% (see Figure 3.7).

Rainfall flooding is referred to as Pluvial flooding in the Maps and Plans. This type of flooding results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer, and can be resolved by providing or improving drainage

Low Probability flood events have an indicative 1-in-a-200 chance (Dublin) or 1-in-a-1000 (Raphoe, Co. Donegal) of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 0.5% or 0.1%.

OPW pluvial flood maps model the present-day scenario. The Present-Day scenario is referred to as the Current Scenario in the Maps and Plans. The Present-Day maps were generated using methodologies based on historic flood data, without taking account of potential changes due to climate change. The potential effects of climate change have been separately modelled and reported on. OPW flood maps are included in Appendix 3.1.

The pluvial maps for the proposed development site show there are a number of nodes of possible modelled rainfall this is similar to the greater Dublin area and rages from low to high extents.

Based on the presence of >10m of overburden throughout the majority of the site (discussed in Section 2) there is no indication that the site is subject to groundwater flooding.

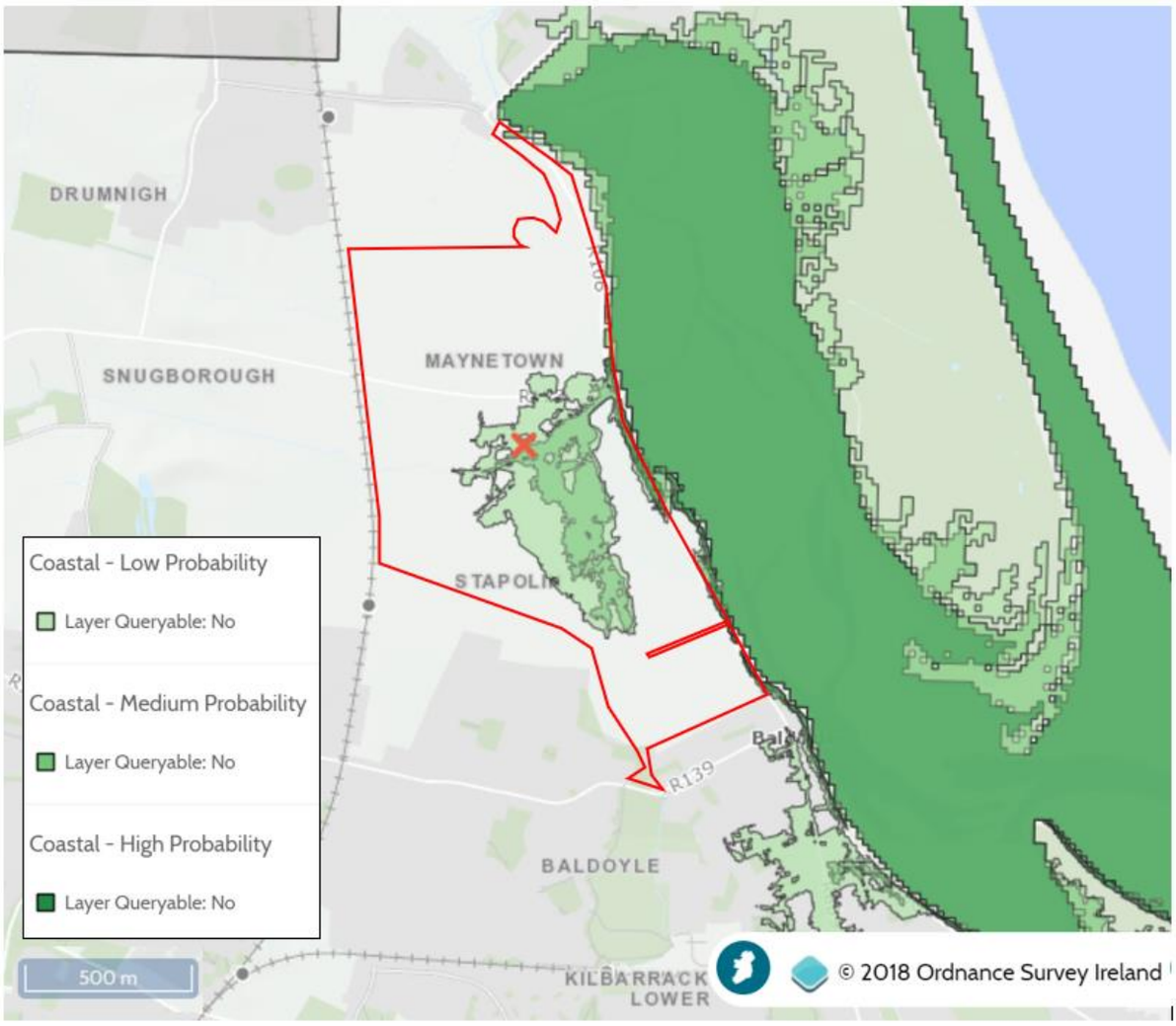


Figure 3.6 Costal Flood Extents. Approximate site outline in red (OPW, 2021)

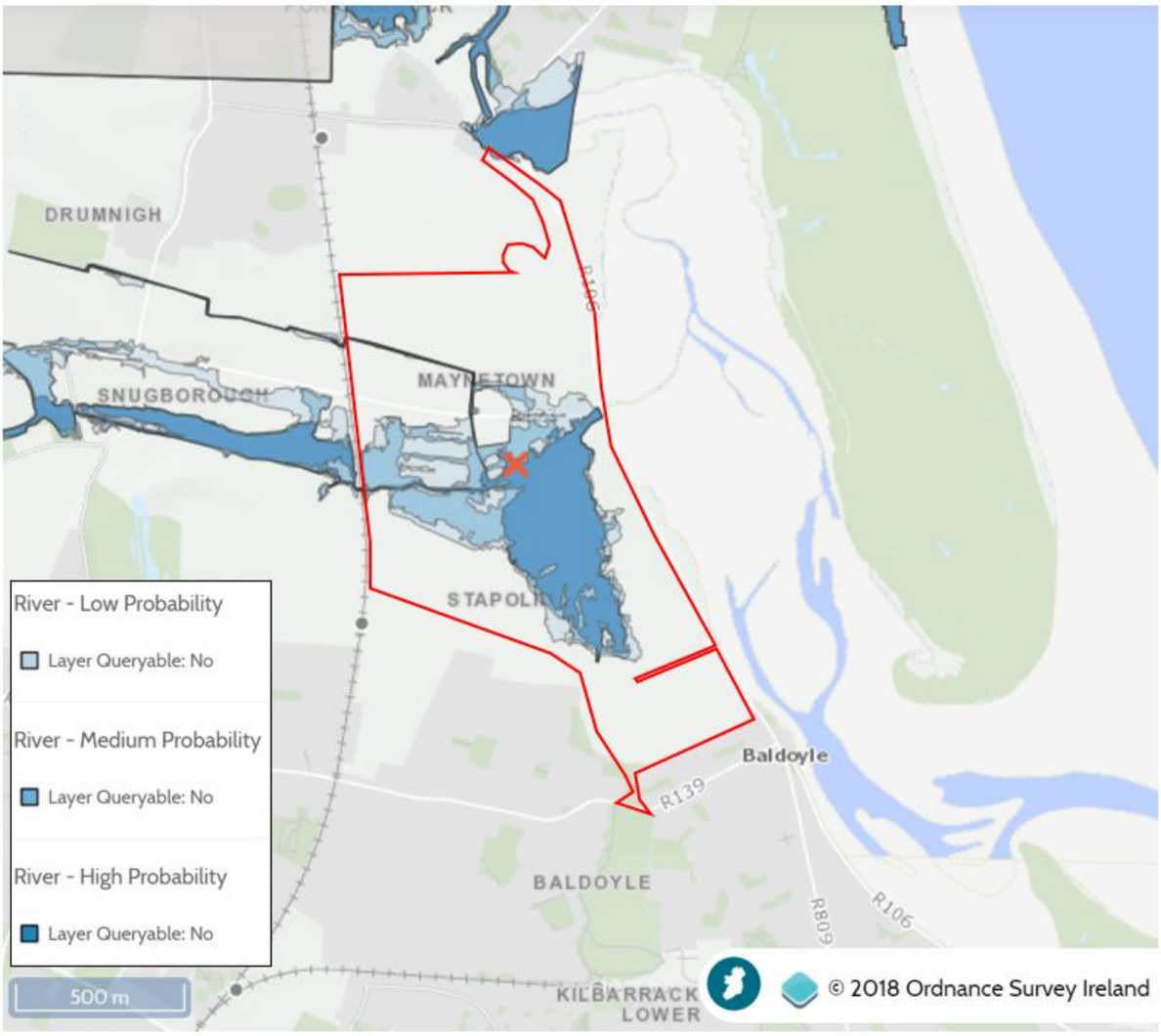


Figure 3.7 River Flood Extents. Approximate site outline in red (OPW 2021)

3.4.3 Existing Drainage and Flooding Management.

Two large attenuation ponds are present in the park and received surface water from adjacent developments. One at the northern end will provide surface water attenuation for the development lands within the Portmarnock LAP. The pond in the centre of the park provides attenuation for the new phases of development within the Stapolin LAP. There will be no additional risk to any nearby residential properties due to the parkland development.

It is proposed to put pedestrian/ cycle bridge as part of the wider parkland development. JBA Consulting undertook an assessment of a new bridge (5.00m long, soffit 4.26mOD) and flood relief culverts (2.00m wide, 1.00m high, and 5.00m long) under the Section 50 Arterial Drainage Act (1945) for the site (see JBA report 2019s0993 provided as a separate report to this application). An existing bridge structure is located 5.00 m upstream of the proposed structure location but is has not undergone Section 50 assessment and was not considered in the analysis. The location of the proposed bridge can be seen in Figure 3.8. Following the development of a 1D hydraulic flood model it was concluded that the bridge culvert satisfies the requirements of Section 50 being able to safely convey the peak design flows and not increase flood risk.

As can be seen above parts of the Baldoyle Racecourse Park is at risk of fluvial, coastal and pluvial flooding. The proposed park will not change the current hydrological regime and will

have an overall positive impact by the use of additional contouring and wetland areas. There will be no additional flood risk to the park and its surrounding lands.

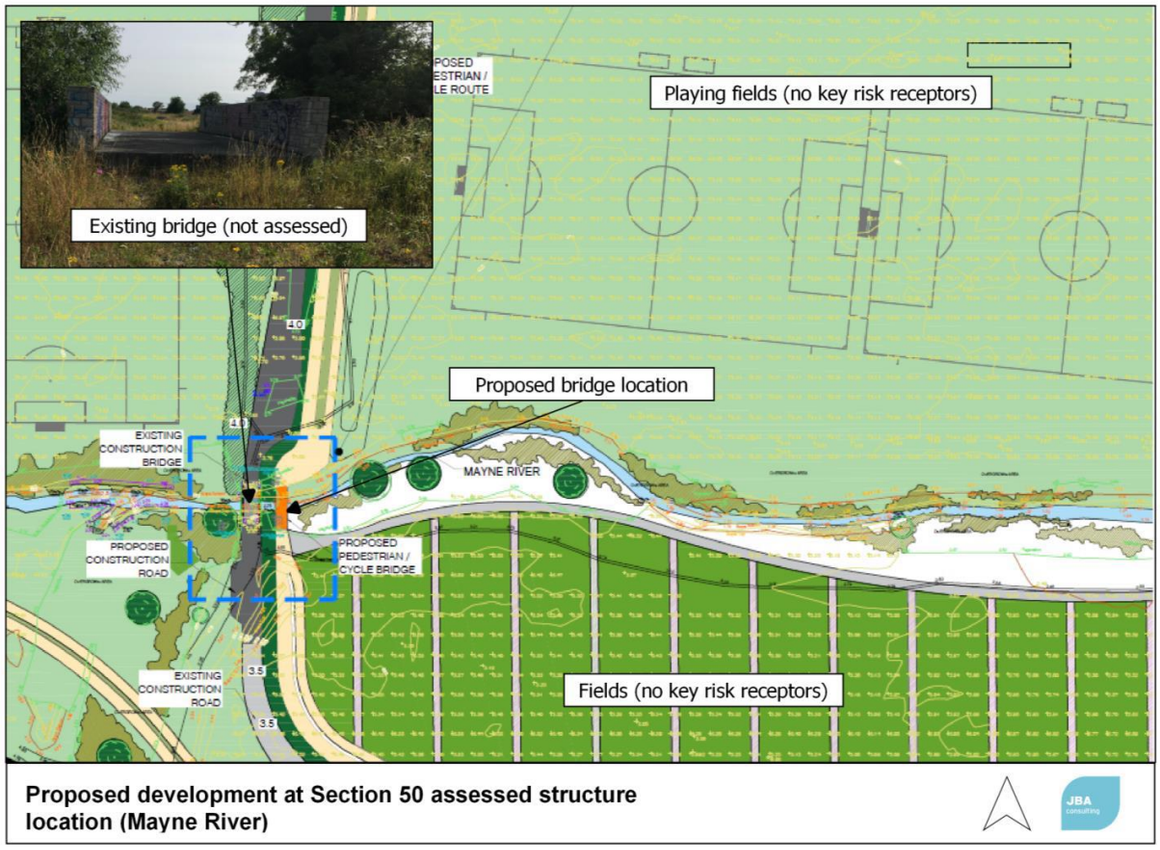


Figure 3.8 Proposed bridge location (JBA 2020)

3.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The potential impacts to the hydrological environment due to the development of the Racecourse Park if not adequately mitigated are outlined below:

3.5.1 Construction Stage

Sediment within run-off:
Surface water runoff during the construction phase may contain increased silt levels from construction activities. Silt water can arise from exposed ground, stockpiles and access roads. Runoff containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise for stockpiles and access roads.

Contamination of Local Watercourses*:*
Machinery on site during the construction phase may result in contamination of run-off water. The potential impacts could derive from accidental spillage of fuels, oils, paints and solvents, which could impact surface water quality if allowed to infiltrate to runoff to surface water systems and/or receiving watercourses.

Concrete operations carried out near surface water bodies during construction of the pedestrian. Cycle bridge activities could lead to a discharge of wastewaters to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora.

3.5.2 Operational Stage

Local Increase in run-off rate
The proposed development works will entail minimum soil distribution and soil reprofiling of the current greenfield area. The proposed park will primarily be green permeable with minor areas of permeable hardstand which include footpaths and a 146 no. car parking spaces. However, as all run-off will be discharged to ground and the Mayne River (which is being maintained as part of the proposed development) as it is at present.

Foul Water:

There will be no foul water created as part of this proposal.

3.6 REMEDIAL AND MITIGATION MEASURES

The following is an outline of the mitigation measures proposed to address the potential impacts outlined in section 2.5 above. Measure listed in section 4.7.3 of Section 4: Biodiversity should also be applied to reduce the impact on surface water features at the site.

The aim is to ensure good site management to avoid silt laden run-off, increased run-off due to soil compaction and hardstand and contamination of water due to accidental release of hydrocarbons. The site will operate in compliance with Fingal Development Plan (FCC, 2017-2023) and the following section outlines the site specific current and planned mitigation measures:

3.6.1 Construction Stage

Management of Run-off Quality
The Baldoyle Racecourse Park site is primarily drained by the Mayne River and its tributaries. Existing stormwater runoff & drainage is addressed in section 3.3.2 above. Temporary stockpiles will be managed to minimise silt laden run-off entering water courses including drainage during the works. Stockpiles will be graded and compacted to minimise creep and encourage rainfall run-off without ponding. Temporary stockpiles will be kept to below 2m insofar as is possible. The project schedule will ensure that landscaped areas are seeded as soon as is practically possible to reduce sediment run-off. Silt traps and other protective measures will be employed along the Mayne River during construction.

Oils, solvents, paints and fuels used during construction will be stored within temporary bunded areas/or suitable containment and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30 mm for rainwater ingress). Filling and draw-off points will be located entirely within the bunded area(s). Drainage from the bunded area(s) will be diverted for collection and safe disposal.

Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles/ equipment will take place in designated bunded areas where possible. Re-fuelling will take place within appropriately bunded areas at a designated distance away from watercourses (>10m). This is in accordance with the buffer zone guidelines set out by the Department of the Marine and Natural Recourses.

If it is not possible to bring a machine to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. The vehicles and equipment will not be left unattended during refuelling. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators will be fully trained in the use of this equipment.

Wet concrete operations adjacent to surface gullies and drains will be avoided where possible. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated stormwater to groundwater.

3.6.2 Operational Stage

Surface Water Management

Modification of the current park area green field will be kept to a minimum. There will be no overall change to the hydrological regime. Greenfield runoff rates will be maintained as current. There will be no major modifications to the surface water drainage through the proposed Parkland site.

Any surface run off from outer roads and footpaths around the periphery of the park will drain by gravity into the current gullies on surrounding roads and into the surface water pipe towards Baldoyle Bay. The grass playing pitches are graded (1:100) across their diagonal with surface water draining to the side and recharging to ground as it is currently. The development of Baldoyle Racecourse Park will not increase the runoff rates from the site or increase the risk of flooding to surrounding properties as the permeable surface area will be largely similar to before development. The increase in hard standing for the carparks and skatepark to will be a small percentage of the overall development and has been designed with permeable parking bays.

The proposed surface water drainage system for Baldoyle Racecourse Park will primarily be via soakaways, permeable paving, soakage trenches to the sides of the carparking area and drainage to ground to the side of the pedestrian foot/ cycle paths.

3.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section describes the predicted impact of the proposed development following the implementation of the remedial and mitigation measures.

3.7.1 Construction Phase

The implementation of mitigation measures highlighted in Section 3.5.1 will ensure that the potential impacts on the surface water environment do not occur during the construction phase and that the predicted impact will be ***short-term-imperceptible-neutral***.

3.8 Operational Phase

The implementation of mitigation measures highlighted in Section 3.5.2 will ensure that the potential impacts on the surface water environment do not occur during the operational phase and that the predicted impact will be ***long-term-imperceptible- neutral.***

3.9 RESIDUAL IMPACTS

There will be no residual impact from the proposed development.

There are no likely significant impacts on the local or regional hydrological environment associated with the proposed development of the Parkland Site. It is not anticipated that any impacts will arise following the implementation of the mitigation measures discussed above. As such the impact (EPA 2017) is considered to have a long term-imperceptible significance.

The proposed redevelopment is included in its Local and Green Infrastructure Objectives as part of Fingal County Councils Development Plan 2017-2023.

3.10 REFERENCES

CIRIA, (2001). 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, January 2001)

CIRIA, (2005). 'Environmental Good Practice on Site' (C650). London: Construction Industry Research and Information Association (CIRIA) (Connolly S. and Charles P.)

CIRIA, (2007). 'The SUDS Manual'. London: Construction Industry Research and Information Association, CIRIA reference C697

CIRIA, (2011). Environmental good practice on site; Construction Industry Research and Information Association publication C692 (3rd Edition - an update of C650 (2005); (I. Audus, P. Charles and S. Evans)

CIRIA, (2012). Environmental good practice on site –pocketbook; Construction Industry Research and Information Association publication C715 (P. Charles, and G. Wadams)

DCC, (2005). Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council.

DoEHLG, (2009). 'Consultation Guidelines for Planning Authorities by the DoEHLG, The Planning System and Flood Risk Management'; November 2009

EA, (2004) 'UK Pollution Prevention Guidelines' (PPG), Environment Agency, UK

EPA, (2017). EPA 'Guidelines on the information to be contained in Environmental Impact Assessment Reports Draft'; Environmental Protection Agency, Co. Wexford, Ireland

EPA, (2015). EPA 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements Draft'; Environmental Protection Agency, Co. Wexford, Ireland

EPA, (2002). EPA 'Guidelines on the information to be contained in Environmental Impact Statements'; Environmental Protection Agency, Co. Wexford, Ireland

EPA, (2003). EPA 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements'; Environmental Protection Agency, Co. Wexford, Ireland

EPA, (2009). Water Framework Directive Monitoring Programme, Environmental Protection Agency

EPA, (2021). Environmental Protection Agency; [Available on-line at: www.epa.ie/maps

ERBD, (2004). 'Requirements for the Protection of Fisheries Habitats during Construction and Development Works at River Sites'. Dublin: Eastern Regional Fisheries Board.

Fingal County Council Development Plan 2017-2023

Inland Fisheries Ireland (2016) '*Guidelines on protection of fisheries during construction works in and adjacent to waters*.

JBA Consulting (2020) Baldoyle Section 50 - Mayne River Assessment 2019s0993

OPW, (2021). Office of Public Works; [Available on-line at www.floodmaps.ie]

OPW, (2009) '*The Planning System and Flood Risk Management Guidelines for Planning Authorities'*

Roughan & O'Donovan (2018) '*Flap Valve Management Programme for the reestablishment of Brackish habitats and Fish in the Mayne River, Baldoyle, Co. Dublin. Final Report, December 2018*'

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

4.0 ECOLOGY/ BIODIVERSITY

4.1 SUMMARY

Scott Cawley Ltd. was commissioned by Bernard Seymour Landscape Architects (BSLA), on behalf of Fingal County Council, to undertake an Ecological Impact Assessment (EcIA) for the proposed Parkland Development.

This Ecological Impact Assessment (EcIA) should be read in conjunction with other documents contained within the planning application, in particular the Natura Impact Statement (NIS) which Scott Cawley Ltd. have also prepared. The purpose of the EcIA is to establish the ecological baseline within the subject lands, evaluate the ecological features present and assess the potential impacts resulting from the proposed development. Following on from this, it is the purpose of the EcIA to recommend measures to address impacts and comply with relevant ecological legislation and policies. A summary of the impacts and mitigation measures is provided here.

4.2 Ecology Impacts and Mitigation

- **European sites-**
  - Potential displacement impact of migratory birds (e.g. brent geese) from ex-situ inland feeding site
  - Construction Related Disturbance Impacts on Light-bellied Brent Geese using Ex-situ Inland Feeding Sites
  - Construction Related Surface Water Discharges
  - Construction Related Spread of Invasive Species Material
  - Operation Related Disturbance Impacts on Light-bellied Brent Geese

4.3 Mitigation for European Sites

4.3.1 Mitigation for construction related disturbance:

- Construction activities associated with the proposed car park at Red Arches playing pitches will be restricted to the period May- August (inclusive) so as to avoid construction related disturbance to foraging geese (which are only winter visitors).

- Likewise, construction activities associated with the proposed skate park in the area of amenity grassland to the north of Red Arches Road will be restricted to the period May-August (inclusive).

- If the above measures cannot be complied with, due to an incompatible project program, then a visual screen will be erected around the perimeter of construction works on the pitches or amenity grassland area, to avoid visual disturbance to foraging geese.

4.3.2 Mitigation regarding protection of surface waters during construction

The construction contractor will be required to implement the following specific mitigation measures, for release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters control:

- Specific measures to prevent the release of sediment over baseline conditions to the Mayne River, Snugborough River, Maynetown Stream and Snugborough Stream (and subsequently Baldoyle Bay) during the construction work, which will be implemented

as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. This is particularly important when undertaking any works/upgrading to the surface and foul water drainage networks at the proposed development site.

- Provision of exclusion zones and barriers (*e.g.* silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing into any of the watercourses on site and/or existing drainage systems and hence the downstream receiving water environment.
- Silt traps will not be constructed immediately adjacent to the existing watercourses, *i.e.* a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terram, straw bales, coarse to fine gravel will be used either separately or in-combination as appropriate to remove suspended matter from discharges.
- Provision of temporary construction surface drainage and sediment control measures to be in place before the construction of any pipeline and/or earthworks commence.
- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the site.
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to any of the watercourses on site and/or surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to any watercourses or existing surface water drainage systems. Concrete washout areas will be located remote from any watercourses or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses.
- Any fuels or chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area to prevent any seepage of same into any of the watercourses, local surface water network or groundwater, and care and attention will be taken during refuelling and maintenance operations.
- Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams. Works where this may be applicable include the removal of the existing outfall and creation of extended reed bed area in the vicinity of the River Snugborough; the creation of brackish grassland habitat to the north of the River Mayne; and; the installation of culverts in drainage ditches to the north of the construction road and cycle path.
- All containment and treatment facilities will be regularly inspected and maintained.
- All mobile fuel bowsers will carry a skill kit and operatives must have spill response training. All fuel containing equipment such as portable generators will be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked.
- Implementation of response measures to potential pollution incidents.
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- Water supplies shall be recycled for use in the wheel wash. All waters will be drained through appropriate filter material prior to discharge from the construction sites.
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility will be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase.

- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).

In addition to the above, the following measure will also be applied:

- Any works in close proximity to watercourses will be restricted to taking place during the summer period only (May- August (inclusive)), when weather is drier. This is to avoid sediment and other harmful materials being transferred to watercourses, and subsequently to downstream European sites, by precipitation and surface waters flowing overland. In addition, this measure will help to ensure the early re-colonisation of any cleared areas by opportunistic plants, which will help to bind soil together and prevent any further transfer of sediment. Proposed pond/pool creation works and preparatory works for proposed playing pitches to the north of the River Mayne (e.g. vegetation clearance and regrading) will abide by this measure.

4.3.3 Mitigation re invasive species

- Prior to any works commencing on site any areas of invasive species will be clearly demarcated and an exclusion zone around these areas will be established.
- All contractors on site will be given a toolbox talk in relation to the invasive species present on site and the biosecurity risks associated with them. Biosecurity protocols/procedures to be employed while working on site will be clearly conveyed to all contractors in advance of any works commencing.
- All invasive species listed on the Third Schedule of the Birds and Natural Habitats Regulations (2011), will be eradicated prior to any other works commencing in affected areas.
- An Invasive Species Management Plan (ISMP) will be prepared to inform the contractor on how to deal with invasive species within the construction site. The ISMP will clearly outline the control methods to be employed for each Third Schedule invasive species recorded on site. A suitably qualified contractor, with experience in dealing with invasive species, will be employed to execute the ISMP. This ISMP will be lodged with the relevant authority.
- The site will be monitored for the presence of invasive species for a period of 3 years post development. Any subsequent regrowth of invasive species will be treated accordingly by a suitably qualified contractor, following best guidance.

4.3.4 Mitigation re operational disturbance to wintering birds

- The proposed car park in the northernmost part of the existing playing pitches at Red Arches, has been designed so as to lead visitors from the car park to a designated entrance to the playing pitches, located to the south-west of the proposed car park. This is to ensure that people use a defined entrance as opposed to simply running onto the pitches from any location in the car park. Furthermore, screen planting and fencing has been provided around the perimeter of the car park to ensure that loose dogs cannot simply run onto the pitches from the car park.

- The playing pitches and potentially the other areas in the wider park which are to be managed for geese will be zoned as “dog-free” for the winter bird season (September – April) and signs will be erected to convey this message to the public. These signs will also act as a means of public education to describe how disturbance such as loose dogs can impact geese.

- It will be park policy that all dogs must be kept on a lead at all times while in the park, with the exception of the dog park. This will be implemented by a by-law (see Fingal County Council's *Regional Parks & Open Spaces Bye-Laws 2017* (Fingal County Council, 2017a) for details) and enforced by Fingal County Council Park Rangers who will monitor the park.

4.4 Impacts on Habitats

- Habitats (impacts assessed for key ecological receptors only)
  - Accidental damage to retained trees during construction
  - Potential for pollution of watercourses (e.g. construction of bridge over River Mayne) and excavation/ regrading works in close proximity to watercourses
  - Provision of construction compounds and associated habitat loss is not considered significant given habitats affected and relative abundance of these across the site as well as landscaping proposals and the temporary nature of any such impact
  - Habitat loss of dry meadows and grass verges habitats as a result of expansion of reed bed habitat, creation of string of ponds to east of River Snugborough, provision of playing pitches to the south of the Moyne Road, installation of proposed viewpoint and intermittent wildflower meadow planting.

- Positive impacts for habitats include:
  - Wetland planting is proposed for both existing attenuation ponds on site, which will increase biodiversity in these areas and possibly provide additional foraging resources for bats and pollinators on site, as well as additional breeding habitat for some bird species.
  - The proposed intermittent areas of wildflower meadow will also provide a valuable resource for pollinators on site
  - Riparian planting is proposed along some stretches of the existing watercourses on site. This planting will increase biodiversity in these areas, which will benefit invertebrates such as damselflies and dragonflies.
  - Enhancement of wet grassland habitat through riparian planting
  - Improvements to the banks of existing watercourses are proposed in particular locations. These improvements will be achieved through tree planting to stabilise the banks and thus prevent sediment loss to the river.

4.4.1 Mitigation for Impacts on Habitats

- **HAB01:** In order to protect existing hedgerows from accidental damage during construction (e.g. during the construction of the pathway network), all hedgerows which are to be retained should be afforded a buffer of 5m within which machinery etc cannot enter. This is to retain the ecological value the hedgerows on site provide. This buffer should clearly be demarcated before works commence and a toolbox talk explaining the significance of the hedgerow buffer should be given to all personnel prior to works commencing.
- **HAB02:** Riparian planting should grade into the existing adjacent habitats, which currently line the banks of the watercourses on site, to create a more natural habitat transition.
- **HAB03:** Inland Fisheries Ireland (IFI) should be consulted prior to any works to any of the watercourses on site, including proposed river crossings and bank improvement

works. This is particularly relevant for the proposed bridge over the River Mayne as well as the proposed reedbed expansion works and regrading works along the River Mayne and River Snugborough.

- **HAB04:** To control dust emissions during construction works standard mitigation measures shall include: spraying of exposed earthwork activities and site haul roads during dry and/or windy conditions; provision of wheel washes at exit points; control of vehicle speeds and speed restrictions (20 km/h on any un-surfaced site road); covering of haulage vehicles; and, sweeping of hard surface roads. These procedures will be strictly monitored and assessed on a daily basis. Dust screens will be implemented at locations where there is the potential for air quality impacts on sensitive ecological receptors (i.e. within 100m of the works), such as the watercourses on site, during the construction phase.

4.5 Impacts on Water quality

- Accidental pollution event during construction (i.e. through the release of sediment/ hydrocarbons or other harmful substances directly into these watercourses), or over land runoff. These impacts are most likely to occur during works in the vicinity of these watercourses (e.g. installation of culverts into existing drainage ditches, installation of the proposed new bridge over the River Mayne, creation of additional ponds, works to enable riparian planting etc.)

4.5.1 Mitigation for Impacts on Habitats

- The following measures are proposed with regard to specific habitat creation works, during construction:
    - **WM01:** Any works in close proximity to watercourses will be restricted to taking place during the summer period only (May- August (inclusive)), when weather is drier. This is to avoid sediment and other harmful materials being transferred to watercourses, and subsequently to downstream European sites, by precipitation and surface waters flowing overland. In addition, this measure will help to ensure the early re-colonisation of any cleared areas by opportunistic plants, which will help to bind soil together and prevent any further transfer of sediment. Proposed pond/pool creation works and preparatory works for proposed playing pitches to the north of the River Mayne (e.g. vegetation clearance and regrading) will abide by this measure. In addition, a buffer zone between the pitch locations and nearby watercourses will be established in advance of works commencing to further reduce the potential for overland flow of contaminated runoff.
- Furthermore, the following measures must also be adhered to prevent any impact to water quality:
    - **WM02**: An Environmental Management System (EMS) must be maintained by contractors during all phases. This should cover all potentially polluting activities and include an emergency response procedure.
    - **WM03:** Specific measures to prevent the release of sediment over baseline conditions to the Mayne River, Snugborough River, Maynetown Stream and Snugborough Stream (and subsequently Baldoyle Bay) during the construction work, which will be implemented as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. This is particularly important when undertaking any

works/upgrading to the surface and foul water drainage networks at the proposed development site. This is also of particular relevance for the proposed regrading works in close proximity to the River Mayne and River Snugborough to allow for the natural expansion of reed beds and brackish grassland habitats, as well as regrading works for the proposed football pitches, and excavations required to create the proposed attenuation ponds.

- **WM03:** Re-fuelling and maintenance/servicing of construction equipment will take place in designated bunded areas.
- **WM04:** Any fuels or chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area, remote from any watercourse, to prevent any seepage of same into any of the watercourses, local surface water network or groundwater, and care and attention taken during refuelling and maintenance operations.
- **WM05:** Provision of exclusion zones and barriers (*e.g.* silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing into any of the watercourses on site and/or existing drainage systems and hence the downstream receiving water environment.
- **WM06:** Silt traps shall not be constructed immediately adjacent to the existing watercourses, *i.e.* a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in-combination as appropriate to remove suspended matter from discharges.
- **WM07:** Provision of temporary construction surface drainage and sediment control measures to be in place before the construction of any pipeline and/or earthworks commence.
- **WM08:** Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams.
- **WM09:** All containment and treatment facilities will be regularly inspected and maintained.
- **WM10:** Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- **WM11:** All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- **WM12:** All mobile fuel bowsers shall carry a skill kit and operatives must have spill response training. All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked.
- **WM13:** Design and installation of fuel tanks will be in accordance with best practice guidelines.
- **WM14:** Implementation of response measures to potential pollution incidents.
- **WM15:** Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to any of the watercourses on site and/or surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to any watercourses or existing surface water drainage systems. Concrete washout areas will be located remote from any watercourses or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses.
- **WM16:** A suitable risk assessment will be completed for all concrete works to outline measures to prevent discharge of wastewaters or contaminated stormwater to any of the watercourses on site.

- **WM17:** The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- **WM18:** A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase.
- **WM19:** Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).
- **WM20:** Any effluent generated by temporary on-site toilet facilities will be taken off site for appropriate treatment.
- **WM21:** Discharge from any vehicle wheel wash areas will be directed to on-site settlement tanks/ponds. Debris and sediment captured by vehicle wheel washes will be disposed off-site at a licensed facility.
- **WM22:** Any hazardous waste residuals or potentially contaminated sludge from spill clean-up will be stored within appropriate containers in temporary bunded storage areas prior to removal by an authorized waste management contractor for off-site treatment/recycling/disposal.
- **WM23:** Where works are taking place within 10 m of the edge of a watercourse or tributary thereof, a Fisheries Protection/Construction Method Statement will be prepared demonstrating how pollution of watercourses during and after the construction period will be prevented and/or mitigated. This will only apply if, at the detailed design stage when the site is being marked out, there are proposed works that will incur into this 10 m zone.
- **WM24:** Weather conditions and seasonal weather variation will be taken into account when planning stripping of topsoil and excavations, with an objective of minimising soil erosion and sediment runoff.

4.6 Impacts on Rare/ Protected Flora

- During construction, there is a small possibility that proposed works, in certain locations, have the potential to effect rare and protected plants that have been known to occur on site. Common Water-crowfoot occurs on wet muddy ground by the eastern edge of the Snugborough Stream. Works in this area are restricted to thinning locally retained shrubs and small trees and reinforcing with additional whip planting of native species on elevated sections. These works are unlikely to result in direct impacts on rare/ protected flora species. Nonetheless, a precautionary approach has been adopted and mitigation in this regard has been prescribed.

4.6.1 Mitigation for impacts on Rare/ Protected Flora

- **RF01:** A pre-construction survey for rare and protected flora species should be carried out on site, by a suitably qualified ecologist, within a suitable survey season, in advance of any works being undertaken. This survey should form an update to previous surveys of this kind undertaken and should accurately map the location and extents of any rare/protected flora species identified. The results of this survey should be considered in the development of the park.

4.7 Impacts on Bats

- During construction, works required to upgrade the existing railway bridge along the western boundary of the site have the potential to result in adverse impacts on roosting bats, if present, due to the potential suitability of the bridge's stonework to contain crevices which could support roosting bats. Works to the existing railway bridge will include re-pointing, required due to the current state of disrepair which the bridge is in.
- Introduction of artificial lighting and displacement effects on local bats- lighting tends to displace bats from an area

4.7.1 Mitigation for Impacts on Bats

- BM01: An up-to-date inspection of the existing railway bridge must be carried out prior to any works being carried out on this structure. This will involve a suitably qualified bat ecologist inspecting the structure during daylight hours and assessing its potential to support roosting bats. Following on from this, bat surveys will be carried out to determine whether or not the bridge supports roosting bats. Bat surveys will be carried out in accordance with Bat Conservation Trust Guidelines (Collins, 2016). The number of bat surveys required will be determined following the results of the daytime inspection and will be in accordance with the guidance detailed in Collins (2016). An Ecological Clerk of Works will be appointed for this work.
- BM02: Any external lighting to be installed, including facilitating night-time working or security lighting during construction, on the site should be sensitive to the presence of bats in the area. Lighting of the site will be designed in accordance with the following guidance:
  - Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2020)
  - Bats & Lighting - Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, December 2010)
  - Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2008).

4.8 Impacts on Otter

- Pollution event during the construction phase of the proposed development to result in impacts on Otters in the locality. Potential impacts include fish kill (thereby affecting prey availability within the watercourses on site and potentially further downstream) and indirect effects of impacts on water quality. Accidental spillages into any of the watercourses on site, would in turn adversely affect Otters in the locality, as oil has a negative effect on the Otter's waterproof coat and thus negates their ability to control body temperature in water. Furthermore, Otters may be affected by contamination of water by heavy metal compounds through bioaccumulation in their prey items

4.8.1 Mitigation for Impacts on Bats

- As otter could potentially establish new holts in the future within the ZoI of the proposed development, in particular along the River Mayne, a pre-construction check of all suitable habitat along the banks of the watercourses within the proposed development site will be required within 12 months of any construction works commencing. Any new otter holts present will be afforded protection in line with the requirements set out in the National Roads Authority's *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (2008).

4.9 Impacts on Badger

- In the absence of mitigation there is potential for accidental direct harm to badgers to occur during construction. This is because it is a possibility that Badger will establish new setts within the proposed development site before construction works commence, and the locations of potential newly established setts could be within the ZoI of the proposed development

4.9.1 Mitigation for Impacts on Badger

The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (*National Roads Authority, 2006c). These guidelines set out the best practice approach in considering and mitigating impacts on badgers during construction works.

As badger could potentially establish new setts in the future within the ZoI of the proposed development, a pre-construction check of all suitable habitat within the proposed development boundary will be required within 12 months of any construction works commencing. Any new badger setts present will be afforded protection in line with the requirements set out in the TII/NRA guidance document as follows:

- Badger setts will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage

- No heavy machinery shall be used within 30 m of badger setts; lighter machinery (generally wheeled vehicles) shall not be used within 20 m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10 m of sett entrances

- During the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts, nor blasting or pile driving within 150m of active setts

- Works can be undertaken within these zones following consultation with, the approval of and, if required, under the supervision of a badger ecologist

4.10 Impacts on Hare, Hedgehog, Pygmy Shrew and Irish Stoat

No impacts of significance and therefore no mitigation proposed

4.11 Impacts on Breeding Birds

- Potential for direct impacts on nesting birds and/or mortality of birds arising from the clearance of vegetation within the subject lands. Examples of works which could lead to such potential impacts include the thinning of existing shrubs/ small trees along the existing watercourses on site, pitch development works and the regrading works proposed in close proximity to existing reed beds along the River Snugborough. Potential impacts on nesting birds would be most likely if works were to occur during the time of year when birds are likely to be nesting (1st March to 31st August, inclusive). Impacts arising from vegetation clearance would be significant, in the absence of mitigation

4.11.1 Mitigation for impacts on Breeding Birds

In order to avoid potential significant impacts on breeding birds, the following measures are prescribed:

- **BB01**: Where feasible, vegetation (e.g. hedgerows, trees, scrub and grassland) will not be removed, between the 1st March and the 31st August, to avoid direct impacts on nesting birds. Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist for the presence of breeding birds prior to clearance. Areas found not to contain nests will be cleared within 3 days of the nest survey, otherwise repeat surveys will be required.

- **BB02:** If all vegetation clearance cannot be undertaken outside of the breeding bird season, tall grassy vegetation which is to be removed should be mown on a regular basis in advance of the commencement of the breeding bird season. This may help to discourage birds from nesting in these areas, such that clearance during the breeding bird season may be possible. To ascertain whether mowing has discouraged breeding birds to the point that no breeding birds are present in these areas, a suitably qualified ecologist will be required to undertake a ground nest search and advise the contractor on their findings and recommendations regarding vegetation clearance.

4.12 Impacts on Breeding Birds

- Accidental spillages of oils, cement or other potential pollutants, during construction works could potentially be released into the Mayne River, Snugborough River, Maynetown Stream or Snugborough Stream and/or the existing surface water drainage network in the area and transferred into Baldoyle Bay. Qualifying Interest bird species of Baldoyle Bay SPA utilise the intertidal and estuarine habitats in Baldoyle Bay for feeding and/or roosting. These species would be vulnerable to an accidental pollution incident either directly e.g. through direct contact with oil or other polluting chemicals, or indirectly by affecting the habitats and food supply on which they rely for feeding and/or roosting within the Baldoyle Bay area.
- the construction and operation of the proposed car park here could result in disturbance to winter birds such as Light-bellied Brent geese, which forage on the pitches. This could result in a profound temporary impact on goose populations, which are associated with Baldoyle Bay SPA, significant at the international level
- the proposed development will result in the displacement of geese from the area to the north of Red Arches Road which is known to be used by Light-bellied Brent Geese as an *ex-situ* inland feeding site. NIS has concluded that this will not be significant due to the following reasons:
    - this area is not consistently used by foraging brent geese
    - provision of additional playing pitches to the south of Moyne Road
    - lands to north of Moyne road are currently successfully being managed for brent geese

4.12.1 Mitigation for impacts on wintering birds

- The following measures are proposed to reduce disturbance impacts to wintering birds during construction:

- **WB01:** Construction activities associated with the proposed car park at Red Arches playing pitches should be restricted to the period May- August (inclusive) so as to avoid construction related disturbance to foraging geese (which are only winter visitors).

- **WB02:** Likewise, construction activities associated with the proposed skate park in the area of amenity grassland to the north of Red Arches Road should be restricted to the period May-August (inclusive).

- **WB03:** If the above measures cannot be complied with, due to an incompatible project program, then a visual screen will need to be erected around the perimeter of construction works on the pitches or amenity grassland area, to avoid visual disturbance to foraging geese.

- The following measures are proposed to reduce disturbance impacts on foraging winter birds during the operation of the proposed development:

  - **WB06:** The proposed car park in the northernmost part of the existing playing pitches at Red Arches, has been designed so as to lead visitors from the car park to a designated entrance to the playing pitches, located to the south-west of the proposed car park. This is to ensure that people use a defined entrance as opposed to simply running onto the pitches from any location in the car park. Furthermore, sufficient landscaping or fencing has been provided around the perimeter of the car park to ensure that loose dogs cannot simply run onto the pitches from the car park.

  - **WB07:** The playing pitches and potentially the other areas in the wider park which are to be managed for geese will be zoned as “dog-free” for the winter bird season (September – April) and signs will be erected to convey this message to the public. These signs will also act as a means of public education to describe how disturbance such as loose dogs can impact geese.

  - **WB08:** It will be Baldoyle Racecourse Park policy that all dogs must be kept on a lead at all times while in the park, with the exception of the dog park. This will be implemented by a by-law (see Fingal County Council’s *Regional Parks & Open Spaces Bye-Laws 2017* (Fingal County Council, 2017a) for details) and enforced by Fingal County Council Park Rangers who will monitor the park.

4.13 Impacts on Amphibians

- Effects to surface water quality of watercourses and drainage ditches on site as a result of construction activities (e.g. excavations, soil stripping, regrading works, which could all potentially result in the release of silt/ sediment into the receiving surface waters). Effects on surface wate quality could lead to impacts with regards habitat suitability for amphibian species

4.13.1 Mitigation

- Measures provided for already regarding protection of surface waters

4.14 Invasive species

The proposed works will involve soil stripping, regrading, minor excavations for the creation of wetland habitat and substantial landscaping. These works have the potential to exacerbate the spread of invasive species present on site, which could result in significant impacts at the local level

4.14.1 Mitigation re Invasive species

The following measures are proposed to control the spread of invasive species both within the subject lands and further afield:

- **IM01:** A pre-construction invasive species survey will be undertaken prior to any works commencing on site. The aim of the survey will be to accurately map the location and extents of any invasive species identified.
- **IM02:** All invasive species listed on the Third Schedule of the *Birds and Natural Habitats Regulations* (2011), will be eradicated from the subject lands prior to any other works commencing. It should be noted that Japanese Knotweed on site has been treated by Fingal County Council for the past three years and Giant Hogweed has been treated for the past four years. Furthermore, Japanese Knotweed is located remote from any proposed works areas for the proposed park development.
- **IM03:** An Invasive Species Management Plan (ISMP), which will clearly outline the control methods to be employed for each Third Schedule invasive species recorded on site, will be prepared prior to commencement of the proposed works. A suitably qualified contractor, with experience in dealing with invasive species, will be employed to execute the ISMP.
- **IM04:** The site will be monitored for the presence of invasive species for a period of 3 years post development. Any subsequent regrowth of invasive species will be treated accordingly by a suitably qualified contractor, following best guidance.

5.0 AIR QUALITY AND CLIMATE

5.1 INTRODUCTION

AWN Consulting has prepared this section of the ER which assesses and evaluates the potential impact the development would have on air quality and climate.

The assessment of the receiving environment and the potential impacts to air quality and climate associated with the construction phase of the proposed development was carried out following the methodology prescribed by the UK Institute of Air Quality Management (IAQM) in their document titled *Guidance on the Assessment of Dust from Demolition and Construction Version 1.1*, published in 2016.

Additional traffic associated with the operational phase of the proposed development has the potential to impact ambient air quality at nearby sensitive receptors. As the additional local traffic associated with the proposed development is below the threshold requiring a quantitative assessment using the UK Design Manual for Roads and Bridges (DMRB) screening model, no detailed assessment of potential air quality and climate impacts from the operational phase of the proposed development is required.

5.2 BASELINE ENVIRONMENT

Long-term monitoring data from the EPA (EPA, 2018) has been used to determine background concentrations for the key pollutants in the region of the proposed development. The most recent annual report on air quality "Air Quality Monitoring Annual Report 2017" details the range and scope of monitoring undertaken throughout Ireland and a review of suburban Zone A data within that report has yielded the following conclusions:

- An estimate of the background NO_2 concentration in the region of the proposed development is determined to be 18 µg/m^3;
- A conservative estimate of the background PM_{10} concentration in the region of the proposed development is determined to be 15 µg/m^3;
- A conservative ratio of $PM_{2.5}$ to PM_{10} was estimated to be 0.7 giving an estimated background concentration of 10.5 µg/m^3 for the region of the proposed development.

In terms of the dust soiling impacts, there are more than 10 high sensitivity receptors located less than 20m from the boundary of the proposed development. Based on the IAQM classification criteria, the receiving environment is therefore considered to be of high sensitivity for dust soiling during construction without mitigation measures in place.

In addition to dust soiling, the IAQM guidelines also outline assessment criteria for determining the sensitivity of the area to human health impacts from dust. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is estimated to be 15 µg/m^3 based on a review of EPA monitoring data (EPA, 2018) for similar environments. There are less than 100 high sensitivity receptors located less than 20m from the proposed development boundary. Based on the IAQM criteria, the sensitivity of the surrounding area to human health impacts during construction is considered to be low without mitigation measures in place.

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to ecological impacts from dust. The criteria take into consideration whether the receiving environment is classified as a Special Area of Conservation (SAC), a Special Protected Area (SPA), a Natural Heritage Area (NHA) or a proposed Natural Heritage Area (pNHA) as dictated by the EU Habitats Directive or whether the site is a local nature reserve or home to a sensitive

plant or animal species. The proposed site is adjacent to the Baldoyle Bay SAC (Site Code 000199) and Baldoyle Bay SPA (Site Code 004016) which are located directly east of the site, across the R106. The receiving environment is therefore considered to be of medium to high sensitivity for ecological impacts from dust during construction, in the absence of mitigation measures.

5.3 Construction Impacts

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200 m of a construction site, the majority of the deposition occurs within the first 50 m.

The potential impacts from the construction phase are dust emissions from demolition activities, earthworks, construction activities and track-out (truck movement) activities. Following the criteria defined within the IAQM guidance, the dust emission magnitude from the four key construction activities is provided below:

- The dust emission magnitude from the removal of some of the existing pathway network associated with the proposed development has been classified as small based on the scale and nature of the demolition works;
- The dust emission magnitude from earthworks associated with the proposed development has been classified as large as a worst-case based on the area of the site works;
- The dust emission magnitude from construction works has been classified as small as a worst-case based on the small volume of structures to be constructed as part of the proposed development;
- The dust emission magnitude from truck movements has been classified as medium as a worst-case based on a conservative estimate of daily truck movements associated with the proposed works.

The sensitivity of the receiving environment is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. The results are shown in Table 5.1 below:

Potential Impact	**Dust Emission Magnitude**			
	Demolition (Small Dust Emission magnitude)	**Earthworks** (Large Dust Emission Magnitude)	**Construction** (Small Dust Emission Magnitude)	**Trackout** (Medium Dust Emission Magnitude)
Dust Soiling (High Sensitivity Receiving Environment)	Medium Risk	High Risk	Low Risk	Medium Risk
Human Health (Low Sensitivity Receiving Environment)	Negligible Risk	Low Risk	Negligible Risk	Low Risk
Ecological (Medium to High Sensitivity Receiving Environment)	Low to Medium Risk	Medium to High Risk	Low Risk	Low to Medium Risk

Table 5.1 Summary of Dust Impact Risks used to Define Site-Specific Mitigation

Overall, in order to ensure that no dust nuisance, human health or ecological impacts occur during the construction phase, a range of dust mitigation measures associated with a medium to high risk of dust impacts will be implemented at the site. When the dust mitigation measures are implemented, fugitive dust impacts associated with the construction of the proposed development will be short-term and imperceptible.

Construction traffic and plant emissions would be expected to be the dominant source of greenhouse gas emissions as a result of the construction phase and may give rise to CO_2 and N_2O emissions during construction. Based on the relatively low number of construction vehicles and equipment to be used during construction and the short-term nature of the construction phase, the potential impact on climate from the proposed development is deemed to be short-term and imperceptible.

5.4 Operational Impacts

The additional traffic associated with the operational phase of the proposed development has the potential to impact ambient air quality at nearby sensitive receptors. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, PM_{10}, $PM_{2.5}$, CO and benzene. As the additional local traffic associated with the proposed development is below the threshold requiring a quantitative assessment using the UK Design Manual for Roads and Bridges (DMRB) screening model, the predicted impact of the operational phase on ambient air quality (including at the nearby sensitive ecosystem receptors) and climate can be described as long-term and imperceptible. No specific mitigation measures are required for the operational phase of the proposed development.

5.5 Summary of Potential Air Quality and Climate Impacts

In conclusion, the construction and operational phases of the proposed development will have an imperceptible impact on air quality and climate in the short and long-term.

6.0 NOISE

6.1 INTRODUCTION

AWN Consulting has prepared this section of the ER which assesses and evaluates the potential noise and vibration impact the development would have.

When considering a development of this nature, the potential noise and vibration impacts on the surroundings must be considered for each of two distinct stages, the short-term construction phase and the permanent operational phase.

During the construction phase the main site activities will include, site clearance, demolition of existing structures, road works, and landscaping. This phase has the greatest potential for noise and vibration impacts on the surrounding environment, however this phase will be of short-term impact.

During the community consultation the people living in the houses and apartment in the vicinity of the playground, skatepark, dog run and Muga's have expressed a concern regarding noise from the skateboards, children screaming and dogs barking. During the operational phase of the development, no significant sources of outward noise or vibration are expected with the development. The primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network.

6.2 BASELINE ENVIRONMENT

The following noise maps have been referred to when assessing the baseline noise environment,

- Round 3 Noise Maps for Roads – Dublin Agglomeration, and;
- Round 3 Noise Maps for Airports – Dublin Airport.

The above noise maps are provided for the overall day evening night period in terms of L_{den} and for the night-time period in terms of L_{night}. On review the noise levels across the site and at adjacent sensitive locations are in the range of 55dB to 65dB L_{den}. L_{night} levels are not relevant as it is assumed that the park will not be used at night.

All data has been taken from the EPA Mapping website http://gis.epa.ie.

6.3 Construction Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise and vibration levels that may be generated during the construction phase of a project. It is common practice to use BS 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites with respect to the controlling noise and vibration impacts.

It is anticipated that the construction programme will create typical construction activity related noise on site. During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators.

The proposed general construction hours are 07:00 to 18:00 hrs, Monday to Friday and 08:00 to 14:00 on Saturdays.

Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of elevated levels of noise. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the nature of the construction works on site there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

Due to the fact that the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. Notwithstanding this, best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be adopted. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening, and;
- liaison with the public.

6.4 Operational Impacts

The additional traffic associated with the operational phase of the proposed development has the potential to impact ambient noise levels at nearby sensitive receptors. However, given the logarithmic relationship between traffic volumes, very large changes in traffic volume are required to change the noise level by a significant amount. For example, existing road traffic volumes would need to increase by 25% in order to result in a 1dB increase in noise. Table 6.4 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2011).

Change in Sound Level (dB L_{A10})	Subjective Reaction	DMRB magnitude of Impact	EPA Classification Magnitude of Impact
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate
10+	Doubling of loudness and above	Major	Significant

Table 6.1 Likely Impact Associated with Change in Traffic Noise Level

Making reference to Table 6.1 confirms that a noise increase of less than 3dB is barely perceptible and the resultant impact is imperceptible.

A noise impact assessment for the proposed skate park was undertaken in February 2020 and included as appendix 6.1 to this report. The results have shown that the skate park does not exceed the criterion of 55dB LAeq at the nearest noise sensitive location. It should be noted that the noise result presented is representative of the worst-case instantaneous noise level but that the average noise level over the course of the day would be much lower. It should also be noted that the skate park will not operate at night-time.

The noise level should also be viewed in the context of the existing baseline noise levels, which were found to be <55dB Lday due to road traffic noise in the area, as

outlined in Section 2.1 of the impact assessment . Therefore, it is likely that skate park activity may be just audible during lulls in road traffic noise in the area.

If required, the noise levels could be further reduced by the introduction of suitable landscaping e.g. grass mounds or acoustic screening, (as proposed) however this is not essential as the predicted skate park noise levels are below the noise criterion. Suitable mitigation measures have been outlined in Section 6.0.

In summary, the noise impact of the operational phase is considered to be negligible.

6.5 Summary of Potential NOISE & VIBRATION Impacts

In conclusion, the construction and operational phases of the proposed development will have no significant impact on noise and vibration in the short and long-term.

7.0 ARCHAEOLOGY

7.1 Introduction

This report is an overview of the archaeological implications and predicted impact of the formation of a new public park in the coastal area between the villages of Baldoyle and Portmarnock.

The report reviews the existing work that has been undertaken on the lands, and recommends where, subject to details of any interventions in the form of paths, drains, or other, further archaeological surveys should be undertaken.

A series of plans have been prepared to accompany this report.

7.1.1 Project Description

The proposed development will comprise a 112 ha Public Park, to be known as Baldoyle Racecourse Park.

The masterplan seeks to propose a coherent approach to the development of the future park by the integration of the SACs and the Coastal Greenway to the East of the site

Taking a lead from the Baydoyle-Stapolin LAP and in particular Figure 4A.0 Green Infrastructure Context the design seeks to ensure that the natural, cultural, and health requirements of communities are integrated into, and not compromised by, new development.

The LAP utilises green infrastructure as a means of developing a strategy in relation to the following key areas: the conservation and enhancement of biodiversity; the provision of accessible parks, open spaces and recreational facilities; the sustainable management of water and the maintenance of sensitive landscapes.

Baldoyle-Stapolin and the surrounding areas have a natural environment which incorporates both nationally and internationally important sites in terms of wildlife and habitats.

The proposed design seeks to create a connection between Seagrange Park to the South, the amenity areas presently between Admiral Park and Castlerosse View, extending north across Red Arches Road into the open space east of The Coast development. The park extends further north across Moyne Road, ending at the boundary with Station Road roundabout.

The southern part of the development has a higher density of amenities as it houses facilities such as the community centre with associated play areas for lower age groups, existing pitches, a bowling green and a MUGA, alongside a network of cycle and pedestrian paths.

Furthermore, the masterplan also accommodates a skate park/teenage play area and a dog park in carefully chosen locations away from ecologically sensitive areas and a new string of attenuation ponds increasing the ecological value in some areas alongside the provision of a viewing platform overlapping the ponds and taking advantage of sight lines.

A Recorded Monument lies on the northern area of the site which the proposal seeks to pay homage to by tracing of its original footprint.
This area is also connected to the remaining of the site by the extension of the cycle and pedestrian network found throughout. This area also houses an existing bird feeding and nature development area which the proposal seeks to leave untouched.

The following works are to be undertaken as part of the current application:

- 4.5km of new walking and cycling routes including a bridge over the Mayne river and the repair to the railway underpass;
- Public lighting along key walking and cycling routes
- Expanding the existing car park to cater for up to 161 car parking spaces;
- Upgrading and expanding the existing playground;
- A Skate park and Teenage Adventure Playground;
- A Multi use games area;
- A dog run;
- A Bowls green;
- Four grass football pitches
- A viewing platform
- Tracing of circular archaeological feature through soft landscaping and removal of existing fence;
- Extension of existing reedbed south of Mayne river and creation of new brackish grassland north of Mayne river;
- All landscaping works in the park.

7.2 Background

The large site, of approximately 112 hectares, spans most of the townland of Maynetown, and part of Stapolin to the south. It is bordered on the east by the Baldoyle estuary, a shallow sand/ mud inlet with the isthmus of Portmarnock on its eastern side. The site is therefore well sheltered from the Irish Sea. The railway line, and the town land of Snugborough, form the western border. The historic settlement of Baldoyle village lies to the south-east while the northern part is flanked by a conglomeration of recently completed and ongoing development sites. This northern development area was the location of the medieval 'ville' of Portmarnock, and of fairly intensive settlement of the early medieval period.

Several sites listed on the Record of Monuments and Places map of National Monuments occur within and close to the site. Almost without exception, these have been uncovered through recent archaeological work, in advance of proposed development.

The sites are listed in Appendix A. The evidence from archaeological excavation, within or very close to the park boundaries, is given in Appendix B.

7.2.1 Sources

The primary source for this study is the Record of Monuments and Places, a series of maps and accompanying manual and files, which has been compiled on all known sites of archaeological significance by National Monuments. The Sites and Monuments Record is continually updated as new sites are discovered through archaeological and related work, and can be viewed on the Historic Map viewer of National Monuments website. Each entry indicates whether it is scheduled for inclusion in the next revision of the Record of Monuments and Places. There are several sites in the immediate vicinity of the proposed park, indicated on the map/ photoviewer reproduced from National Monuments website, archaeology.ie. Several sites lie within the park itself, notably on the northern flank.

Evidence from recent archaeological excavations and licensed investigations in the locality is most significant as a predictor of archaeological potential. Summary results of all licensed excavations are listed on excavations.ie, where the information is provided by the licence holder. More detailed reports up until about 2011 are available on Dublin County Excavations available on HeritageMaps.ie. A map of the excavation evidence used or quoted in this report is given.

The topographical files formerly maintained by the National Museum of Ireland are out of date, and have little or no relevance for this study. The NMI Topographical file layer on Heritage maps shows nothing of relevance to this study area. However, many artefacts have been recovered from the licenced archaeological excavations within the study area.

Historic maps of the area at the scale required here are few: these include the Down Survey (1655-6), Rocque's map of county Dublin 1760, and the Ordnance Survey 6inch (c. 1847) and 25 inch (1880-1909) maps.

Aerial photography of the site includes a series of Google Earth photographs, which are accessible on National Monuments website, and on the Geological Survey of Ireland website. Older aerial photographs of the southern part of the site have shown an earthwork, DU015-018, over which the Seagrange housing estate in Baldoyle was constructed in the 1970s. The photograph in the Cambridge University series, 1970-CUCAP AIG 95-c, shows the outline of a probable medieval moated site in what was then a field, south of the park location. The monument was tested with partial excavation in 2013 and 2014 (Duffy 2016). No further monuments were recognised by study of the earlier aerial photographs in the area.

7.3 Archaeological and historical background

Evidence for Ireland's earliest inhabitants in the Mesolithic is generally confined to the coast, and identifiable through the stone technology. Antiquarians and collectors of flints and other stone tools of the Mesolithic have identified the areas of the two estuaries at Malahide and Rogerstown, north of Portmarnock, as particularly rich in artefacts of the Mesolithic period (Stout and Stout 1992, 5). The 'type site' of this period is considered to be a transitory, impermanent settlement, with small mobile groups exploiting richly available foodstuffs in a dominantly coastal environment. There is less evidence from the lowlying relatively sheltered area of Baldoyle/ Portmarnock. Lithics of both Mesolithic and Neolithic date were excavated by the late Frank Mitchell at a raised beach site at Sutton (DU015-024). Residual flint tools, mainly scrapers, were recovered from the medieval vill at Station Road (Scully Appendix 7, in Moriarty 2009).

The rich lands of the Portmarnock/ Baldoyle area have been subject to continuous tillage from at least the early medieval period, so few monuments of the earlier prehistoric period, which are generally represented as earthworks, remain. No settlement sites of the Neolithic period are represented in the archaeology of the immediate area of the proposed park. However, sites a short distance further north, such as the axe factory at Lambay Island, attest to the continuing presence of populations at this period, while there are several unclassifiable cairns at Howth Head. Identifiable sherds of Neolithic pottery, in small quantities, were recovered from the excavation of plough - truncated features at the development to the south- west of the park (04E0350 et al).

Few sites or monuments of the Bronze age are present in this area, amongst them a fulacht fiadh (DU015-014) in Maynetown, north- east of the proposed park, destroyed by ploughing; the trough however was excavated (see Appendix B, below, 04E1415). A ring-ditch DU015-119 of Bronze age date in the adjacent townland of Drumnigh, c. 12.5m in diameter was identified through aerial photography by National Monuments. These were burial monuments with cremation pits, with or without accompanying vessels. Its presence was confirmed by geophysics, and test trenching, and it is to be preserved within the green space of the housing development at Drumnigh.
In general, Bronze Age sites in ploughland have little or no surface expression, and the intensive fieldwork within the area has uncovered few residual finds of this date. Part of a domestic vessel of later Bronze Age date was recovered from a plough damaged pit at the large housing development site to the south- west of the site (04E0350 et al).

Lambay island, the site of two promontory forts, and Drumanagh promontory fort, north of Portmarnock, appear to have been a focus of settlement and coastal trade possibly from the late Bronze age and the Iron age. A lesser known promontory fort lies at Dungriffin, at Howth Head, while a cemetery of stone- lined graves was discovered at the present grounds of the Suttonians Rugby Club in 1937. No settlement activity of this period is attested in the record from the environs of the park, and it is likely to have been removed by intensive ploughing.

In the early Medieval period, these lands probably lay within the petty kingdom of Gailenga Becca, which also included St Mobhi's foundation of Glas Naidin, and Finn Glas. It was one of several tuatha which made up the kingdom of Brega, the southern kingdom of the Ui Neill (Mac Samhrain 2016, 39). Ringforts and associated field systems are known from the area, identified from oblique aerial photography, geophysical survey, and licensed excavation. There is a noted cluster of such monuments at the northern fringe of the proposed park, sited on the south- facing slope overlooking the Mayne river. These are particularly located on an east- west ridge. Finds from the sites include cereal drying kilns, and many plough pebbles, (direct evidence for agriculture) as well as quantities of animal bone and marine shell. Sherds of Late Roman Amphora 1 and E ware have been recovered from the excavations at DU015-014001, suggestive of a relatively high status site, and certainly one with significant imported goods. The enclosure DU015-055 has linear features extending from the entrance, which may be a cattle drove entrance, suggesting that they may have been subject to cattle raids. Curiously, the area is associated with the legend of the Tain bo Cualinge: the townland of Mayne is the reputed burial place of Maine, son of Maedbh and Ailill of Connacht.

Notable ecclesiastic sites lie further inland. Balgriffin, on the bank of the Moyne river, lies two km to the west of the site. St Doulagh's early ecclesiastic foundation lies approximately 2.5k from the site. Viking raids in the area occurred at Lambay in AD795, while Howth was raided in 821. Vikings were recorded in the Annals on the islands of Eastern Brega. Nameplace evidence along the coast from Dublin, Howth to Skerries, indicates that the north Dublin coastal lands were settled by Norse and their descendants. Both townlands of Stapolin and Balgriffin suggest a Viking or Hiberno- Norse connection, but probably more associated with 11th and 12th century Dublin ruling classes. The area became known as Fingal, territory of the foreigners.

A cross fragment from Balgriffin has possible Scandinavian/Manx connections (Duffy 2018, 30; discussed further by Con Manning 2018, 47); Duffy has postulated the presence of a Viking camp on the Moyne river, at or adjacent to a pre- existing ecclesiastic foundation, in the 9th century. Baldoyle, Baile Dubh Gaill, has been ascribed to a settlement of 'dark foreigners', who are mentioned in the annals from the mid- 9th century (Duffy 2018, 33); it may alternatively derive from a personal name, Dubgal.

Baldoyle was bestowed to Holy Trinity (Christ Church) in 1038, along with its 'villeins, cattle and corn'. The Black Book of Christ Church states that in 1040, King Sitric of Dublin granted the lands of Baldoyle to Bishop Donatus of Dublin.

Circa 1162, McMurrough, the king of Leinster granted the lands of Baldoyle to the head of the Augustinian Canons of the Arrouasian observance in Ireland, 'along with Maelisu Macfeilecan, his sons and grandsons'. This possibly coincided with the foundation of All Hallows by Diarmuid Mc Murchada. This grant was confirmed by King Henry II c. 1172. The grange of Baldoyle extended over the townlands of Baldoyle, Stapolin, and Grange. It was the single most important holding of the priory of All Hallows. With the arrival of the Anglo- Normans, the lands of Baldoyle were disputed and claimed by vassals of Howth. Various named Mackelegans continued to dwell at Baldoyle in the 13th century, and a "Balikeligan' is mentioned in 1228 in one such dispute.

The church at Portmarnock, to the north of the site, is mentioned first in 1185, when it was granted to St Mary's Abbey, Dublin, but it Is considered likely that it is an earlier foundation. This is evidenced by the former presence of an ogham stone at the site, and the dedication to St Marnock, a contemporary of St Columba. Kilmarnock in Scotland also bears his name. His relics were kept at the church in Portmarnock until the 15th century when they were moved to St Mary's Abbey. A holy well adjacent to the church was venerated annually on 15th July and was an important pilgrimage site well into the 17th century.

Portmarnock was held by the abbey of St Mary's as early as 1172, when the townland is mentioned in a survey carried out by William Fitz Audelin at the behest of Henry II. In the late 12th century, de Talbot of Malahide and his son ceded land at Portmyrnoch…. Inevitably claims to these extensive land grants arose, in this case, from Comyn of Kinsealy. Despite arbitration, bad blood continued, and in 1277 Comyn of Kinsealy was killed by a number of monks residing at Grange. The culprit was detained in the abbey's prison until his death fourteen years later.

The harbours at Howth and Lambay became satellite anchorages for the port of Dublin in the medieval period, when it could not accommodate larger vessels (Brady 2009, 296), as well as that at the medieval landing/harbour of Baldoyle (Brady 2009, 299). Ships were stranded at Portmarnock in the 14th and 15th centuries, including the recovery of eight barrels of Spanish wine which had washed ashore at Portmarnock in 1465.

A document dating from 1318 details a settlement between St Mary's Abbey and a William de la Rivere, whereby Portmarnock had to provide sixteen afers (draught horses) worth 40d each, as well as eight oxen, as well as sixty sheep, and quantities of wheat and oats.

Following the Dissolution, the lands of Portmarnock were leased, including the 'hall ferme that is Portmarnoke'. In 1539, the lands and possessions were transferred to the state, and an inquisition made of the whole. The village contained then ten cottages and nine messuages, and a number of the residents were named. There were also two watermills to the north of the village along the Sluice river, and a rabbit warren (on the sandy land which is now Portmarnock Golf Club). The village and townland of Portmarnock were granted to Walter Peppard. Following his death, the lands were later demised to Jacques Wingfield. The town of Portmarnock is described in 1602 as containing nine messuages, ten cottages, 220 acres arable, etc.

Following a complex series of transactions, the lands of Portmarnock passed to Luke Plunkett, whose line held them for the next 300 years. The Plunkett residence, Portmarnock House, lay to the northern side of Station Road. The Civil Survey of 1654-6 lists their abode as containing two houses, one slated, the other tiled, along with several thatched outhouses and a malt house. The village was described as ten thatched cottages, as well as two small orchards and three gardens.

The medieval vill of Portmarnock, located in an area known locally as Old Portmarnock, was excavated in 2009. Six well- defined plots, divided in to the front- toft, and rear- croft, were uncovered. The plots measured between 16- 22m in width, and up to 65m in length. A trackway to the village was later uncovered and part of this excavated in advance of a housing scheme. The plots and houses are described in brief in Appendix A. The village appears to have been abandoned before the late 17th century, although it survived the turbulence of the Confederate wars of the 1640s. It is mentioned in the 1664 Hearth Money Roll for Dublin, but deserted soon after. On Rocque's map of 1760, it is an ornamental garden and fields to the south of Portmarnock House. This did not remain into the preparation of the Ordnance Survey first edition.

7.3.1 Later history

Racing was established at Howth in the late 18th century, but moved to Baldoyle in the earlier part of the 19th century. The earls of Howth were enthusiastic horsemen, and the fourth Earl rode his first race in 1846. Military races were popular, and Baldoyle hosted one such in 1860. The racecourse was enclosed some years later due to trouble from hooligans. The inaugural meeting took place in May 1874. The racecourse was threatened by the success of Leopardstown in the 1880s. Success in the following decades was followed by a curtailed in the Great Depression, but recovered. In 1968, the insurers demanded that the stands be rebuilt, as the reinforcing steel rods were bursting through the concrete. The last race took place in 1972. The grandstand was demolished in 1985.The history of the racecourse is given in detail by Michael J. Hurley (2006).

Figure 1. Racecourse Park 1970. CUCAP AIG95c.

The station at Baldoyle on the Dublin to Drogheda railway line was opened in 1846. The mid 19th century double- arched railway bridge over the Mayne river and laneway (RPS 0919) is included on the list of Protected Structures on the Fingal Development Plan 2017-2023.

7.3.2 Cartography

Down Survey

Mayne (Moyne) is annotated on the Down Survey map (1654-6). The only structures shown in the immediate area are the mills at Mayne and Conneyborough,

Rocque's map (1760) of north-east county Dublin shows the area from the village of Baldoyle to the south, the roadway along the coast leading to the bridge over the river Mayne (Maine); a small settlement at the crossing over the river, annotated Maine, and the road that leads from the bridge towards Balgriffin, along which there is a further small cluster of buildings, and westwards to Stopolin. South of the Maine river, the terrain is in scrubby, enclosed almost grid-like fields, with the main axis running from Baldoyle village westwards; a short road or lane extends from the west road to two tiny structures on the bank of the river. Slopes or contours are indicated on the south side of the river towards the coast. It has been noted that the Mayne river now appears canalized.

North of the Maine/ Mayne river, Rocque shows a stream, which loops through the fields around the village of Portmarnock to the mill (annotated). A mound is shown south of the settlement at Portmarnock; the fields are similarly scrubby and grid- like, while one field south-east of the stream is shown as ploughed. Portmarnock House is shown north of the mound, but the late medieval settlement of the vill at Portmarnock is gone by this date.

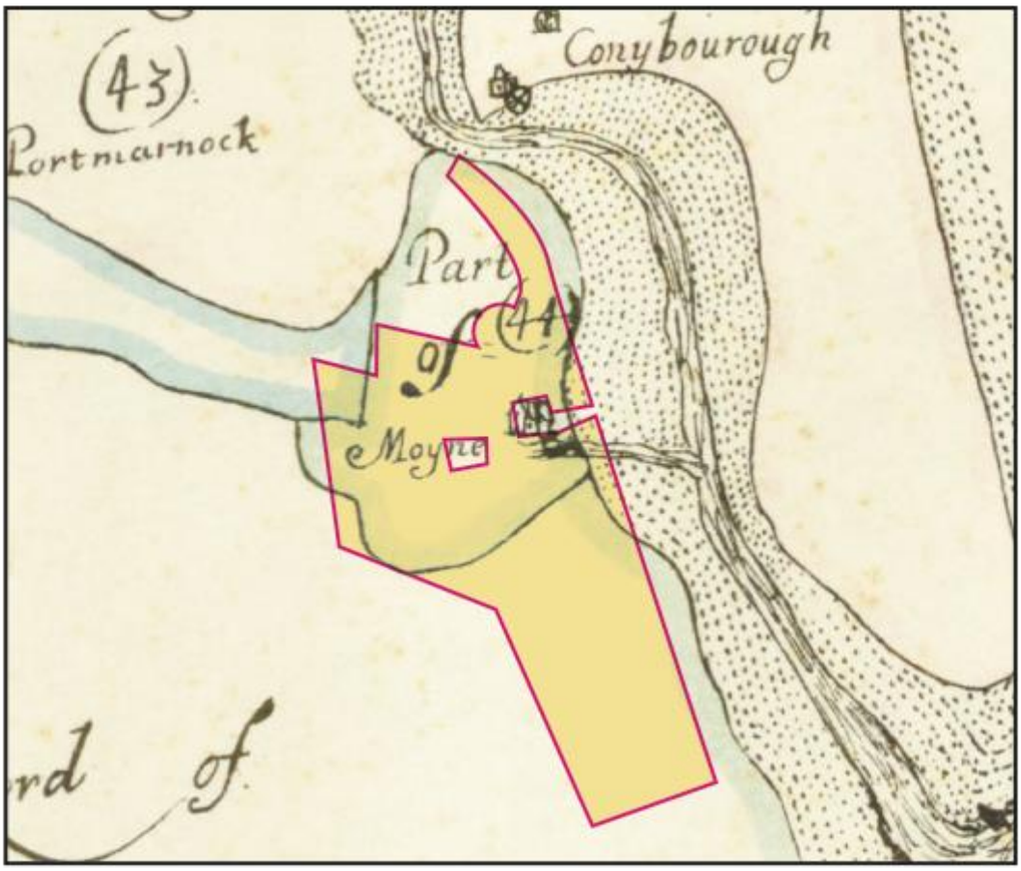


Figure 2. Site location on 1655-6 Down Survey map

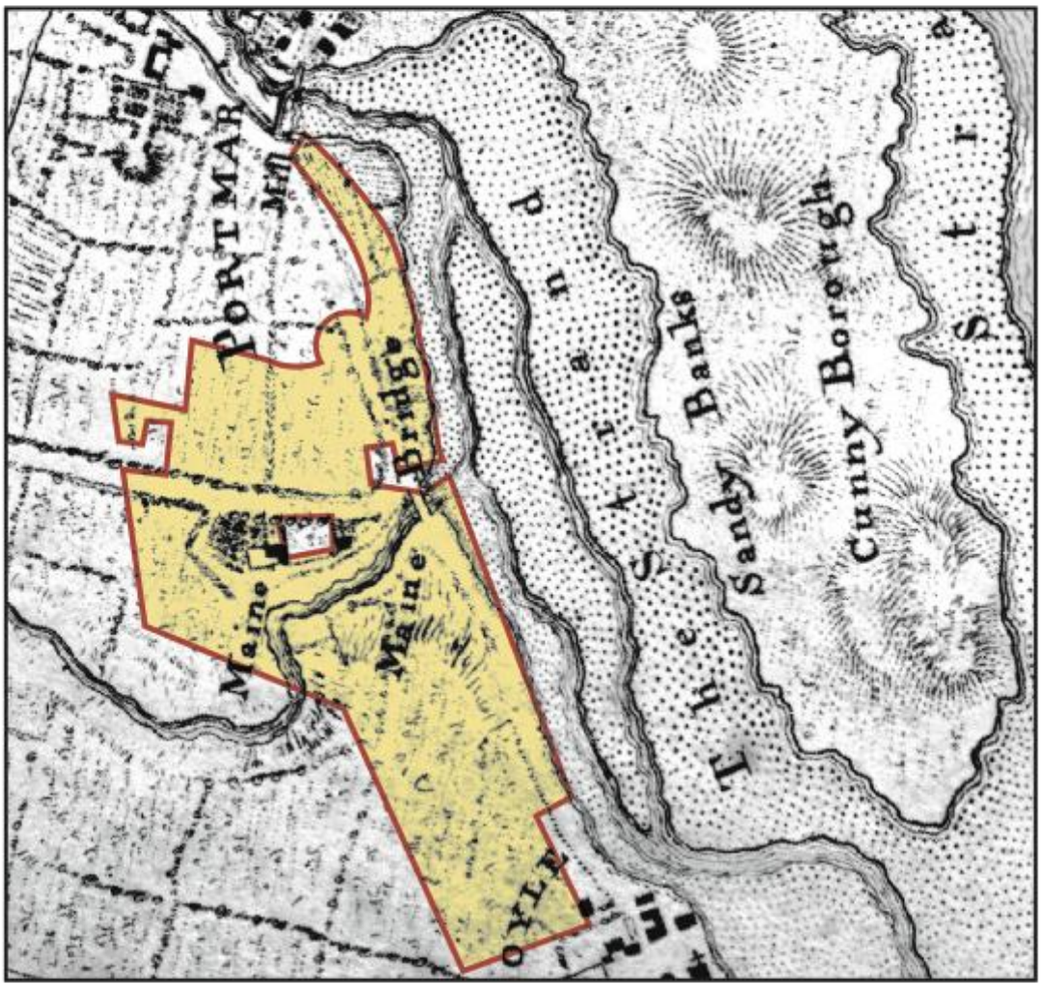


Figure 3. Site location on Rocque's 1760 map of County Dublin

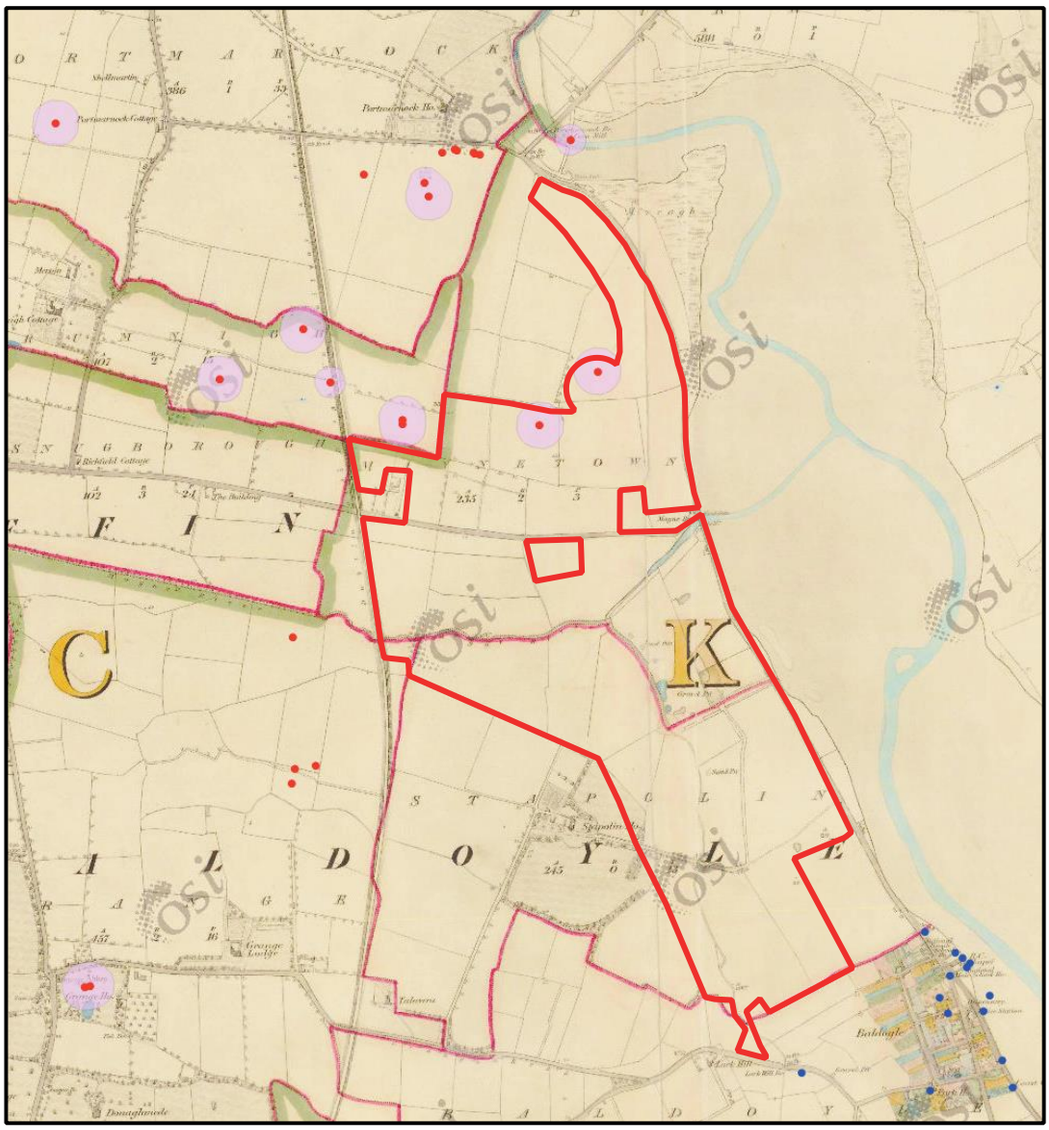


Figure 4. Park outline on Ordnance Survey first edition 1847.

Figure 5. Details of proposed works to RPS 0919, Railway Bridge.

The First Edition of the Ordnance Survey (1845-8) depicts ponds, sand pits and gravel pits, annotated on the southern part of Maynetown. The presence of 19th century sand and gravel pits indicates that a degree of disturbance has occurred here. It is intended to restore the ground as a habitat for migratory birds.

No features are shown or annotated on the northern part of the proposed park. Portmarnock Bridge and Corn Mill are annotated to the north of the site.

The train line, embankments, and Portmarnock Station are indicated on the 25inch historic map (1880-1913). The railway arch over Mayne Road is listed on the Record of Protected Structures in the Fingal Development Plan, entry 0919, Grange/Maynestown, Clongriffin, mid 19th century double-arch railway bridge. The undersides of the arches to the bridge will be repaired as part of the park development in a specification drawn up by CORA. These repairs are superficial, and do not require planning permission. They include the removal of growth such as ivy, the replacement of damaged or spalled brick work with similar, the removal of excessive cementitious repointing and repointing with a lime mortar, and general cleanup, including removal of dumped material beneath the arches.

The dwelling on the northern part of the site is shown- (now two dwellings). High Water Mark is indicated on the edge of the road. Mayne Bridge, the Flood Gate, and Sluice, are annotated, along with some small cottages. The wall of one of these cottages, now demolished, is still visible south of the Mayne river. The site of a well is annotated in the field north of the racecourse. Most of the former race course track is present within the park. The former stands however, lie outside the park boundary, as does the estate and gardens of Stapolin House. A property in an enclosed garden, Mayne Lodge, is first depicted on the Ordnance Survey 6 inch map (1845). The house still stands. It is included in the designated list of Designed Landscape and in the Unrecorded Built Heritage List of the same report, in the Greater Dublin Drainage

EIAR. (Jacobs/Tobin CH 16, 26). It is not included in the National Inventory of Architectural Heritage.

Townland boundaries are present within the proposed park site, and are shown on the 25inch map. These include the eastern boundary of Drumnigh townland, which is the existing field boundary, a ditch and hedgerow. The boundary between Maynetown and Stapolin crosses the southern part of the proposed park. Most of this is formed by the Mayne river, and trees/ hedgerow, with the south directed part another watercourse, the remaining part to the north of the former racecourse now gone.

Figure 6. Aerial photograph showing park boundaries and townland boundaries (hatched).

7.3.3 Other sources: SI, geophysics and aerial photographs

A site investigation report of the Baldoyle to Portmarnock Greenway (2018) was commissioned by Fingal County Council, and contained the results of bores, test pits, and other ground investigation such as contaminants. The line of the Greenway lies just west of the coast road from Red Arches to Station Road in Portmarnock. Bores and test pits were taken to assess the degree of ground contamination, amongst other. The results of the nine trial pits are of some interest for the archaeological report.
Made ground extended to 3.00m in BH1A, but generally only at the surface in TP2, 5 and 6.
Marine sands, commonly with shell and shell debris, was encountered across most of the southern part of the site to the south of the Mayne river, and in TP6 and 7 to the north of the Mayne river. This extended to below 2.8m at the south end, thinning to 1.5-1.8m at the north.

The line of the proposed Greater Dublin Drainage pipeline extends through the proposed park. A detailed Environmental Impact Assessment Report was prepared (Jacobs 2018) and geophysics and associated test trenching was carried out as part of this study. The line of the pipeline skirts the south side of the east-west ridge on which the group of monuments DU015-135, DU015-130 and DU015-055, are sited. This location, including the monuments in the adjacent townland of Drumnigh, was identified in the Report as an Area of Archaeological Potential (AAP 19: Coastal area and proliferation of archaeological sites: Jacobs /Tobin 2018 CH 16, 24).

Several phases of geophysical survey have been undertaken on parts of the lands, all for pre-development purposes. The results of geophysics on lands bordering the site are also of relevance for the park lands.

An overall map of the various geophysical surveys carried out to date has been overlaid on the 25inch map (1880-1911, figure 7), along with the main anomalies. Several of these latter have been tested. In one case, the compound fields to the north of the Mayne river was surveyed, with resulting anomalies, but no archaeological features were discovered following monitored topsoil stripping (see report below).

Few anomalies and few sites of significance were identified in the phases of geophysical survey south of the park boundary (Figure 7). Evidence from archaeological monitoring and excavation shows a considerable amount of former plough truncation, resulting in shallow and rather random cut features of archaeological origin.

The band of enclosures at the northern periphery of the park however, have been shown to present both in geophysics, and in follow-up test excavation, as well as aerial photography. A band of survey in 2007 along the line of a proposed altered Maynetown road uncovered several enclosures, DU015-118, 135 and 130, none of which appear to have been tested to date in follow- up trial trenching. The rerouted road scheme does not appear to be part of this park masterplan.

Several phases of geophysical survey were undertaken as part of the Greater Dublin Drainage Scheme (Licence 14R0045). Survey of the route within the townland of Drumnigh to the south of a large early medieval enclosure revealed a right-angled ditch, which is a possible relict field boundary. The southern side of the enclosure (above) was also identified in the survey. The potential entrance to this is located on the eastern side. A pit, and some curving responses were detected- the latter may be ditches.

The survey continued in to the townland of Maynetown, where six discreet areas of potential archaeological activity were detected, south of the complex of monuments DU015-135,130, and 055.

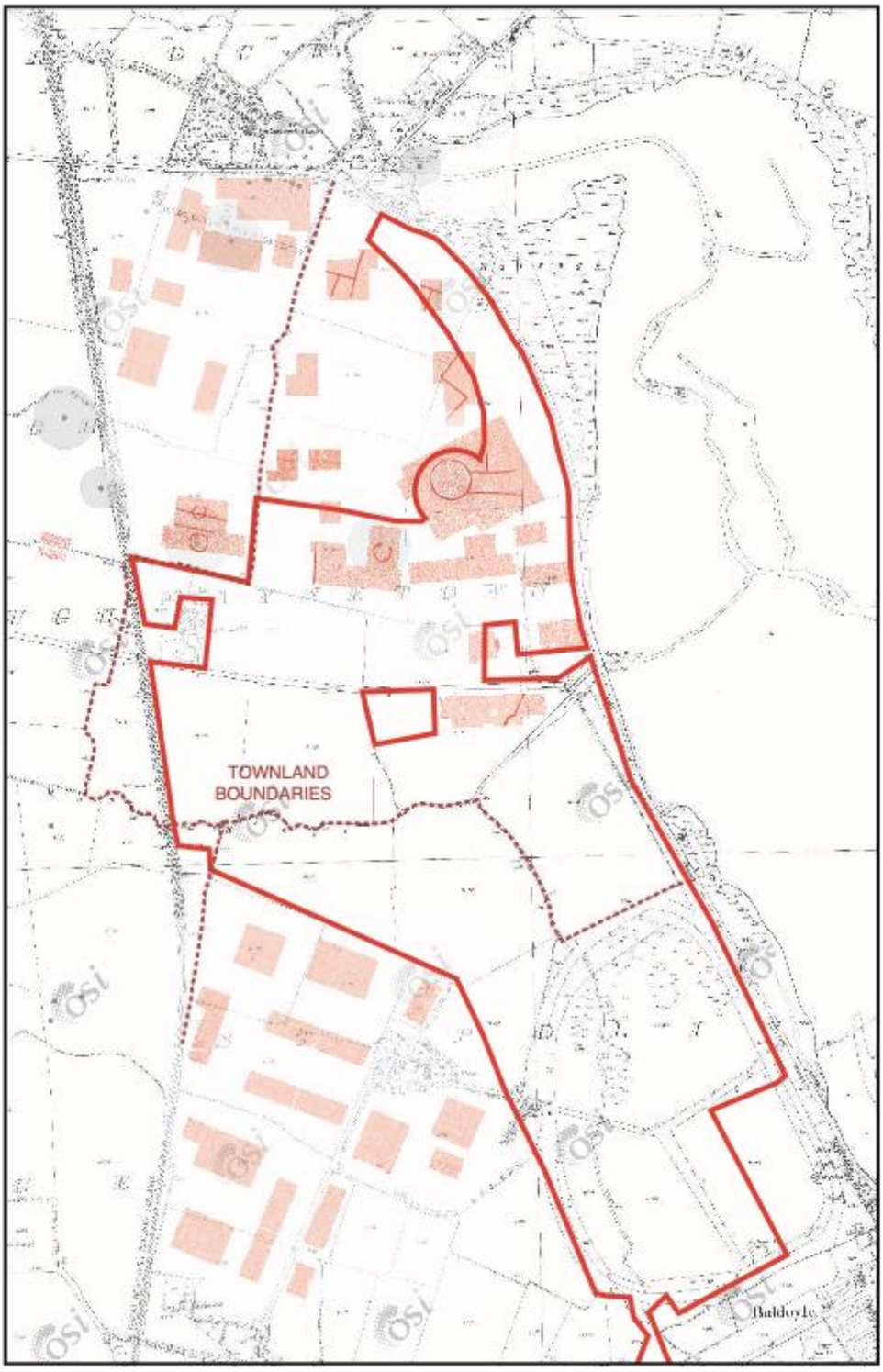


Figure 7. Geophysics overlaid on Ordnance Survey 25 inch map 1880-1909.

Several phases of aerial photography have been undertaken on these lands. The Cambridge survey identified a single monument, suggestive of a medieval moated site, on the southern borders of the park, now enclosed by a housing estate; this was partly excavated (see Duffy 2016).

Recent aerial photography (Google Earth) shows the location of monument DU015-055 very clearly. Less apparent but identifable is a similar sized possible enclosure sited to the south-west, immediately east of the townland boundary hedge with Drumnigh (Figure 8). This is sited in the zone for the Greater Dublin Drainage pipeline but is located in a large panel which was not subject to geophysical survey. It needs to be tested by geophysics and potentially licensed ground investigation. It is much less visible on an earlier Bing map, which shows the site DU015-117 under excavation. This Bing map does not clearly show either DU015-118, DU015-135 , or DU0150130, which are clearer on the later Google Earth (dry summer) series.

Figure 8. Bing maps, c. April 2017, showing excavation 16E0613 at north- west.

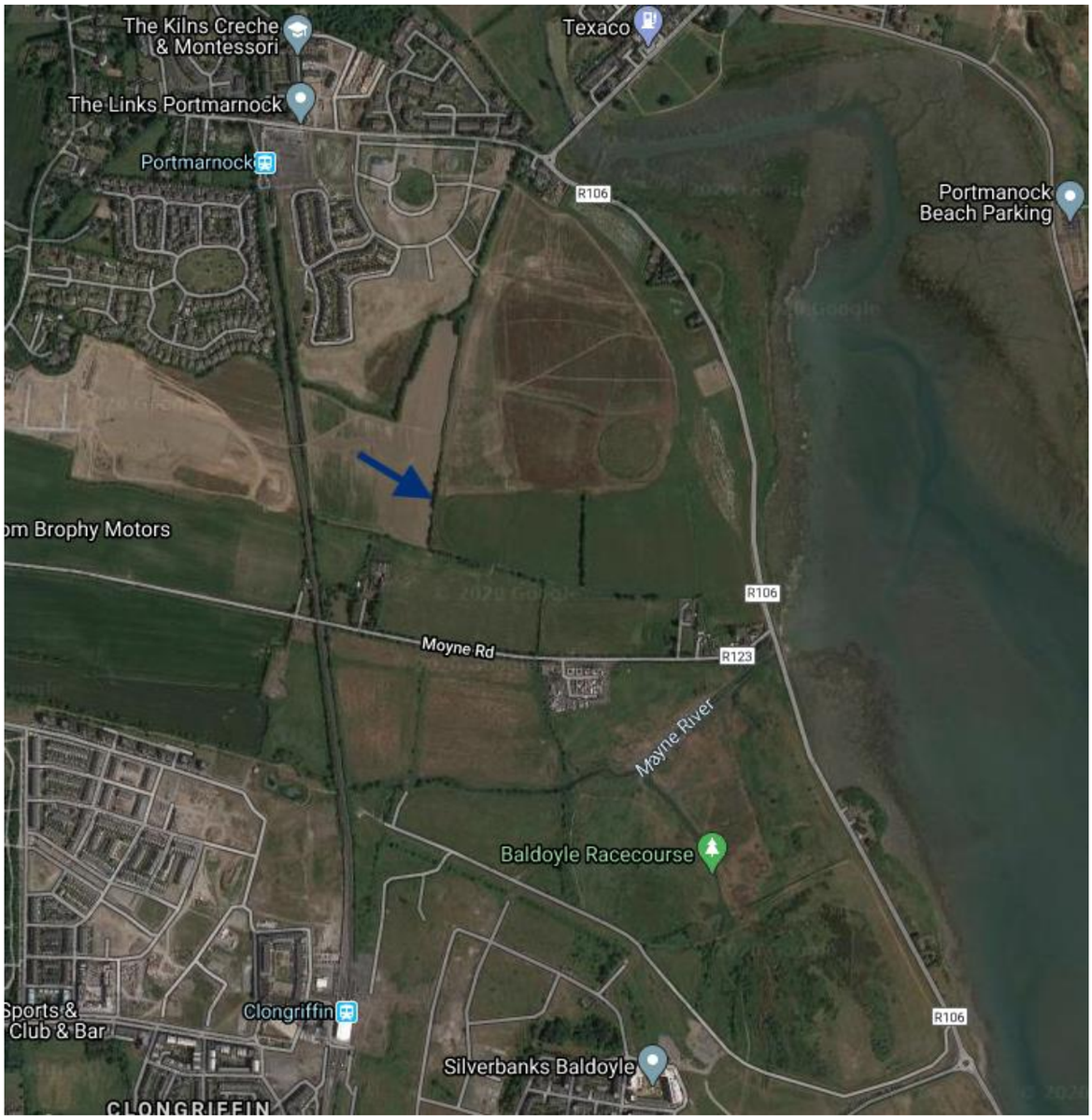


Figure 9. Screen-shot from Google Earth, possible enclosure arrowed.

7.4 Main interventions of the proposed project

The northern part of the proposed park encompasses the lands of the Portmarnock South Local Area Plan (LAP) which was published in 2013 by FCC. The existing LAP was updated to address specifically Green Infrastructural planning. This includes the preservation and enhancement of the archaeological and built heritage resource. The LAP noted the presence of several monuments within and on the margins of the lands, specifically enclosures, and the Portmarnock Burial Mound (DU015-014) which is also a Protected Structure Ref. no. 475. The latter is the reputed burial mound of Maine, son of Queen Maedbh of Connaught. The LAP states the agreement to preserve these monuments in situ and to accord a buffer zone of at least 20m between the monuments and any landscape alteration.

Additionally, the LAP addresses the historic townland boundaries between Portmarnock, Drumnigh and Maynetown, in the requirement that they remain intact on the plan lands. It is a

priority of the LAP that these heritage features, including existing trees and watercourses, are incorporated into the

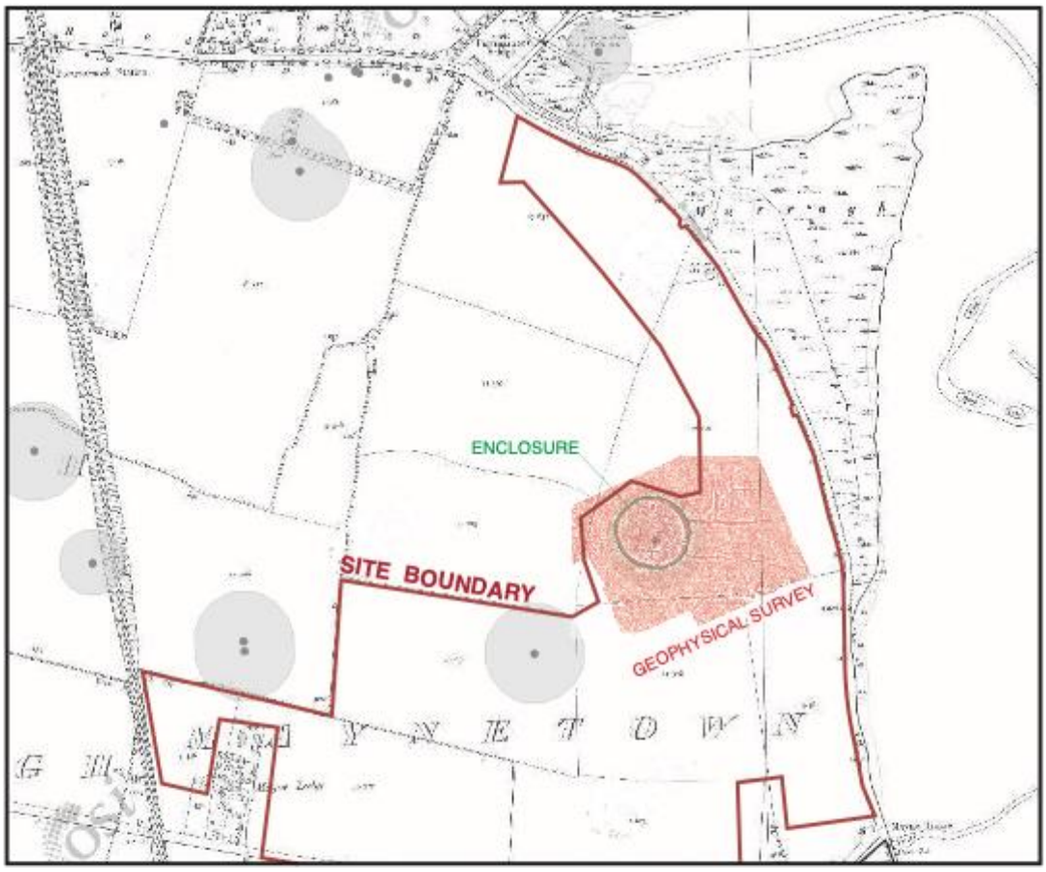


Figure 10. Detail of geophysics study of enclosure DU015-055.

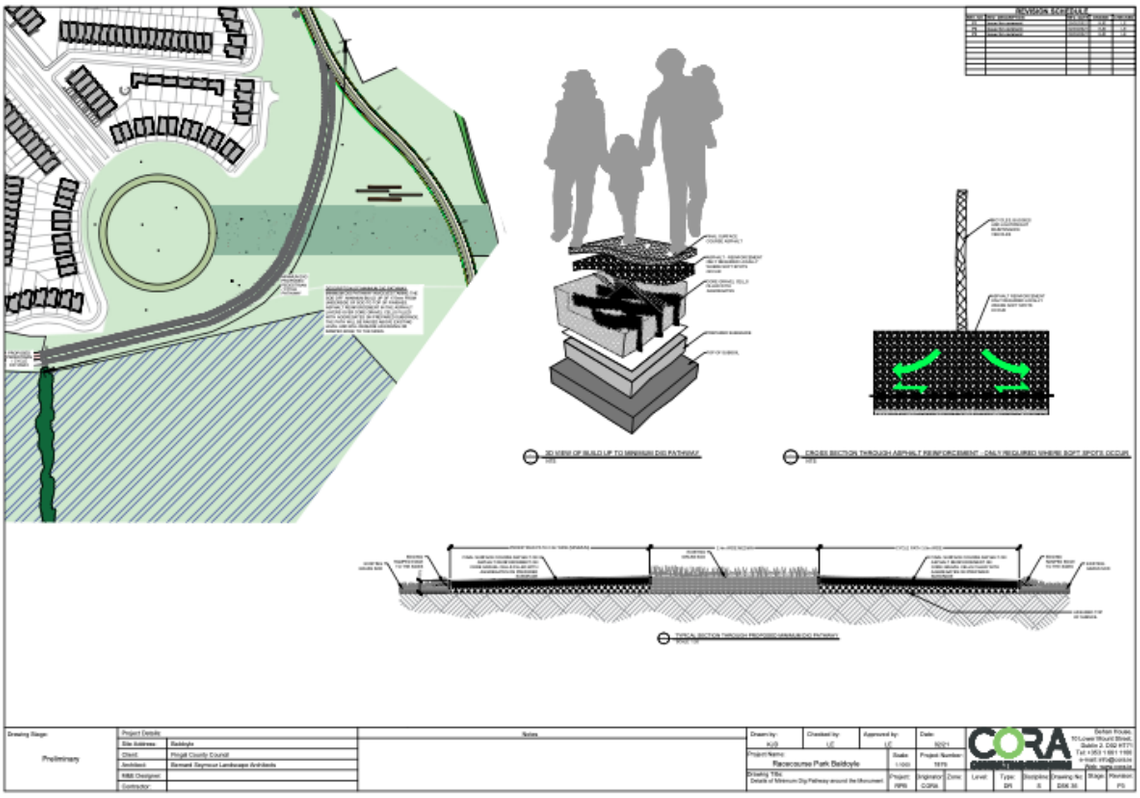


Figure 11. Schematic drawing showing materials to be used in minimum-dig pathways.

layout of any future schemes. It was preferable that Recorded Monuments be retained in situ and linked physically by a proposed green route. A suggested link in the LAP was between the Portmarnock Mound DU015-014 and enclosure DU015-055. Since the preparation of the LAP, further monuments/ enclosures DU014-118, DU015-130 and DU015-130 have been discovered within the lands. Permeability between these monuments along the east- west aligned ridge is proposed. No development or alteration of this area is proposed.

The northern part of the site appears to have most interest from the archaeological perspective. It is proposed to integrate monument DU015-055, which is presently located as a designated green area on an adjacent housing development, into the park. The fence between the monument and the park will be removed, and the fence reinstated further north, closer to the new housing development. A tracing of the outline of the monument and the linear ditched feature extending south- east from the entrance could be marked out on the landscape. It is proposed to mark out the original entrance and drove road with large concrete single slab elements set into the grass, with information etched into the concrete in relation to the archaeology. All groundworks here will require archaeological monitoring, and the footings of slabs should not be placed over the actual ditches/ archaeological features. Planting will be limited and will avoid known archaeological features. A buffer of a minimum of 20m from known archaeological features will be maintained.

The walking and cycling route interacts with the entrance to the Recorded Monument DU015. Any paths close to the monument will be no-dig paths. The paths are surface laid, and any ground levelling required during their construction will require archaeological monitoring. The attached drawing by CORA shows the low impact of the minimum dig path design to be used.

Timber stands: construction to be monitored

Location of SUDS pond: these are already constructed. A series of archaeological excavations have taken place on the development to the west.

7.4.1 South of Mayne Road

The southern part of the proposed park falls within the area of the Baldoyle-Stapolin Local Area Plan. This states that there are no recorded archaeological monuments within the area of the LAP,in contrast to the lands on the western side of the railway track, and the lands covered by the LAP for Portmarnock South, both of which have a high density of recorded monuments.

The construction for the pitches may require extensive grading of the ground surface, and drainage. If this is so, geophysical survey should be carried out in sample areas, away from railway/ late interference, with follow-up archaeological testing for verification. Geophysical survey samples should indicate how intensive potential archaeological anomalies are in this area.

Creation of wetland ponds: test trenches advisable to confirm depth of made-up ground here.

The lands on either side of Red Arches Road has been previously landscaped, with existing hard standing, buildings/ drainage. This area will continue to be used for play areas, a community centre, changing rooms and Multi Use Games Area. Any new interventions here require archaeological monitoring but archaeological potential is considered to be low.

7.4.2 Conclusions and recommendations

The proposed park can be divided into zones, depending on the current level of knowledge of the archaeological potential.
The potential of the zone to the northern perimeter is very high, with a band of enclosures here detected through geophysics. These will be retained in situ, with every effort to avoid disturbance. The minimal intervention in this area reflects the high archaeological potential here, with surface only paths skirting the buffer zone of known archaeological monuments. Therefore in the area of highest archaeological potential, there will be minimal impact.

Along the shore road, test pits, as part of the proposed 2018 Greenway, indicate that the underlying soils are composed of sands and mud. The SUDS pond has been created as part of the above works. Work here is limited to a new pathway.

The area of the proposed playing pitches, south of the Mayne Road, is unknown in terms of archaeology. Sample areas should have geophysical surveys undertaken, with the proviso for further survey if there is a high level of identifiable archaeological anomalies. Test excavation to follow to verify findings should be carried out, if any features identified in the geophysics are in the unavoidable location of construction. This is dependent on the requirement for levelling the ground and installation of drainage etc.

The southern part of the park is considered to be low in archaeological potential. Much of this area has been subject to landscaping, and OS historical maps indicate previous sand and gravel quarrying/ extraction here. Archaeological monitoring should be undertaken of groundworks.

All of these recommendations are subject to agreement with the National Monuments Service, Department of Housing, Local Government and Heritage.

7.5 Appendix A: Record of Monuments and Places, National Monuments

Sites which are entered on the Record of Monuments and Places are afforded protective status, by virtue of being included on the list and maps of these monuments. Most of the monuments below are scheduled for inclusion in the next revision of the Record of Monuments and Places. Where works are intended to be carried out at or within the zoned of notification of a Recorded or Registered Monument, they are required to give notice to the Minister two months before commencing that work.

DU015-015, Maynetown, Portmarnock, tide mill. Scheduled for inclusion in the next revision of the RMP. According to Flanagan, 1984, 108, there was an early tidal mill at the mouth of the river. From the 12th century, the Portmarnock corn mill and surrounding lands were owned by the Abbey of St Mary, Dublin. By 1650 there was only one mill, the tide water mill at Connyborough, situated just east of Portmarnock bridge and connected to the land by a causeway. It is shown on Rocque's map of 1760. In 1799 Thomas's Dickinson of Drumnigh took a lease of the mill and a year later knocked it down, rebuilding to three storeys. By 1867 the mill was unused as it had no water power. Damaged by a storm in 1903 and unroofed by 1912 it was taken down in the 1940s (Ahern 2013, 207). The remains of the mill comprise the footing of walls, sluice gate, 19th century mill race and fragmentary remains of the walls revetting the mill pond and inlet.

The following entries describe the structures and main features of the late medieval vill of Portmarnock.
DU015-136001, structure. Scheduled for inclusion in the next revision of the RMP. An extensive later medieval settlement, c. 50 by 70m NSx 110, containing six well defined property plots, was excavated at Station Road, Portmarnock (Licence no. 08E0376). The six plots were defined by linear ditches, and were separated into Toft and Croft areas by internal divisions. This structure was identified within Plot 1 which was defined by a series of shallow intercutting ditches, 16m-17m E-W x 64m. The north of the plot contained the truncated reminds of a structure with a metaled yard, well and rubbish pits to the rear. The structure 15m E-W, was defined by a stone wall which had been largely robbed out in the 17th century. Evidence for a doorway (c. 2.1m wide) survived along the southern wall, while internally the building contained a packed clay floor, the remains of a hearth and the foundations for an internal division.
A large assemblage of artifacts was recovered during the excavation, including in excess of 2,000 sherds of medieval pottery, mainly locally produced Leinster Cooking Ware and Dublin-type wares, as well as large numbers of metal artifacts. Evidence for food waste included butchered animal bone, as well as quantities of seashell, and carbonized grains. Radiocarbon analysis (AD 1491-1642) suggests the main occupation of the settlement was 16th-17th century (Moriarty 2009).

DU015-136002, Structure. This structure, one of two (see DU015-136003) was identified within Plot 2 which was defined by a series of shallow intercutting ditches (14m-16m E-W x 65m). The partial remains of two buildings and an associated yard area were identified to the front of the Toft, while the Croft was largely devoid of features. This structure was defined by shallow foundation cuts which enclosed a sub- rectangular area (6m N-S x 7m E-W). Although severely truncated by 17th century ditch and pits, the foundation cuts contained some in situ wall stones including a foundation pad. The partial remains of a packed floor and charcoal spread were uncovered in the interior.

DU015-136003, Structure. This structure, one of two (see above) was identified within Plot 2. It survived as an area of clay flooring (5.4m x 3.5m) with an associated hearth and a western shallow wall cut. It was in a poor state of preservation, having been truncated by a medieval gully and a 17th century ditch, as well as modern deep ploughing. Nine animal skulls (eight

horse, one sheep) were deliberately placed within the floor when it was thrown down. The horse skulls were all from stallions,

Figure 12. Location of sites in vicinity from National Monuments RMP map.

the majority of which were over 15 years old at the time of death. None had jaw bones attached, suggesting that they were defleshed at the time of interment. The placement of horse skulls in floors is a long tradition, and 17th and 19th century folklore accounts suggest that their presence was to bring luck to the inhabitants, as well as improve acoustics within the building. In addition, a ferrous knife with maker's mark (rosette, dot and sideward chevron) Dublin-type ware and Leinster Cooking ware were recovered from the floor (Moriarty 2009, 37).

DU015-136004, Structure. This structure was one of two identified within Plot 3, which was defined by a series of shallow intercutting ditches (14-16m E-W x 60m). The Toft contained the two structures along with pits, gullies and wells.
This rectangular structure (8.5m x 6m) was located at the front (N) of the Toft. It was divided into separate rooms by a internal wall. The southern room (5m E-W x 4m) was defined by low foundation walls and contained a packed clay floor and two areas of burning. The second room (2m NS x 4.8m EW) was defined by an L-shaped wall that had been severely truncated and contained a metaled floor. A horse skull had been placed in the Centre of the building. Leinster Cooking ware and Dubli wares were recovered from the structure. Charcoal inclusions from the floor deposit included oak and blackthorn while plant remains consisted of barley/wheat, oats, garden peas and legumes. Radiocarbon analysis of oak charcoal returned a date of c. AD 1491-1641.

DU015-136005. Structure, one of two within plot 3 (see above). This rectangular structure 4m EW x 5.5m, was located 0.7m NW of the other structure within the plot. Severely truncated, the surviving elements consisted of mud- bonded limestone walls and contained a well-defined hearth (0.60m diameter). The presence of a spud- stone suggested an east facing entrance. The interior of the structure was filled by accumulated domestic waste that consisted of food remains, medieval pottery, a glass bead, three knives and iron nails.

DU015-136006. Habitation site. The full extent of the western plots, 4-6, could not be assessed as they extended beneath Station Road. Plot 4 (15m wide by 55m) was defined by a series of shallow ditches, separated into Toft and Croft areas. A well pit (5.4m x 3m x 2m deep) was excavated. The waterlogged basal fill contained grass, twigs leather shoe fragments and part of a wooden bowl.

The Toft of plot 5 (21m wide x 48m) was dominated by a large terraced yard area (16m x 12m) while the Croft contained a scatter of pits and a large metaled laneway (5m wide) to the rear. The Toft of the west most plot 6 (www wide x 38m) contained a metaled surface, gullies, and pits white the Croft contained the partial remains of the metaled laneway.

DU015-014 Mound, Scheduled for inclusion in the next revision of the RMP. This flat- topped mound in s located on a slight rise and enjoys extensive views of the coast but restricted views to the north. The mound is oval in plan (27m N-S x 14m E-W, H 3.5m). Morris (1939, 18203) has associated this site with the burying place of 'Maine' sons of Medb and Ailill which is mentioned in the Metrical Dindsenchus. Originally the monument may have been considerably larger as according to a local landowner it was severely damaged in the early 1970s when an attempt was made to level it during field clearance works. In 2000, five trenches were excavated under licence 00E0731, around the base of the mound. Due to the lack of information from the testing, a geophysical survey was recommended.

In 2007, vegetation was removed and a topographical survey undertaken. Two test trenches were hand- excavated under licence 07E0754 into the eastern side of the mound and revealed the mound had been severely disturbed by modern activity. Intact mound deposits did survive and comprised dumped clay that contained infrequent pieces of shell and charcoal as well as occasional sherds of medieval pottery, suggesting that the mound may in fact be medieval in date and may be associated with the medieval village to the north- east. Test excavation to

the south of the mound identified an oval enclosure, the possible bailey associated with the mound. The monument has been landscaped and preserved within the new development.

DU015-014001, enclosure. This enclosure is visible on Aerial Photographs. It underwent test excavation (07E0574) as part of archaeological excavations of the mound (DU015-014). It is suggested that the enclosure may have served as a bailey.

DU015-055, enclosure. Located towards the western end of an east- west ridge with extensive views of the coast and Ireland's Eye. An Aerial photograph (OS 8, 7654) shows crop mark evidence for a roughly circular univallate enclosure. Geophysical survey and two test excavations were undertaken at the site in advance of proposed development.
The enclosure measures c 70m in diameter, and abuts an avenue feature, defined by two parallel ditches leading away from an east- west facing entrance. Initial archaeological testing (00E0732) consisted of a single trench situated diagonally across the site, that confirmed the presence of a ditch, entrance and archaeological material both internally and external to the main enclosure ditch. A decorated bone bead was recovered.

Further investigation of this monument took place; another phase in 2018 (licence 18E0409). This entailed monitoring of a single test trench between Baldoyle and Portmarnock, to identify the impact of a proposed cycleway on any previously unrecorded archaeological monuments. A single trench measuring 980 linear meters was excavated by machine. At ITM 723840/741684, a possible relict field boundary was indentified in the trench. This was a light yellow fine sandy fill, oriented east- west. No archaeological features were identified in the trench.

Three episodes of geophysical study were undertaken on these lands. The first in 2000 by Shiel et al was to determine the extent of archaeological material in these areas. Further programmes of detailed geophysical survey were carried out in 2002 and 2004 (Nichols 2002/Leigh 2004).

Anomalies on the geophysical studies were investigated in test trenching in 2004 under licence 04E1415 when twenty four test trenches were excavated. This uncovered archaeological material in the form of medieval field ditches extending from DU015-014, at the north- east of the site (later excavated under licence 08E0376). This area measured 630m by 525m.
Other pits and more recent land drains were uncovered in the test trenches, and several anomalies were due to silty variations in the natural strata and ploughing trends.

A possible trough of a Fulacht Fiadha was uncovered in trench 8 of this excavation. A note in OPW files from the 1980s states that a fulacht fiadha in the field next to the mound of Portmarnock (DU015:014) appears to have been removed by ploughing. The test excavation confirms that this was indeed the case.

Further test excavation under licence 07E0574 consisted of opening sections across the enclosure ditch and avenue of DU015-055. The ditch (c. 7m wide and 2.20m deep) was filled by a number of silty clay deposits that contained much charcoal, butchered animal bone, and sea shell. The lower fills were waterlogged, and contained decayed wood and grass. A charcoal sample from the primary fill was dated to AD 687-887 (2 sigma). A section was also excavated through the southern avenue ditch, and this revealed a cut measuring c. 5m wide by 1.2m deep.

According to the Portmarnock South LAP, the buffer zone for the monument will form part of the open space within the green infrastructure network. The site is currently fenced with overgrown wasteland.

DU015-063, enclosure, Grange townland. An aerial photograph (OS7 9517, 9519) showed cropmark evidence for a univallate enclosure which is roughly circular in plan. Test excavation (licence 03E1496) was undertaken in advance of housing development. Nine trenches were opened on the site of the monument but no traces of any features were identified. The site is now built over.

DU015-064001, enclosure, Grange townland. An aerial photograph (OS7 9517, 9519) showed cropmark evidence for a univallate enclosure (diameter c. 20m with an annex on the east. Test excavation (Licence 031496) in advance of housing did not identify the site. It is now built over.

DU015-096, burnt mound, Grange townland. Pre- development testing in 1993 revealed the remains of a prehistoric burnt mound, l=0.68m, w=0.96m. It comprised a deposit of heat shattered stone.
DU015-097, burnt mound, Grange townland. Archaeological testing in 2003 revealed the remains of a small prehistoric burnt- mound, l= 082m, w.068m. It consisted of a deposit of heat- shattered stone.

DU015-117, enclosure, Drumnigh townland. Scheduled for inclusion in the next revision of the RMP. A large oval shaped enclosure visible as a crop mark on an aerial photograph. May contain internal features (SMR file, pers. Comm, T. Condit). Geophysical survey (licence 14R001) undertaken at the site did not yield significant responses. However testing (Licence 14E0007) confirmed the presence of a large enclosure (c. 100m diameter) with a ditch 2.5m wide and 1.1m deep.The note on National Monument's website states that ' It is to be excavated in advance of development'.
Testing was carried out at the site in 2014. In addition to the potential enclosure DU015-117 and ring- ditch DU015-119, a figure of eight enclosure was identified within the development site through examination of aerial photography. The large figure of eight enclosure was 50m east- west by at least 75m north-south. Additionally 19th century deposits, and a brick- kiln, the latter to be excavated, were identified in the testing.

DU015-118, enclosure, Drumnigh townland. Scheduled for inclusion in the next revision of the RMP. A circular enclosure, visible as a crop mark on an aerial photograph (SMR file, pers.comm. T. COndit). This site was subject to three geophysical surveys, Geophysical survey (licence no. 07R0230) was undertaken in advance of proposed road realignment. It identified a pennanular ditch, c. 30m in diameter, with an entrance to the east (Nichols 2008). Another geophysical survey (Licence 07R0230EXT) also in advance of a proposed road realignment immediately north, identified another circular feature (c. 25m diameter) which may be associated (Harrison 2008). A third geophysical survey (14R0045) in advance of the Greater Dublin Drainage Scheme identified the southern limit of the same enclosure, the ditch of which may contain burnt remains (Bonsall 2014, 9).

DU015-119, ring- ditch, Drumnigh townland. Scheduled for inclusion in the next revision of the RMP. A circular ring- ditch visible as a crop mark on an aerial photograph (SMR file, pers. Comm, Tom Condit). Geophysical survey (Licence no. 14R001) confirmed the presence of a ring ditch (c. 12.5m in diameter) as did subsequent test excavation (Licence no 14E0007). It will be preserved in situ within green space of the development.

DU015-130, enclosure. The site was subject to geophysical survey (licence 07R0230) in advance of proposed road realignment. It confirmed the presence of a sub- circular enclosure (34m in diameter) that contains internal responses suggestive of pits and potholes (D. Harrison, licence 07R0230 ext).

DU015-134, enclosure, Drumnigh townland. Scheduled for inclusion in the next revision of the RMP. Geophysical survey (Licence 14R0010 and test excavation (Licence 14E007) were

undertaken in advance of a residential development. Within the same field to the east is a ring ditch (DU015-119) and to the North- east, an enclosure DU015-117). This monument is a large figure-of- eight enclosure (c. 75m north south by 50m east- west). The ditches, 2m wide by 1m deep, contain waterlogged basal deposits with well preserved mollusk and animal bone inclusions. A possible enclosure is located to the north- west. The southern element of the enclosure encompasses internal features including a possible kiln, pits and ditches.

DU015-135, enclosure, Drumnigh townland. Scheduled for inclusion in the next revision of the RMP. An enclosure was identified by geophysical survey Licence 07R0230 ext, undertaken in advance of a road realignment scheme. The circular enclosure 25m diameter, is located 27m north of another enclosure DU015-118, on the south facing slope of a low east- west ridge. Internal responses indicative of pits and postholes have been identified suggesting an area of occupation or settlement (Harrison 2008, 8).

DU015-137, road/ trackway, Portmarnock townland. A previously unrecorded medieval roadway was partially excavated (Licence 08E0376) in advance of car park construction. It is located 200m west of the medieval settlement DU0150136, and is oriented north- south, and extends beyond the limit of the settlement. The excavated section, 35m in length, consisted of a compact metalled surface 3-3.5m in width, flanked on either side by ditches, 1.2m- 1.6m in width.

7.6 Appendix B

Licensed archaeological investigation in the immediate area
There is a degree of overlap with the list of monuments given above. Where this occurs, the information is included with the recorded monument information, see Appendix A, above.

99E0467, archaeological monitoring of the North Fringe Sewer at Grange did not uncover any finds or features of archaeological significance.

00E0130, monitoring of the Baldoyle Flood Relief at Mayne Bridge. The survey noted that the river Mayne appears to have been canalised at some point in the past. Monitoring of works was undertaken, including grading of soil for a compound, 15m x 32m. A section of the old racetrack was exposed, this was 31m in width and made of compacted sand. No archaeological finds or features were recorded in the ensuing construction works.

00E0404. Monitoring of Landfall site for fibre optic cable at the foreshore in Baldoyle did not reveal any material of archaeological significance.

00E0731 see DU015-014 above.
00E0732, see DU015-055 above.

03E0350 and twenty one further licenses, The Grange, Baldoyle. This covers archaeological monitoring and excavation of fairly small sites at the construction site south of the Mayne River, and west of the railway line. The sites were mainly isolated pits, traces of burnt mounds, a ring- ditch, a cremation burial, and a ring- fort. Prior to development the site contained two recorded monuments, both detected through aerial photographs.
The isolated cremation pit, 0.55m by 0.40m and only 0.16m in depth, was located at the base of a shallow slope. A few fragments of crude ‘earthenware’ were located close to the pit.

The ringfort was c. 30m in diameter, with an entrance on the north- east side. A fragment of a lignite bracelet was recovered from a cut feature within the site.

One pit contained coarse pottery of late Bronze age date and an amber bead.
Few of the lithics recovered were actually knapped; most were natural, and/or plough damaged.
The pottery was two probable early Neolithic carinated bowls, a single late Bronze Age domestic vessel, and a possible late Bronze Age crucible.

03E0458. Monitoring for the Mayne Bridge Flood Alleviation scheme did not uncover any finds or features of archaeological significance. The site consisted of two fields to the north of the Mayne Road and one to the south. The site had been subject to geophysical survey in advance of works. The ploughsoil contained modern detritus, and a spread of burnt stone and redbrick was uncovered in one field- this was of no archaeological significance.

04E1024. Test excavation in advance of large scale construction in the townlands of Stapolin and Grange was undertaken following a geophysical survey. Nine test trenches excavated over anomalies did not uncover any finds or features of archaeological significance.

04E1294, Former Stapolin House and garden. Nine trenches excavated in advance of housing development uncovered the remains of garden features and outhouses relating to the 19th century Stapolin House. No other archaeological features were uncovered.

04E1415 see DU015-014 and DU015-055 above

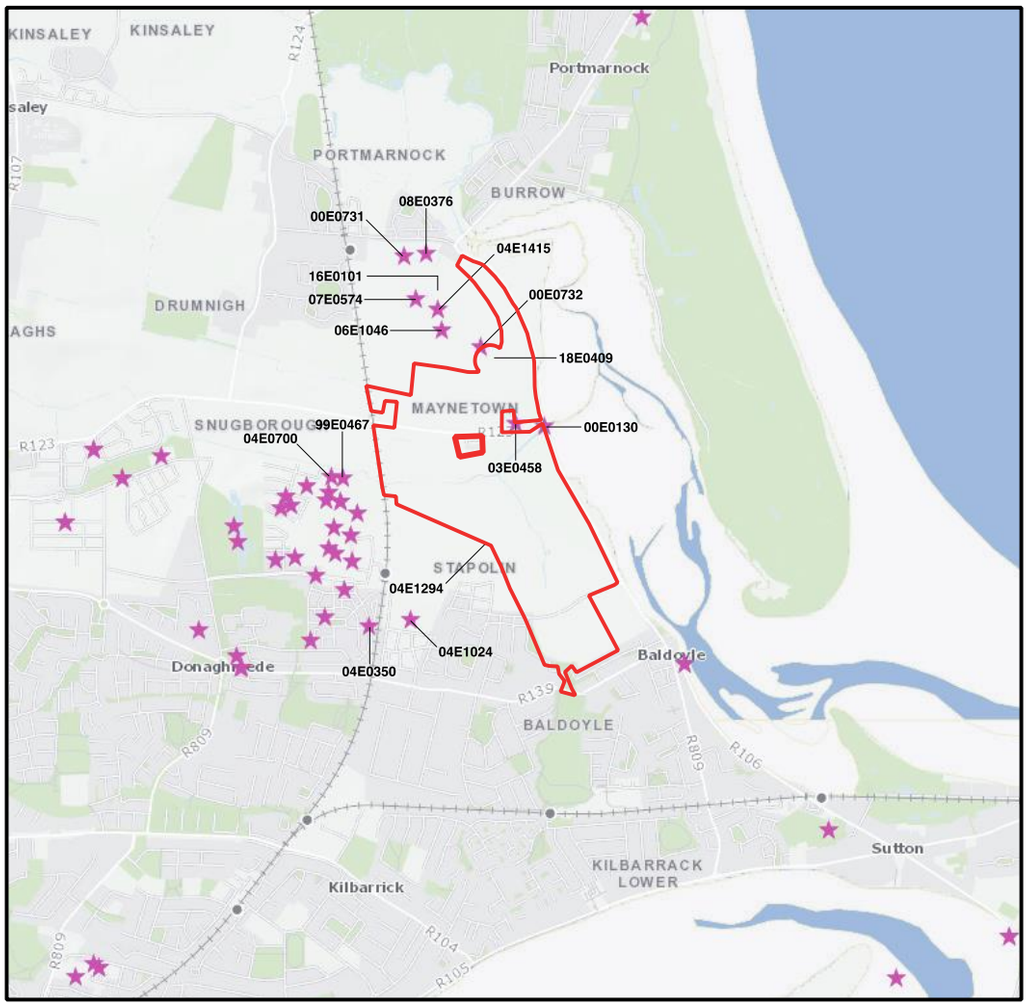


Figure 13. Location of licenced archaeological work in the immediate area

06E1046. Geotechnical pits excavated for development purposes were monitored with no archaeological results.

13E0E0238, excavation of possible moated site DU015-018 at Seagrange Housing Estate opened 10 trenches. Artefacts from the Neolithic period to the modern day were recovered. C14 dating from a possible hearth returned a date of 858-983 cal. AD. Medieval pottery sherds were recovered from topsoil.

07R0230, Geophysical report on proposed Mayne Road realignment. This is the second report on the proposed route. The first report identified two possible enclosures within the route. Soil conditions within the corridor are considered suitable for geophysical survey. Clear areas of archaeological potential were recognized within the area surveyed. Part of a circular enclosure, estimated at 25m in diameter, and a second potential larger enclosure, just 27m south, were identified. Information from the numerous geophysical reports on the park and adjacent sites is presented in the attached Figures.

16E0101, Station Road, Portmarnock.
This excavation summary, and the report below, 16E0613, describe work on three adjacent enclosures, only one of which is presently listed on the Record of Monuments and Places of National Monuments (DU015-014001). The enclosures are now absorbed by a housing development to the south side of Station Road.

Excavation of an early medieval ditched enclosure was carried out in response to a planning condition for housing at Station Road (F13A/0248). This site is an extension of an earlier development, which was subject to geophysical survey, archaeological testing and excavation (see above). Seven archaeological areas were identified, five of which were small- scale features. Six of these were fully excavated. One area was an extension of the medieval village excavated by Colm Moriarty in 2008.

Three ditches, one of which were oriented north- south, and two of which was oriented east-west contained medieval pottery, animal bone and shell.
Ditches and a pit of medieval date were also excavated in another area.
Part of a metalled trackway (DU015-137) was excavated in these works.
A large pit, filled with charcoal and burnt stones, was located towards the eastern end of a foul water pipeline leading to Coast Road. The feature suggests the presence nearby of a burnt mound.
A cereal drying kiln and linear feature of uncertain function were located within the main ditched enclosure. This was a sub- square enclosure which measured 39m north- south by 50m east- west internally, with an entrance gap 2.5m in width at the north- north- east side. The ditch was 2 to 4.75 m in width, and 0.8 to 2.60m in depth.
An extension to the ditch on the south- eastern side, and the presence of a gap here, is indicative of an entrance for livestock.
Finds were animal bone, marine shell, and the waterlogged lower fills produced a wooden barrel hoop of yew fastened with a leather tie, part of a wooden staff, and a decorated ring-pin. C14 dating from the wooden hoop was Cal AD 686-876 at 2 sigma (late 7th to 9th centuries).
No evidence for dwelling was recovered from within the enclosure.

16E0613, excavation of a sub- surface ditched enclosure was carried out at the large development site (as above). The enclosure was depicted on aerial photography. The northern part of the enclosure is within the conservation area for the mound at Portmarnock (DU015-014). The excavation took place over a 14 week period from January 2017. The feature measured 77m east- west by 70m north- south, with an entrance to the east. The ditch was 5.5m in width, and 1.65m in depth. A wooden hoop, similar to that found in the above site, was recovered from close to the base of the ditch, and dated by C14 to AD641-763 @ 2 sigma. Finds recovered from the ditch include early Medieval pottery, imported pottery (LRA 1 and possibly also some E- ware; a wooden dish in the base of the ditch, stone tools and worked

antler artifacts. A large quantity of butchered animal bone was recovered. Cereal drying kilns and metal working activity are attested to from the interior, and a single adult burial was recovered from the interior of the enclosure.

The third enclosure, identified from Aerial photography, was also tested: this lies c. 200m south of this enclosure. This is a large double ditched enclosure, with animal bone and shell from ditch fills tested. It is considered likely that it dates to the same period as the other two enclosures.

16E0574. Assessment of a development site at the north side of Station Road did not uncover any deposits of archaeological significance.

18E0016. This site lies immediately south of Station Road, and east of the Dublin- Belfast railway line. Excavation took place over a 13 week period. A pattern of ditches, broadly similar to those uncovered in the excavation of the medieval Ville of Portmarnock, was exposed. A metalled yard area and three well pits were uncovered. An L- shaped foundation with a stone keyhole shaped structure is likely to be an oven. Charred wheat was recovered, dating to 1275-1386 cal AD (C14). Charred barley from a ditch was recovered.

Full excavation of a burnt mound trough was carried out- a sample of hazel was dated to 2135-1920 cal BC (early Bronze Age).

17E0757 Maynetown. Testing of cropmark features was carried out in response to comments by National Monuments to a pre- application submission to An Bord Pleanala. It lies north-west of the proposed park. Many of the features – ditches, linear cuts, and others, visible on AP contained modern material, and nothing of significance was found.

19E0303, Portmarnock. Further test excavation of the outer enclosure of this monument, subject to excavation in 2017 (see 16E0613, above) was undertaken at the request of National Monuments. A Bronze age date was recovered from birch fragments in the base of the ditch, along with a possible late Bronze age dagger fragments, and iron slag. It appears to be a site of possible multi-date occupancy.

20E0598, Maynetown, Drumnigh and Portmarnock. Pre-planning test excavation was carried out along a proposed haul route associated with Phase 1C of a permitted housing development (planning reference ABP Ref. 305619-19) on behalf of a private developer.
The testing took place over six days from 12 November 2020. Eleven trenches totalling 850 linear metres were excavated along the centre line of the proposed haul route and no features, finds or deposits of archaeological interest were identified. The western end of the proposed haul route is adjacent to a double ditched enclosure excavated in 2019 under licence 19E0303.
Additional archaeological investigation will be required in two locations where the proposed haul route crosses the townland boundaries between Portmarnock-Drumnigh and Drumnigh-Maynetown, however this will not be carried out until planning permission has been granted to breach the townland boundaries.

7.7 References

Ahern, G. 2013. Portmarnock: Its people and townland, a history. Fingal County Council Libraries
Brady, N. 2009. Dublin's maritime setting and the archaeology of its medieval harbours in Dublin in the Medieval world eds J. Bradley, A.J. Fletcher, and a. Simms.
Duffy, P. 2016. The church of Bearach, the grange of Baldoyle and the town of the dark stranger in Medieval Dublin XV, ed. S. Duffy.
Duffy, P. 2018. Balgriffin Cross. Archaeology Ireland Vol. 32, No. 2.
Fingal County Council 2013 Local Area Plan Portmarnock South.
Fingal County Council 2013 Local Area Plan Baldoyle- Stapolin. Environmental Report.
Hurley, M. J. 2006. Baldoyle as a Racecourse Village. DHR vol. 59, no. 1
Jacob/Tobin 2018. Greater Dublin Drainage Scheme EIAR.
Mac Shamrain, A. 2016. Swords and district; the political and ecclesiastical background, fifth to twelfth centuries in Medieval Dublin XV, ed. S Duffy.
Manning, C. 2018. More on the Balgriffin Cross-slab. Archaeology Ireland vol. 32, no. 3.
Mitchell, G. 1972. Further excavations of the early kitchen middens at Sutton, county Dublin. JRSAI cii.
Moriarty, C. 2009a. Final report, archaeological excavations at Portmarnock , Co. Dublin. Licence no. 08E0376. Unpublished Report submitted to the National Monuments Service, Department of Culture, Heritage and the Gaeltacht.
Moriarty, C. 2011. The medieval vill of Portmarnock. Medieval Dublin XI, ed. S. Duffy.

Web:
http://www.archaeology.ie
http://excavations.ie
http://www.heritagemaps.ie

Photographs:
CUCAP
Google Earth
Bing maps

APPENDIX 2.1

DRILL & TRIAL PIT LOGS

OCB GEOTECHNICAL (2018)

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Borehole No.:** BH 1
Coordinates: 723897.17 E 741484.68 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1
Method: Cable Percussion	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:50
		Driller: RN
Plant: Dando	**Ground Level:** 3.51 mOD	**Dates:** 12/07/2018 - 12/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.80	B1							MADE GROUND: Brown sandy gravelly silty Clay with high cobble and boulder content, dry to slightly moist.		
0.00 - 0.80	D2					(0.80)				
					2.71	0.80		End of borehole at 0.800m		

Remarks
Relocated due to large boulder in borehole

Water Added	
From (m)	To (m)

Water Strike - General			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Casing Details	
To (m)	Diam (mm)

Chiselling Details		
From (m)	To (m)	Time (hh:mm)

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Borehole No.:** BH/RC1A	
Coordinates: 723897.17 E 741484.68 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 2	
Method: Cable Percussion+Rotary Coring	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:50	**Driller:** RN+DS
Plant: Dando+Socamafor 50/65	**Ground Level:** 3.51 mOD	**Dates:** 13/07/2018 - 30/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.70	B1							MADE GROUND: Brown slightly sandy slightly gravelly clayey SILT with high cobble content, dry to slightly moist.		
0.00 - 0.70	D2					(0.70)				
0.70 - 1.00	B3				2.81	0.70		POSSIBLE MADE GROUND: Very soft to soft greyish brown slightly sandy, slightly gravelly silty Clay with medium cobble content and a trace of yellow and red brick fragments and glass fragments. Sand finer to coarse. Gravel fine to coarse, angular to subrounded.		
0.70 - 1.00	D4									
1.00 - 2.00	B5									
1.00 - 2.00	D6									
1.20 - 1.65	SPT (C) N=6			N=6 (1,1/1,2,2,1)						
						(2.30)				
2.00 - 3.00	B7									
2.00 - 3.00	D8									
2.00 - 2.45	SPT (C) N=3			N=3 (1,2/1,1,1,0)						
3.00 - 3.50	U23			Ublow=2 0%	0.51	3.00		Very soft grey slightly gravelly silty CLAY with occasional shell fragments and dark brown and black partially decayed plant fragments, moist (ESTUARINE ALLUVIUM)		
3.00 - 4.00	B9									
3.00 - 4.00	D10									
			3.50	13-07-2018		(1.00)				
4.00 - 5.00	B11				-0.49	4.00		Firm becoming stiff greyish brown slightly sandy, gravelly silty CLAY with low to medium cobble content., moist. Sand fine to coarse. Gravel fine to coarse, angular to subangular.		
4.00 - 5.00	D12									
4.00 - 4.45	SPT (C) N=8			N=8 (1,2/2,2,2,2)						
5.00 - 6.00	B13					(2.00)				
5.00 - 6.00	D14									
5.00 - 5.45	SPT (C) N=17			N=17 (2,3/3,4,5,5)						
6.00 - 7.00	B15				-2.49	6.00		Stiff greyish brown slightly sandy, slightly gravelly, silty CLAY with medium cobble content., moist. Sand fine to coarse. Gravel fine to coarse, angular to subrounded. Cobbles subangular to subrounded, predominantly dark grey fine grained limestone. (GLACIAL TILL)		
6.00 - 7.00	D16									
6.00 - 6.45	SPT (C) N=18			N=18 (3,4/4,4,5,5)						
7.00 - 8.00	B17									
7.00 - 8.00	D18									
7.00 - 7.45	SPT (C) N=20			N=20 (4,5/6,5,4,5)						
						(3.65)				
8.00 - 9.00	B19									
8.00 - 9.00	D20									
8.00 - 8.45	SPT (C) N=40			N=40 (4,7/9,9,9,13)						
9.00 - 9.60	B21									
9.00 - 9.60	D22									
9.00 - 9.22	SPT (C)			25 (10,15/25 for 75mm)						
9.60 - 9.68	SPT (C)			25 (50 for 60mm/25 for 20mm)	-6.14	9.65		Rotary Open Hole Drilling Driller describes: Dark grey gravelly CLAY with cobbles and boulders		
						(0.65)				
					-6.79	10.30				
	TCR	SCR	RQD	FI						

Continued on Next Page

Remarks

From 10.76m to 11.05m: Moderately strong and more highly weathered with much light grey discolouration and up to 70mm thick infill of light yellowish brown gravelly silty clay on discontinuities.

Water Added	
From (m)	To (m)
1.20	4.00

Water Strike - General			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.50		20	3.50
4.00		20	3.00
10.20	10.20	20	4.30

Casing Details	
To (m)	Diam (mm)

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
9.60	9.65	01:00

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Borehole No.:** BH/RC1A	
Coordinates: 723897.17 E 741484.68 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 2 of 2	
Method: Cable Percussion+Rotary Coring	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:50	**Driller:** RN+DS
Plant: Dando+Socamafor 50/65	**Ground Level:** 3.51 mOD	**Dates:** 13/07/2018 - 30/07/2018	**Logger:** MN

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.30 - 10.60	100	87	73	7	55 (6,7/55 for 150mm)				Strong dark grey fine grained muddy LIMESTONE with wavy bedding dipping 30 degrees. Slightly to distinctly weathered with occasional yellowish discolouration along discontinuities. Discontinuities: closely to medium spaced, locally very closely spaced (1) Bedding parallel / 30 degrees, planar, rough (2) Subvertical, undulating, rough Occasional yellowish to orangish staining on fracture surfaces.		
11.30	100	83	74				(3.00)				
12.30	96	76	63	8							
13.30						-9.79	13.30		End of borehole at 13.300m		
	TCR	SCR	RQD	FI							

Remarks
From 10.76m to 11.05m: Moderately strong and more highly weathered with much light grey discolouration and up to 70mm thick infill of light yellowish brown gravelly silty clay on discontinuities.

Water Added	
From (m)	To (m)
1.20	4.00

Water Strike - General			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.50		20	3.50
4.00		20	3.00
10.20	10.20	20	4.30

Casing Details	
To (m)	Diam (mm)

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
9.60	9.65	01:00

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Borehole No.:** BH/RC2	
Coordinates: 723881.93 E	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 2	
Method: CABLE PERCUSSION+ROTARY OPEN+ROTARY CORING	741525.91 N	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:50
Plant: Dando+SOCOMAFOR	**Ground Level:** mOD	**Dates:** 17/07/2018 - 31/07/2018	**Driller:** RN+DS **Logger:** MN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.00 0.00 - 1.00	B1 D2					(1.00)		MADE GROUND: Angular Cobbles and small Boulders of concrete and limestone with a little dark grey slightly sandy, slightly gravelly silty clay, moist.		
1.00 - 2.00 1.00 - 2.00 1.20 - 1.65	B3 D4 SPT (C) N=1			N=1 (0,1/0,0,1,0)		1.00 (1.00)		Very soft grey slightly gravelly, silty CLAY with frequent partially decayed plant fragments and associated brown and dark grey mottling and occasional shell fragments, moist. Gravel fine to coarse, angular to subrounded. (ESTUARINE ALLUVIUM)		
2.00 - 3.00 2.00 - 3.00 2.00 - 2.45	B5 D6 SPT (C) N=3			N=3 (1,0/1,1,0,1)		2.00 (1.00)		Soft grey slightly gravelly, silty CLAY with some laminae of silty fine sand, moist. Gravel fine to coarse, angular to subrounded. (ESTUARINE ALLUVIUM)		
3.00 - 3.50 3.00 - 3.50 3.00 - 3.50	B7 D8 U17			Ublow=3 0%		3.00 (0.50)		Stiff grey slightly gravelly, silty CLAY with high cobble content, moist. Gravel fine to coarse, angular to subrounded. Cobbles angular to subrounded.		
3.50 - 4.50 3.50 - 4.50 4.00 - 4.45	B9 D10 SPT (C) N=19			N=19 (2,4/4,4,5,6)		3.50 (1.00)		Stiff grey slightly sandy, gravelly, silty CLAY with medium cobble content, moist. Sand fine to coarse. Gravel fine to coarse, angular to subrounded. Cobbles angular to subrounded.		
4.50 - 5.50 4.50 - 5.50 5.00 - 5.45 5.50 - 6.50 5.50 - 6.50 6.00 - 6.45 6.50 - 7.30 6.50 - 7.30 7.00 - 7.31 7.30 - 7.41	B11 D12 SPT (C) N=27 B13 D14 SPT (C) N=32 B15 D16 SPT (C) SPT (C)			N=27 (3,5/5,6,8,8) N=32 (2,5/6,8,9,9) 62 (4,8/62 for 160mm) 25 (50 for 80mm/25 for 30mm)		4.50 (2.90) 7.40		Stiff becoming very stiff greyish brown slightly sandy, slightly gravelly, silty CLAY with medium cobble content, moist. Sand fine to coarse. Gravel fine to coarse, angular to subrounded. Cobbles angular to subrounded, predominantly dark grey fine grained limestone. (GLACIAL TILL)		
8.80 - 9.02	SPT (C)			41 (10,14/41 for 75mm)		(3.00)		Rotary Open Hole Drilling Driller describes: Dark grey gravelly silty CLAY with cobbles and boulders		

Continued on Next Page

Remarks
Cable percussion borehole terminated at 7.4m by client.

Water Added		Water Strike - General			
From (m)	To (m)	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
		4.10 10.30	10.30	20 20	3.20 4.20

Casing Details		Chiselling Details		
To (m)	Diam (mm)	From (m)	To (m)	Time (hh:mm)
		7.30	7.40	01:00

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Borehole No.:** BH/RC2	
Coordinates: 723881.93 E	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 2 of 2	
Method: CABLE PERCUSSION+ROTARY OPEN+ROTARY CORING	741525.91 N	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:50
			Driller: RN+DS
Plant: Dando+SOCOMAFOR	**Ground Level:** mOD	**Dates:** 17/07/2018 - 31/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.40 - 10.48	SPT (C)			0 (45 for 75mm/0 for 0mm)		10.40		Moderately strong to strong dark grey fine grained muddy LIMESTONE with occasional bioturbation texture. Distinctly weathered with occasional orange brown discolouration along discontinuities and incipient discontinuities and locally penetrating a few millimetres into the matrix. Occasional calcite veins (mostly <1mm thick, locally up to 6mm thick). From 10.57m to 10.69m thin bed of strong grey fine to coarse grained limestone with frequent fossil shell debris. Discontinuities: closely spaced, becoming by 11.6m closely to medium spaced (1) 30 to 45 degrees, planar to undulating, rough (2) Subvertical, undulating, rough Occasional orange brown staining on fracture surfaces.		
						(1.90)				
						12.30		Moderately strong light grey fine grained muddy LIMESTONE. Distinctly to highly weathered with some orange brown discolouration along discontinuities and incipient discontinuities, locally penetrating into the matrix. Occasional calcite veins (up to 6mm thick). From 12.30m to 12.37m much calcite veining (up to 40mm thick) and 30mm of gravelly silty clay infilling on a subvertical fracture. Discontinuities: closely spaced, becoming by 12.9m very closely paced (1) 30 to 45 degrees, planar to undulating, rough (2) Subvertical, undulating, rough Much orange brown and occasional dark brown staining and up to 3mm of gravelly silty clay infilling on fracture surfaces.		
						(1.00)				
						13.30		End of borehole at 13.400m		
	TCR	SCR	RQD	FI						

Remarks
Cable percussion borehole terminated at 7.4m by client.

Water Added	
From (m)	To (m)

Water Strike - General			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
4.10		20	3.20
10.30	10.30	20	4.20

Casing Details	
To (m)	Diam (mm)

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
7.30	7.40	01:00

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway		**Trial Pit No.:** TP1
Co-ordinates: 724225.93 E 740839.32 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council		Sheet 1 of 1
Method: Trial Pitting	**Client's Representative:** WS Atkins Ireland Limited		**Scale:** 1:20
			Driver:
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 10/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.30)		TOPSOIL: Dark brown slightly gravelly, slightly clayey, silty fime to medium SAND with frequent rootlets, dry to slightly moist	
				0.30		Brown slightly gravelly slightly, clayey, silty fine to medium SAND with occasional rootlets. Bottom varies from 0.4m to 0.6m bgs.	
0.40 - 0.80 0.40 - 0.80	B1 D2			(0.30)			
				0.60		Light brown and grey thinly interbedded slightly gravelly silty SAND and very sandy GRAVEL with frequent shells and shell fragments, and occasional rootlets, dry to slightly moist. Top varies from 0.4 to 0.6m bgs.	
				(0.20)			
				0.80		Light brown slightly silty slightly gravely fine to coarse SAND with frequent shells and shell fragments, moist becoming by 2m wet. Gravel is fine to coarse, subangular to subrounded.	
0.90 - 1.40 0.90 - 1.40	B3 D4						
				(1.80)			
2.00 - 2.50 2.00 - 2.50	B5 D6						
				2.60		End of trial pit at 2.600m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Remarks

Water Strikes:	
Struck at (m):	Remarks:

Stability: Slight spalling of sides

Width: 1.10

Length: 2.50

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP2	
Co-ordinates: 724150.73 E 740965.63 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1	
Method: Trial Pitting	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20	
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 10/07/2018	**Driver:**
		Logger: MN	

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	
				(0.30)		MADE GROUND / TOPSOIL Dark brown and greyish brown as below, but with frequent rootlets.		
				0.30		MADE GROUND: Greyish brown slightly silty, gravelly fine to medium Sand with low cobble and boulder content, and occasional rootlets, dry. Gravel fine to coarse, angular to subrounded. Cobbles include angular concrete with red brick. One metal bar (830 x 40 x 10mm). Trace of glazed stoneware.		
0.50	ES2			(0.50)				0.5
0.80 - 1.30 0.80 - 1.30	B2 D3			0.80		Yellowish brown, becoming by 1.1m light brown, medium to thickly interbedded slightly gravelly fine to medium SAND and gravelly fine to coarse SAND. Occasional shell fragments in fine to medium sand and frequent shells and shell fragments in fine to coarse sand. Gravel is fine to coarse subangular to subrounded. Moist becoming by 1.5m wet.		1.0
1.50 - 1.80 1.50 - 1.80	B4 D5			(1.90)				1.5
2.00 - 2.50 2.00 - 2.50	B6 D7							2.0
		Steady flow					▼	2.5
				2.70		End of trial pit at 2.700m		
								3.0
								3.5

Remarks

Water Strikes:	
Struck at (m):	Remarks:
2.50	Steady flow

Stability: East side collapse

Width: 1.10

Length: 2.60

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP3	
Co-ordinates: 724047.54 E 741139.24 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1	
Method: Trial Pitting	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20	
Plant: Komatsu PC30HR	**Ground Level:** mOD	**Date:** 10/07/2018	**Driver:**
		Logger: MN	

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.30)		TOPSOIL: Dark brown slightly gravelly, slightly clayey, silty Sand with frequent rootlets, dry to slightly moist.	
				0.30		MADE GROUND / REWORKED SOIL: Yellowish brown slightly silty, gravelly fine to coarse SAND with low cobble and small boulder (up to 260mm) content, occasional rootlets. and a trace of orange claystone pipe fragments, white glazed stoneware and shell fragments. Gravel is fine to coarse subangular.	
0.50	ES1			(0.30)			
0.60 - 1.10 0.60 - 1.10	B2 D3			0.60		Brown slightly silty, gravelly fine to coarse SAND with low cobble and boulder (up to 210mm) content, and occasional roots and rootlets. Gravel fine to coarse, subangular to subrounded.	
				(0.90)			
1.50 - 2.00 1.50 - 2.00	B4 D5			1.50		Soft becoming firm grey, with some yellowish orange mottling, slightly sandy, slightly gravelly, silty CLAY. with occasional rootlets and plant fragments, moist becoming wet. Sand is fine to medium. Gravel is fine to course subangular. Locally grading to silt / fine sand.	
				(1.00)			
2.40 2.40 2.40		HVP=39, HVR=13 HVP=44, HVR=18 HVP=46, HVR=17 Seepage below 2.4		2.50		End of trial pit at 2.500m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Remarks

Water Strikes:	
Struck at (m):	Remarks:
2.40	Seepage below 2.4

Stability: Slight spalling of sides

Width: 1.10

Length: 2.50

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP4	
Co-ordinates: 723933.17 E 741365.34 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1	
Method: Trial Pitting	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20	
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 10/07/2018	**Driver:**
		Logger: MN	

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.30)		TOPSOIL: Dark brown slightly gravelly, slightly clayey, silty fine SAND with frequent rootlets, dry to slightly moist.	
0.50 - 1.00 0.50 - 1.00	B1 D2			0.30 (0.80)		Grey slightly silty very sandy GRAVEL with low to medium cobble content, and occasional rootlets moist. From 0.6 to 0.75m interbed of very gravelly sand. Sand is fine to coarse. Gravel fine to coarse subangular to subrounded. Some orange brown iron oxide staining from 1.0 to 1.1m.	
1.20 - 1.70 1.20 - 1.70	B3 D4			1.10 (0.70)		Brown gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded.	
1.80 - 2.30 1.80 - 2.30 2.00 2.00 2.00	B5 D6	 HVP=22, HVR=5 HVP=23, HVR=5 HVP=26, HVR=5		1.80 (0.80) 2.60		Soft grey, locally slightly fine sandy, clayey SILT with occasional shells and shell fragments. End of trial pit at 2.600m	

Remarks

Water Strikes:	
Struck at (m):	Remarks:

Stability: Short spalling of sides above 1.8

Width: 1.10

Length: 2.50

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP5	
Co-ordinates: 723912.27 E 741451.18 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1	
Method: Trial Pitting	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20	
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 09/07/2018	**Driver:**
		Logger: MN	

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.20)		MADE GROUND / TOPSOIL: As below but with frequent rootlets.	
				0.20		MADE GROUND: Grey and brown very gravelly fine to coarse Sand with medium cobble content. Occasional red brick and concrete fragments, and one black PVC pipe fragment. Occasional rootlets. Gravel is fine to coarse subangular.	
0.30	ES3						
0.30 - 0.80	B1						
0.30 - 0.80	D2						
0.50		HVP=31, HVR=12					
0.50		HVP=34, HVR=14		(0.70)			
0.50		HVP=34, HVR=18					
				0.90		Greyish brown gravely fine to medium SAND. Gravel is fine to coarse subangular to subrounded.	
				(0.20)			
				1.10		Soft greyish brown, locally slightly fine sandy, clayey SILT with frequent shells and shell fragments and occasional rootlets and associated orange brown mottling to 1.4m.	
1.20 - 1.70	B4						
1.20 - 1.70	D5						
				(1.00)			
2.10 - 2.50	B6			2.10		Grey slightly sandy GRAVEL. Sand is fine to coarse. Gravel fine to coarse subangular to subrounded.	▼
2.10 - 2.50	D7	Steady flow from the west side.					
				(0.40)			
				2.50		End of trial pit at 2.500m	

Remarks

Water Strikes:	
Struck at (m):	Remarks:
2.10	Steady flow from the west side.

Stability: Spalling of sides below 2.1m

Width: 1.00

Length: 2.70

	Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP6
	Co-ordinates: 723839.84 E 741690.95 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1
Method: Trial Pitting		**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20
			Driver:
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 10/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	
				(0.20)		Possible MADE GROUND / TOPSOIL		
				0.20		Very stiff dark brown slightly sandy, slightly gravelly silty CLAY with low cobble content. Occasional rootlets. Trace of possible red brick fragments and glazed stoneware fragments. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded. (Possible Reworked Native Soil or Made Ground)		
0.50 0.50 - 1.00 0.50 - 1.00	ES3 B1 D2							0.5
								1.0
				(1.80)				
								1.5
2.00 - 2.50 2.00 - 2.50	B4 D5			2.00		Light brown slightly silty, slightly gravelly fine to coarse SAND with occasional shells and shell fragments. Gravel is fine to coarse subangular to subrounded.		2.0
				(0.50)				
				2.50		End of trial pit at 2.500m		2.5
								3.0
								3.5

Remarks	Water Strikes: Struck at (m):	Remarks:	Stability: Good
			Width: 1.00
			Length: 2.20

	Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP7
	Co-ordinates: 723815.86 E 741883.09 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1
Method: Trial Pitting		**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20
			Driver:
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 10/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.40)		TOPSOIL / SUBSOIL: Very stiff dark brown slightly gravelly, sandy silty Clay with frequent becoming occasional rootlets, dry to slightly moist	
0.60 - 1.10 0.60 - 1.10	B1 D2			0.40		Light brown, with occasional to some orange brown mottling, slightly gravelly clayey silty fine to coarse SAND with occasional shells and shell fragments, moist becoming by 2m wet. Gravel is fine to coarse subangular to subrounded.	
1.60 - 2.10 1.60 - 2.10	B3 D4			(2.20)			
		Water and sand sloughing into pit below 2.2m					▼
				2.60		End of trial pit at 2.600m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Remarks

Water Strikes:	
Struck at (m):	Remarks:
2.20	Water and sand sloughing into pit below 2.2m

Stability: Sides collapsed below 0.8m

Width: 1.05

Length: 2.40

	Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP8
	Co-ordinates: 723697.77 E	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1
Method: Trial Pitting	742063.52 N	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20
			Driver:
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 09/07/2018	**Logger:** MN

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.25)		TOPSOIL: Very stiff brown slightly sandy, slightly gravelly, silty CLAY with frequent rootlets, dry to slightly moist.	
				0.25		Very stiff brown to greyish brown slightly sandy, slightly gravelly, silty CLAY with medium cobble content, slightly moist becoming by 0.6m moist. Sand is fine to coarse. Gravel is fine to coarse subangular. to subrounded. Becoming by 1.6m grey.	
0.50 - 1.00 0.50 - 1.00	B1 D3						
1.00 1.00 1.00		HVP=104, HVR=27 HVP=81, HVR=24 HVP=92, HVR=18					
				(2.25)			
1.60 - 2.10 1.60 - 2.10	B2 D4						
				2.50		End of trial pit at 2.500m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Remarks

Water Strikes:	
Struck at (m):	Remarks:

Stability: Good

Width: 1.00

Length: 2.80

Project No.: 18-066	**Project Name:** Baldoyle to Portmarnock Greenway	**Trial Pit No.:** TP9	
Co-ordinates: 723557.17 E 742270.39 N	**Client:** Comhairle Contae Fhine Gall / Fingal County Council	Sheet 1 of 1	
Method: Trial Pitting	**Client's Representative:** WS Atkins Ireland Limited	**Scale:** 1:20	
Plant: Komatsu PC30MR	**Ground Level:** mOD	**Date:** 09/07/2018	**Driver:**
			Logger: MN

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water
				(0.25)		TOPSOIL: Very stiff light brown slightly sandy, slightly gravelly, silty CLAY with frequent rootlets, dry to slightly moist.	
0.40 - 0.90	B1			0.25		Very stiff yellowish brown to greyish brown slightly sandy, slightly gravelly, silty CLAY with low cobble content, dry to slightly moist. Sand is fine to coarse. Gravel is fine to coarse subangular. At 0.9m: fragments of an orange claystone drainage pipe.	
0.40 - 0.90	D2						
0.50		HVP=102, HVR=18					
0.50		HVP=103, HVR=27		(0.65)			
0.50		HVP=107, HVR=30					
0.90 - 1.40	B3			0.90		Firm greyish brown slightly sandy, slightly gravelly silty CLAY with low cobble content, moist becoming by 1.4m wet. Sand is fine to coarse. Gravel is fine to coarse subangular. Becoming very stiff by 2.2m.	
0.90 - 1.40	D4						
1.00		HVP=40, HVR=14					
1.00		HVP=47, HVR=15					
1.00		HVP=48, HVR=22					
1.00		HVP=65, HVR=22					
		Seepage					▼
				(1.60)			
2.00 - 2.50	B5						
2.00 - 2.50	D6						
				2.50		End of trial pit at 2.500m	

Remarks

Water Strikes:	
Struck at (m):	Remarks:
1.40	Seepage

Stability: Good

Width: 1.20

Length: 2.70

APPENDIX 2.2

LAB TEST RESULTS

OCB Geotechnical (2018)

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/001
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP2 0.5m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)								
Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Boron (AnalyticoSubSolidF46874)								
Boron (B)	*	Default	5		<12	mg/kg dm		
Cyanide Total (AnalyticoSub Solid FF07F-1)								
Total Cyanide	*	Default	1		<1	mg/kg dm	YES	
Dry Matter (AnalyticoSub FF07E-1)								
Dry Matter (Solids) %	*	Default	0.1		95.4	%	YES	
EPH (AnalyticoSubSolid FF09L)								
TPH >c10-C12	*	Default	3		<3	mg/kg dm	YES	
GrainSize(AnalyticoSubSolid FF05B)								
GrainSize(AnalyticoSubSolid FF05B)	*	Default	2.0		2.9	%	YES	
Metals x 9 (AnalyticoSubSolid PVXJX-1)								
Arsenic As	*	Default	5.0		5.7	mg/kg dm	YES	
Cadmium Cd	*	Default	0.4		<0.4	mg/kg dm	YES	
Chromium Cr	*	Default	5.0		9.3	mg/kg dm	YES	
Copper Cu	*	Default	5.0		<5.0	mg/kg dm	YES	
Lead Pb	*	Default	10.0		32.0	mg/kg dm	YES	
Mercury Hg	*	Default	0.1		<0.1	mg/kg dm	YES	
Nickel Ni	*	Default	5.0		9.0	mg/kg dm	YES	
Selenium Se	*	Default	2.0		<2.0	mg/kg dm	YES	
Zinc Zn	*	Default	5.0		26.0	mg/kg dm	YES	
OrganicMatter(LossofIgnition)(AnalyticoSubFF058-1)								
Organic Matter (Loss of Ignition)-(Analytico Sub)	*	Default	0.7		2.4	% w/w	YES	
PAH 16-(AnalyticoSubSolid FF635-1)								
Acenaphtene	*	Default	0.01		<0.05	mg/kg dm	YES	
Acenaphthylene	*	Default	0.01		<0.05	mg/kg dm	YES	
Anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (a) Anthracene	*	Default	0.01		0.06	mg/kg dm	YES	
Benzo (a) Pyrene	*	Default	0.01		0.06	mg/kg dm	YES	
Benzo (b)-Fluoranthene	*	Default	0.01		0.09	mg/kg dm	YES	
Benzo (g,h,i)-Perylene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (k) Fluoranthene	*	Default	0.01		<0.05	mg/kg dm	YES	
Chrysene	*	Default	0.01		0.06	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/001
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP2 0.5m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)									
	Dibenz(a,h)anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	
	Fluoranthene	*	Default	0.01		0.01	mg/kg dm	YES	
	Fluorene	*	Default	0.01		<0.05	mg/kg dm	YES	
	Indeno (123-cd) Pyrene	*	Default	0.01		0.05	mg/kg dm	YES	
	Naphthalene	*	Default	0.01		<0.05	mg/kg dm	YES	
	PAH-PAHs (sum 16 US EPA)	*	Default	0.01		<0.84	mg/kg dm	YES	
	Phenanthrene	*	Default	0.01		0.06	mg/kg dm	YES	
	Pyrene	*	Default	0.01		0.10	mg/kg dm	YES	
Phenol Index-(AnalyticoSubSolid F1488-1)									
	Phenol Index	*	Default	0.05		<0.05	mg/kg dm		
SulphateWaterSoluble(AnalyticoSubSolid F1502)									
	Sulphate Water Soluble	*	Default	30		<30	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/002
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP3 0.5m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)								
Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Boron (AnalyticoSubSolidF46874)								
Boron (B)	*	Default	5		<12	mg/kg dm		
Cyanide Total (AnalyticoSub Solid FF07F-1)								
Total Cyanide	*	Default	1		<1	mg/kg dm	YES	
Dry Matter (AnalyticoSub FF07E-1)								
Dry Matter (Solids) %	*	Default	0.1		93.2	%	YES	
EPH (AnalyticoSubSolid FF09L)								
TPH >c10-C12	*	Default	3		<3	mg/kg dm	YES	
GrainSize(AnalyticoSubSolid FF05B)								
GrainSize(AnalyticoSubSolid FF05B)	*	Default	2.0		4.6	%	YES	
Metals x 9 (AnalyticoSubSolid PVXJX-1)								
Arsenic As	*	Default	5.0		6.4	mg/kg dm	YES	
Cadmium Cd	*	Default	0.4		<0.4	mg/kg dm	YES	
Chromium Cr	*	Default	5.0		8.7	mg/kg dm	YES	
Copper Cu	*	Default	5.0		6.6	mg/kg dm	YES	
Lead Pb	*	Default	10.0		14.0	mg/kg dm	YES	
Mercury Hg	*	Default	0.1		<0.1	mg/kg dm	YES	
Nickel Ni	*	Default	5.0		10.0	mg/kg dm	YES	
Selenium Se	*	Default	2.0		<2.0	mg/kg dm	YES	
Zinc Zn	*	Default	5.0		30.0	mg/kg dm	YES	
OrganicMatter(LossofIgnition)(AnalyticoSubFF058-1)								
Organic Matter (Loss of Ignition)-(Analytico Sub)	*	Default	0.7		2.8	% w/w	YES	
PAH 16-(AnalyticoSubSolid FF635-1)								
Acenaphtene	*	Default	0.01		<0.05	mg/kg dm	YES	
Acenaphthylene	*	Default	0.01		<0.05	mg/kg dm	YES	
Anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (a) Anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (a) Pyrene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (b)-Fluoranthene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (g,h,i)-Perylene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (k) Fluoranthene	*	Default	0.01		<0.05	mg/kg dm	YES	
Chrysene	*	Default	0.01		<0.05	mg/kg dm	YES	
Dibenz(a,h)anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/002
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP3 0.5m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)									
	Fluoranthene	*	Default	0.01		<0.07	mg/kg dm	YES	
	Fluorene	*	Default	0.01		<0.05	mg/kg dm	YES	
	Indeno (123-cd) Pyrene	*	Default	0.01		<0.05	mg/kg dm	YES	
	Naphthalene	*	Default	0.01		<0.05	mg/kg dm	YES	
	PAH-PAHs (sum 16 US EPA)	*	Default	0.01		<0.84	mg/kg dm	YES	
	Phenanthrene	*	Default	0.01		<0.06	mg/kg dm	YES	
	Pyrene	*	Default	0.01		<0.06	mg/kg dm	YES	
Phenol Index-(AnalyticoSubSolid F1488-1)									
	Phenol Index	*	Default	0.05		0.07	mg/kg dm		
SulphateWaterSoluble(AnalyticoSubSolid F1502)									
	Sulphate Water Soluble	*	Default	30		110	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/003
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.3m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)								
Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Boron (AnalyticoSubSolidF46874)								
Boron (B)	*	Default	5		<12	mg/kg dm		
Cyanide Total (AnalyticoSub Solid FF07F-1)								
Total Cyanide	*	Default	1		4	mg/kg dm	YES	
Dry Matter (AnalyticoSub FF07E-1)								
Dry Matter (Solids) %	*	Default	0.1		92.4	%	YES	
EPH (AnalyticoSubSolid FF09L)								
TPH >c10-C12	*	Default	3		<3	mg/kg dm	YES	
GrainSize(AnalyticoSubSolid FF05B)								
GrainSize(AnalyticoSubSolid FF05B)	*	Default	2.0		9.5	%	YES	
Metals x 9 (AnalyticoSubSolid PVXJX-1)								
Arsenic As	*	Default	5.0		21.0	mg/kg dm	YES	
Cadmium Cd	*	Default	0.4		1.1	mg/kg dm	YES	
Chromium Cr	*	Default	5.0		19.0	mg/kg dm	YES	
Copper Cu	*	Default	5.0		61.0	mg/kg dm	YES	
Lead Pb	*	Default	10.0		150.0	mg/kg dm	YES	
Mercury Hg	*	Default	0.1		<0.1	mg/kg dm	YES	
Nickel Ni	*	Default	5.0		31.0	mg/kg dm	YES	
Selenium Se	*	Default	2.0		<2.0	mg/kg dm	YES	
Zinc Zn	*	Default	5.0		250.0	mg/kg dm	YES	
OrganicMatter(LossofIgnition)(AnalyticoSubFF058-1)								
Organic Matter (Loss of Ignition)-(Analytico Sub)	*	Default	0.7		3.8	% w/w	YES	
PAH 16-(AnalyticoSubSolid FF635-1)								
Acenaphtene	*	Default	0.01		2.40	mg/kg dm	YES	
Acenaphthylene	*	Default	0.01		1.10	mg/kg dm	YES	
Anthracene	*	Default	0.01		12.00	mg/kg dm	YES	
Benzo (a) Anthracene	*	Default	0.01		8.20	mg/kg dm	YES	
Benzo (a) Pyrene	*	Default	0.01		7.30	mg/kg dm	YES	
Benzo (b)-Fluoranthene	*	Default	0.01		11.00	mg/kg dm	YES	
Benzo (g,h,i)-Perylene	*	Default	0.01		5.30	mg/kg dm	YES	
Benzo (k) Fluoranthene	*	Default	0.01		3.90	mg/kg dm	YES	
Chrysene	*	Default	0.01		8.50	mg/kg dm	YES	
Dibenz(a,h)anthracene	*	Default	0.01		0.86	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/003
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.3m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)									
	Fluoranthene	*	Default	0.01		14.00	mg/kg dm	YES	
	Fluorene	*	Default	0.01		1.00	mg/kg dm	YES	
	Indeno (123-cd) Pyrene	*	Default	0.01		5.50	mg/kg dm	YES	
	Naphthalene	*	Default	0.01		0.57	mg/kg dm	YES	
	PAH-PAHs (sum 16 US EPA)	*	Default	0.01		91.00	mg/kg dm	YES	
	Phenanthrene	*	Default	0.01		7.80	mg/kg dm	YES	
	Pyrene	*	Default	0.01		12.00	mg/kg dm	YES	
Phenol Index-(AnalyticoSubSolid F1488-1)									
	Phenol Index	*	Default	0.05		0.09	mg/kg dm		
SulphateWaterSoluble(AnalyticoSubSolid F1502)									
	Sulphate Water Soluble	*	Default	30		93	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/004
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP6 0.5m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)								
Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Boron (AnalyticoSubSolidF46874)								
Boron (B)	*	Default	5		17	mg/kg dm		
Cyanide Total (AnalyticoSub Solid FF07F-1)								
Total Cyanide	*	Default	1		<1	mg/kg dm	YES	
Dry Matter (AnalyticoSub FF07E-1)								
Dry Matter (Solids) %	*	Default	0.1		88.9	%	YES	
EPH (AnalyticoSubSolid FF09L)								
TPH >c10-C12	*	Default	3		<3	mg/kg dm	YES	
GrainSize(AnalyticoSubSolid FF05B)								
GrainSize(AnalyticoSubSolid FF05B)	*	Default	2.0		14.8	%	YES	
Metals x 9 (AnalyticoSubSolid PVXJX-1)								
Arsenic As	*	Default	5.0		12.0	mg/kg dm	YES	
Cadmium Cd	*	Default	0.4		1.8	mg/kg dm	YES	
Chromium Cr	*	Default	5.0		21.0	mg/kg dm	YES	
Copper Cu	*	Default	5.0		26.0	mg/kg dm	YES	
Lead Pb	*	Default	10.0		40.0	mg/kg dm	YES	
Mercury Hg	*	Default	0.1		<0.1	mg/kg dm	YES	
Nickel Ni	*	Default	5.0		<5.0	mg/kg dm	YES	
Selenium Se	*	Default	2.0		<2.0	mg/kg dm	YES	
Zinc Zn	*	Default	5.0		89.0	mg/kg dm	YES	
OrganicMatter(LossofIgnition)(AnalyticoSubFF058-1)								
Organic Matter (Loss of Ignition)-(Analytico Sub)	*	Default	0.7		2.4	% w/w	YES	
PAH 16-(AnalyticoSubSolid FF635-1)								
Acenaphtene	*	Default	0.01		<0.05	mg/kg dm	YES	
Acenaphthylene	*	Default	0.01		<0.05	mg/kg dm	YES	
Anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (a) Anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (a) Pyrene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (b)-Fluoranthene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (g,h,i)-Perylene	*	Default	0.01		<0.05	mg/kg dm	YES	
Benzo (k) Fluoranthene	*	Default	0.01		<0.05	mg/kg dm	YES	
Chrysene	*	Default	0.01		<0.05	mg/kg dm	YES	
Dibenz(a,h)anthracene	*	Default	0.01		<0.05	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132922 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132922/004
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008262	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP6 0.5m (Suite E)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)									
	Fluoranthene	*	Default	0.01		0.08	mg/kg dm	YES	
	Fluorene	*	Default	0.01		<0.05	mg/kg dm	YES	
	Indeno (123-cd) Pyrene	*	Default	0.01		<0.05	mg/kg dm	YES	
	Naphthalene	*	Default	0.01		<0.05	mg/kg dm	YES	
	PAH-PAHs (sum 16 US EPA)	*	Default	0.01		<0.84	mg/kg dm	YES	
	Phenanthrene	*	Default	0.01		<0.06	mg/kg dm	YES	
	Pyrene	*	Default	0.01		0.07	mg/kg dm	YES	
Phenol Index-(AnalyticoSubSolid F1488-1)									
	Phenol Index	*	Default	0.05		<0.05	mg/kg dm		
SulphateWaterSoluble(AnalyticoSubSolid F1502)									
	Sulphate Water Soluble	*	Default	30		<30	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/001
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP2 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Acid Digestion Metals-Low Level									
	Acid Digestion Metals-Low Level		EM113	0.00		1.00	EA		
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)									
	Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Chromium Hexavalent (AnalyticoSub F4424-1)									
	Chromium - Hexavalent	*	Default	0.5		<0.5	mg/kg dm	YES	
Chromium Trivalent (Calc Cr3+)									
	Chromium Trivalent (Cr3+)(Calc)		Default	0.1		5.2	mg/kg dm		
Drying-40Deg									
	Drying-40Deg		EM113	0		Done			
Extraction - Ultrasonic-Water (On Solid samples)									
	Extraction - Ultrasonic-Water (On Solid samples)		GLP027			1.00	EA		
Metals-Total-Low Level									
	Antimony-Total		EW187	0.0		0.1	mg/kg dm		
	Arsenic-Total		EW187	0.01		4.22	mg/kg dm		
	Barium-Total		EW187	0.1		38.3	mg/kg dm		
	Cadmium-Total		EW187	0.005		0.317	mg/kg dm		
	Chromium-Total		EW187	0.1		5.2	mg/kg dm		
	Copper-Total		EW187	0.15		16.40	mg/kg dm		
	Lead-Total		EW187	0.015		81.386	mg/kg dm		
	Mercury-Total		EW187	0.001		0.088	mg/kg dm		
	Selenium-Total		EW187	0.01		2.54	mg/kg dm		
	Zinc-Total		EW187	0.1		26.9	mg/kg dm		
	Nickel-Total		EW187	0.05		3.07	mg/kg dm		
	Molybdenum-Total		EW187	0.10		0.20	mg/kg dm		
PAH 16-(AnalyticoSubSolid FF635-1)									
	Acenaphtene	*	Default	0.01		0.02	mg/kg dm	YES	
	Acenaphthylene	*	Default	0.01		0.05	mg/kg dm	YES	
	Anthracene	*	Default	0.01		0.07	mg/kg dm	YES	
	Benzo (a) Anthracene	*	Default	0.01		0.19	mg/kg dm	YES	
	Benzo (a) Pyrene	*	Default	0.01		0.18	mg/kg dm	YES	
	Benzo (b)-Fluoranthene	*	Default	0.01		0.31	mg/kg dm	YES	
	Benzo (g,h,i)-Perylene	*	Default	0.01		0.17	mg/kg dm	YES	
	Benzo (k) Fluoranthene	*	Default	0.01		0.11	mg/kg dm	YES	
	Chrysene	*	Default	0.01		0.24	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/001
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP2 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)								
Dibenz(a,h)anthracene	*	Default	0.01		0.03	mg/kg dm	YES	
Fluoranthene	*	Default	0.01		0.47	mg/kg dm	YES	
Fluorene	*	Default	0.01		0.03	mg/kg dm	YES	
Indeno (123-cd) Pyrene	*	Default	0.01		0.16	mg/kg dm	YES	
Naphthalene	*	Default	0.01		0.06	mg/kg dm	YES	
PAH-PAHs (sum 16 US EPA)	*	Default	0.01		2.80	mg/kg dm	YES	
Phenanthrene	*	Default	0.01		0.32	mg/kg dm	YES	
Pyrene	*	Default	0.01		0.41	mg/kg dm	YES	
PCB 7-(AnalyticoSubSolid FF0BH1)								
PCB (sum 7)	*	Default	0.001		<0.007	mg/kg dm	YES	
PCB 101	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 118	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 138	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 153	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 180	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 28	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 52	*	Default	0.001		<0.001	mg/kg dm	YES	
Solids Content (Solid Samples)								
Solids Content (Solid Samples)		EM113	1.0		86.3	% w/w		
TOC by IR & Inorg Subtract-(Analytico Sub PFFLL-1)								
Total Organic Carbon (TOC-Solid)	*	Sub-Contract	5000		10000	mg/kg DW	YES	
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)								
Aliphatic >C10-C12	*	Default	2		<2	mg/kg dm		
Aliphatic >C12-C16	*	Default	8		<8	mg/kg dm		
Aliphatic >C16-C21	*	Default	8		<8	mg/kg dm		
Aliphatic >C21-C35	*	Default	12		59	mg/kg dm		
Aliphatic >C5-C6	*	Default	2		<2	mg/kg dm		
Aliphatic >C6-C8	*	Default	2		<2	mg/kg dm		
Aliphatic >C8-C10	*	Default	2		<2	mg/kg dm		
Aromatic >C10-C12	*	Default	2		<2	mg/kg dm	YES	
Aromatic >C12-C16	*	Default	8		<8	mg/kg dm	YES	
Aromatic >C16-C21	*	Default	8		<8	mg/kg dm	YES	
Aromatic >C21-C35	*	Default	12		17	mg/kg dm	YES	
Aromatic >C6-C8	*	Default	2		<2	mg/kg dm	YES	
Aromatic >C8-C10	*	Default	6		<6	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/001
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP2 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)									
	Benzene	*	Default	0.05		<0.05	mg/kg dm	YES	
	BTEX Sum	*	Default	0.05		<0.25	mg/kg dm		
	EPH C10-C35	*	Default	50		86	mg/kg dm	YES	
	Ethylbenzene	*	Default	0.05		<0.05	mg/kg dm	YES	
	M&P Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Methyl-tert-butylether (MTBE)	*	Default	0.02		<0.02	mg/kg dm	YES	
	O-Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Toluene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Total Aliphatics C10-C35	*	Default	25		66	mg/kg dm		
	Total Aromatics C10-C35	*	Default	25		<25	mg/kg dm	YES	
	Total Vol. Aliphatics	*	Default	6		<6	mg/kg dm		
	Total Vol. Aromatics	*	Default	8		<8	mg/kg dm	YES	
	Xylenes-Total	*	Default	0.05		<0.10	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/002
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP3 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Acid Digestion Metals-Low Level									
	Acid Digestion Metals-Low Level		EM113	0.00		1.00	EA		
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)									
	Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Chromium Hexavalent (AnalyticoSub F4424-1)									
	Chromium - Hexavalent	*	Default	0.5		<0.5	mg/kg dm	YES	
Chromium Trivalent (Calc Cr3+)									
	Chromium Trivalent (Cr3+)(Calc)		Default	0.1		3.8	mg/kg dm		
Drying-40Deg									
	Drying-40Deg		EM113	0		Done			
Extraction - Ultrasonic-Water (On Solid samples)									
	Extraction - Ultrasonic-Water (On Solid samples)		GLP027			1.00	EA		
Metals-Total-Low Level									
	Antimony-Total		EW187	0.0		0.2	mg/kg dm		
	Arsenic-Total		EW187	0.01		3.19	mg/kg dm		
	Barium-Total		EW187	0.1		31.5	mg/kg dm		
	Cadmium-Total		EW187	0.005		0.457	mg/kg dm		
	Chromium-Total		EW187	0.1		3.8	mg/kg dm		
	Copper-Total		EW187	0.15		21.32	mg/kg dm		
	Lead-Total		EW187	0.015		19.048	mg/kg dm		
	Mercury-Total		EW187	0.001		0.102	mg/kg dm		
	Selenium-Total		EW187	0.01		2.50	mg/kg dm		
	Zinc-Total		EW187	0.1		22.6	mg/kg dm		
	Nickel-Total		EW187	0.05		3.46	mg/kg dm		
	Molybdenum-Total		EW187	0.10		0.49	mg/kg dm		
PAH 16-(AnalyticoSubSolid FF635-1)									
	Acenaphtene	*	Default	0.01		0.03	mg/kg dm	YES	
	Acenaphthylene	*	Default	0.01		0.03	mg/kg dm	YES	
	Anthracene	*	Default	0.01		0.04	mg/kg dm	YES	
	Benzo (a) Anthracene	*	Default	0.01		0.15	mg/kg dm	YES	
	Benzo (a) Pyrene	*	Default	0.01		0.20	mg/kg dm	YES	
	Benzo (b)-Fluoranthene	*	Default	0.01		0.30	mg/kg dm	YES	
	Benzo (g,h,i)-Perylene	*	Default	0.01		0.18	mg/kg dm	YES	
	Benzo (k) Fluoranthene	*	Default	0.01		0.11	mg/kg dm	YES	
	Chrysene	*	Default	0.01		0.21	mg/kg dm	YES	
	Dibenz(a,h)anthracene	*	Default	0.01		0.03	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/002
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP3 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)								
Fluoranthene	*	Default	0.01		0.47	mg/kg dm	YES	
Fluorene	*	Default	0.01		0.03	mg/kg dm	YES	
Indeno (123-cd) Pyrene	*	Default	0.01		0.15	mg/kg dm	YES	
Naphthalene	*	Default	0.01		0.07	mg/kg dm	YES	
PAH-PAHs (sum 16 US EPA)	*	Default	0.01		2.90	mg/kg dm	YES	
Phenanthrene	*	Default	0.01		0.44	mg/kg dm	YES	
Pyrene	*	Default	0.01		0.43	mg/kg dm	YES	
PCB 7-(AnalyticoSubSolid FF0BH1)								
PCB (sum 7)	*	Default	0.001		<0.007	mg/kg dm	YES	
PCB 101	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 118	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 138	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 153	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 180	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 28	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 52	*	Default	0.001		<0.001	mg/kg dm	YES	
Solids Content (Solid Samples)								
Solids Content (Solid Samples)		EM113	1.0		91.7	% w/w		
TOC by IR & Inorg Subtract-(Analytico Sub PFFLL-1)								
Total Organic Carbon (TOC-Solid)	*	Sub-Contract	5000		15000	mg/kg DW	YES	
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)								
Aliphatic >C10-C12	*	Default	2		<2	mg/kg dm		
Aliphatic >C12-C16	*	Default	8		<8	mg/kg dm		
Aliphatic >C16-C21	*	Default	8		10	mg/kg dm		
Aliphatic >C21-C35	*	Default	12		57	mg/kg dm		
Aliphatic >C5-C6	*	Default	2		<2	mg/kg dm		
Aliphatic >C6-C8	*	Default	2		<2	mg/kg dm		
Aliphatic >C8-C10	*	Default	2		<2	mg/kg dm		
Aromatic >C10-C12	*	Default	2		2	mg/kg dm	YES	
Aromatic >C12-C16	*	Default	8		<8	mg/kg dm	YES	
Aromatic >C16-C21	*	Default	8		13	mg/kg dm	YES	
Aromatic >C21-C35	*	Default	12		26	mg/kg dm	YES	
Aromatic >C6-C8	*	Default	2		<2	mg/kg dm	YES	
Aromatic >C8-C10	*	Default	6		<6	mg/kg dm	YES	
Benzene	*	Default	0.05		<0.05	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/002
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP3 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)									
	BTEX Sum	*	Default	0.05		<0.25	mg/kg dm		
	EPH C10-C35	*	Default	50		120	mg/kg dm	YES	
	Ethylbenzene	*	Default	0.05		<0.05	mg/kg dm	YES	
	M&P Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Methyl-tert-butylether (MTBE)	*	Default	0.02		<0.02	mg/kg dm	YES	
	O-Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Toluene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Total Aliphatics C10-C35	*	Default	25		73	mg/kg dm		
	Total Aromatics C10-C35	*	Default	25		46	mg/kg dm	YES	
	Total Vol. Aliphatics	*	Default	6		<6	mg/kg dm		
	Total Vol. Aromatics	*	Default	8		<8	mg/kg dm	YES	
	Xylenes-Total	*	Default	0.05		<0.10	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/003
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.3m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Acid Digestion Metals-Low Level									
	Acid Digestion Metals-Low Level		EM113	0.00		1.00	EA		
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)									
	Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Chromium Hexavalent (AnalyticoSub F4424-1)									
	Chromium - Hexavalent	*	Default	0.5		<0.5	mg/kg dm	YES	
Chromium Trivalent (Calc Cr3+)									
	Chromium Trivalent (Cr3+)(Calc)		Default	0.1		5.3	mg/kg dm		
Drying-40Deg									
	Drying-40Deg		EM113	0		Done			
Extraction - Ultrasonic-Water (On Solid samples)									
	Extraction - Ultrasonic-Water (On Solid samples)		GLP027			1.00	EA		
Metals-Total-Low Level									
	Antimony-Total		EW187	0.0		0.7	mg/kg dm		
	Arsenic-Total		EW187	0.01		7.05	mg/kg dm		
	Barium-Total		EW187	0.1		54.3	mg/kg dm		
	Cadmium-Total		EW187	0.005		1.136	mg/kg dm		
	Chromium-Total		EW187	0.1		5.3	mg/kg dm		
	Copper-Total		EW187	0.15		31.07	mg/kg dm		
	Lead-Total		EW187	0.015		77.549	mg/kg dm		
	Mercury-Total		EW187	0.001		0.132	mg/kg dm		
	Selenium-Total		EW187	0.01		3.02	mg/kg dm		
	Zinc-Total		EW187	0.1		151.1	mg/kg dm		
	Nickel-Total		EW187	0.05		12.55	mg/kg dm		
	Molybdenum-Total		EW187	0.10		0.45	mg/kg dm		
PAH 16-(AnalyticoSubSolid FF635-1)									
	Acenaphtene	*	Default	0.01		<0.01	mg/kg dm	YES	
	Acenaphthylene	*	Default	0.01		0.02	mg/kg dm	YES	
	Anthracene	*	Default	0.01		0.02	mg/kg dm	YES	
	Benzo (a) Anthracene	*	Default	0.01		0.08	mg/kg dm	YES	
	Benzo (a) Pyrene	*	Default	0.01		0.10	mg/kg dm	YES	
	Benzo (b)-Fluoranthene	*	Default	0.01		0.17	mg/kg dm	YES	
	Benzo (g,h,i)-Perylene	*	Default	0.01		0.10	mg/kg dm	YES	
	Benzo (k) Fluoranthene	*	Default	0.01		0.06	mg/kg dm	YES	
	Chrysene	*	Default	0.01		0.10	mg/kg dm	YES	
	Dibenz(a,h)anthracene	*	Default	0.01		0.02	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/003
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.3m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)								
Fluoranthene	*	Default	0.01		0.22	mg/kg dm	YES	
Fluorene	*	Default	0.01		0.01	mg/kg dm	YES	
Indeno (123-cd) Pyrene	*	Default	0.01		0.09	mg/kg dm	YES	
Naphthalene	*	Default	0.01		0.02	mg/kg dm	YES	
PAH-PAHs (sum 16 US EPA)	*	Default	0.01		1.40	mg/kg dm	YES	
Phenanthrene	*	Default	0.01		0.13	mg/kg dm	YES	
Pyrene	*	Default	0.01		0.21	mg/kg dm	YES	
PCB 7-(AnalyticoSubSolid FF0BH1)								
PCB (sum 7)	*	Default	0.001		<0.007	mg/kg dm	YES	
PCB 101	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 118	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 138	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 153	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 180	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 28	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 52	*	Default	0.001		<0.001	mg/kg dm	YES	
Solids Content (Solid Samples)								
Solids Content (Solid Samples)		EM113	1.0		82.4	% w/w		
TOC by IR & Inorg Subtract-(Analytico Sub PFFLL-1)								
Total Organic Carbon (TOC-Solid)	*	Sub-Contract	5000		35000	mg/kg DW	YES	
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)								
Aliphatic >C10-C12	*	Default	2		3	mg/kg dm		
Aliphatic >C12-C16	*	Default	8		9	mg/kg dm		
Aliphatic >C16-C21	*	Default	8		12	mg/kg dm		
Aliphatic >C21-C35	*	Default	12		73	mg/kg dm		
Aliphatic >C5-C6	*	Default	2		<2	mg/kg dm		
Aliphatic >C6-C8	*	Default	2		<2	mg/kg dm		
Aliphatic >C8-C10	*	Default	2		<2	mg/kg dm		
Aromatic >C10-C12	*	Default	2		<2	mg/kg dm	YES	
Aromatic >C12-C16	*	Default	8		<8	mg/kg dm	YES	
Aromatic >C16-C21	*	Default	8		10	mg/kg dm	YES	
Aromatic >C21-C35	*	Default	12		25	mg/kg dm	YES	
Aromatic >C6-C8	*	Default	2		<2	mg/kg dm	YES	
Aromatic >C8-C10	*	Default	6		<6	mg/kg dm	YES	
Benzene	*	Default	0.05		<0.05	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/003
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.3m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)									
	BTEX Sum	*	Default	0.05		<0.25	mg/kg dm		
	EPH C10-C35	*	Default	50		140	mg/kg dm	YES	
	Ethylbenzene	*	Default	0.05		<0.05	mg/kg dm	YES	
	M&P Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Methyl-tert-butylether (MTBE)	*	Default	0.02		<0.02	mg/kg dm	YES	
	O-Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Toluene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Total Aliphatics C10-C35	*	Default	25		97	mg/kg dm		
	Total Aromatics C10-C35	*	Default	25		40	mg/kg dm	YES	
	Total Vol. Aliphatics	*	Default	6		<6	mg/kg dm		
	Total Vol. Aromatics	*	Default	8		<8	mg/kg dm	YES	
	Xylenes-Total	*	Default	0.05		<0.1	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/004
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Acid Digestion Metals-Low Level									
	Acid Digestion Metals-Low Level		EM113	0.00		1.00	EA		
Asbestos Screening 0.001% (AnalyticoSubFF1N6-1)									
	Total Asbestos %	*	Default	0.001		No Asbestos detectec	%	YES	
Chromium Hexavalent (AnalyticoSub F4424-1)									
	Chromium - Hexavalent	*	Default	0.5		<0.5	mg/kg dm	YES	
Chromium Trivalent (Calc Cr3+)									
	Chromium Trivalent (Cr3+)(Calc)		Default	0.1		3.2	mg/kg dm		
Drying-40Deg									
	Drying-40Deg		EM113	0		Done			
Extraction - Ultrasonic-Water (On Solid samples)									
	Extraction - Ultrasonic-Water (On Solid samples)		GLP027			1.00	EA		
Metals-Total-Low Level									
	Antimony-Total		EW187	0.0		0.1	mg/kg dm		
	Arsenic-Total		EW187	0.01		2.47	mg/kg dm		
	Barium-Total		EW187	0.1		80.1	mg/kg dm		
	Cadmium-Total		EW187	0.005		1.802	mg/kg dm		
	Chromium-Total		EW187	0.1		3.2	mg/kg dm		
	Copper-Total		EW187	0.15		26.03	mg/kg dm		
	Lead-Total		EW187	0.015		16.803	mg/kg dm		
	Mercury-Total		EW187	0.001		0.050	mg/kg dm		
	Selenium-Total		EW187	0.01		2.90	mg/kg dm		
	Zinc-Total		EW187	0.1		22.5	mg/kg dm		
	Nickel-Total		EW187	0.05		10.53	mg/kg dm		
	Molybdenum-Total		EW187	0.10		0.25	mg/kg dm		
PAH 16-(AnalyticoSubSolid FF635-1)									
	Acenaphtene	*	Default	0.01		0.03	mg/kg dm	YES	
	Acenaphthylene	*	Default	0.01		0.03	mg/kg dm	YES	
	Anthracene	*	Default	0.01		0.04	mg/kg dm	YES	
	Benzo (a) Anthracene	*	Default	0.01		0.13	mg/kg dm	YES	
	Benzo (a) Pyrene	*	Default	0.01		0.15	mg/kg dm	YES	
	Benzo (b)-Fluoranthene	*	Default	0.01		0.25	mg/kg dm	YES	
	Benzo (g,h,i)-Perylene	*	Default	0.01		0.15	mg/kg dm	YES	
	Benzo (k) Fluoranthene	*	Default	0.01		0.09	mg/kg dm	YES	
	Chrysene	*	Default	0.01		0.19	mg/kg dm	YES	
	Dibenz(a,h)anthracene	*	Default	0.01		0.02	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/004
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
PAH 16-(AnalyticoSubSolid FF635-1)								
Fluoranthene	*	Default	0.01		0.47	mg/kg dm	YES	
Fluorene	*	Default	0.01		0.03	mg/kg dm	YES	
Indeno (123-cd) Pyrene	*	Default	0.01		0.12	mg/kg dm	YES	
Naphthalene	*	Default	0.01		0.04	mg/kg dm	YES	
PAH-PAHs (sum 16 US EPA)	*	Default	0.01		2.60	mg/kg dm	YES	
Phenanthrene	*	Default	0.01		0.44	mg/kg dm	YES	
Pyrene	*	Default	0.01		0.43	mg/kg dm	YES	
PCB 7-(AnalyticoSubSolid FF0BH1)								
PCB (sum 7)	*	Default	0.001		<0.007	mg/kg dm	YES	
PCB 101	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 118	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 138	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 153	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 180	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 28	*	Default	0.001		<0.001	mg/kg dm	YES	
PCB 52	*	Default	0.001		<0.001	mg/kg dm	YES	
Solids Content (Solid Samples)								
Solids Content (Solid Samples)		EM113	1.0		82.1	% w/w		
TOC by IR & Inorg Subtract-(Analytico Sub PFFLL-1)								
Total Organic Carbon (TOC-Solid)	*	Sub-Contract	5000		<5000	mg/kg DW	YES	
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)								
Aliphatic >C10-C12	*	Default	2		<2	mg/kg dm		
Aliphatic >C12-C16	*	Default	8		<8	mg/kg dm		
Aliphatic >C16-C21	*	Default	8		14	mg/kg dm		
Aliphatic >C21-C35	*	Default	12		75	mg/kg dm		
Aliphatic >C5-C6	*	Default	2		<2	mg/kg dm		
Aliphatic >C6-C8	*	Default	2		<2	mg/kg dm		
Aliphatic >C8-C10	*	Default	2		<2	mg/kg dm		
Aromatic >C10-C12	*	Default	2		2	mg/kg dm	YES	
Aromatic >C12-C16	*	Default	8		<8	mg/kg dm	YES	
Aromatic >C16-C21	*	Default	8		<8	mg/kg dm	YES	
Aromatic >C21-C35	*	Default	12		14	mg/kg dm	YES	
Aromatic >C6-C8	*	Default	2		<2	mg/kg dm	YES	
Aromatic >C8-C10	*	Default	6		<6	mg/kg dm	YES	
Benzene	*	Default	0.05		<0.05	mg/kg dm	YES	

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132923 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132923/004
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	14/09/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.5m (Suite I Solid)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
TPH CWG Incl BTEX/MTBE (AnalyticoSubSolid PF676-1)									
	BTEX Sum	*	Default	0.05		<0.25	mg/kg dm		
	EPH C10-C35	*	Default	50		120	mg/kg dm	YES	
	Ethylbenzene	*	Default	0.05		<0.05	mg/kg dm	YES	
	M&P Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Methyl-tert-butylether (MTBE)	*	Default	0.02		<0.02	mg/kg dm	YES	
	O-Xylene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Toluene	*	Default	0.05		<0.05	mg/kg dm	YES	
	Total Aliphatics C10-C35	*	Default	25		89	mg/kg dm		
	Total Aromatics C10-C35	*	Default	25		26	mg/kg dm	YES	
	Total Vol. Aliphatics	*	Default	6		<6	mg/kg dm		
	Total Vol. Aromatics	*	Default	8		<8	mg/kg dm	YES	
	Xylenes-Total	*	Default	0.05		<0.1	mg/kg dm		

Signed : _____ 14/09/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132924 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132924/001
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	21/08/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP2 0.5m (Suite I Leach)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
AQ2-UP2 Leachate									
	Chloride (Calc-Leachate)		EW154M-1	260.00		<260.00	mg/kg DW		
	Sulphate (Calc-Leachate)		EW154M-1	100.00		<100.00	mg/kg DW		
Ion Chromatography									
	Flouride Leachate (Calc-Leachate)		EW137	4.00		<4.00	mg/kg DW		
Leaching Per ISEN12457-4 2002- 10/1									
	Dry Weight Sample used		GLP027	0.000		0.069	kg		
	Sample Volume (litres)		GLP027	0.00		0.70	L		
Metals-Leachate									
	Arsenic-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
	Barium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Cadmium-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
	Chromium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Mercury-Total (Leachate)		EW188	0.002		<0.002	mg/kg DW		
	Molybdenum-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Nickel-Total (Leachate)		EW188	0.05		<0.05	mg/kg DW		
	Lead-Total (Leachate)		EW188	0.03		<0.03	mg/kg DW		
	Antimony-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
	Selenium-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
	Zinc-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Copper-Total (Leachate)		EW188	0.3		<0.3	mg/kg DW		
Organic Carbon-Dissolved (TOC Filtered at Source)									
	Dissolved Organic Carbon-Leachate (Calc-Leachate)		EW123	0		78	mg/kg DW		
Phenols Index-(Analytico SubLiquid-FF03Y-1)									
	Phenol Total (Converted to mg/kg by ELS)	*	Default	0.1		0.1	mg/kg DW		
Total Dissolved Solids (TDS)									
	Total Dissolved Solids -Leachate (Calc)		EW046			1521.00	mg/kg DW		

Signed : _____ 21/08/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132924 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132924/002
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	21/08/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP3 0.5m (Suite I Leach)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
AQ2-UP2 Leachate								
Chloride (Calc-Leachate)		EW154M-1	260.00		<260.00	mg/kg DW		
Sulphate (Calc-Leachate)		EW154M-1	100.00		114.69	mg/kg DW		
Ion Chromatography								
Flouride Leachate (Calc-Leachate)		EW137	4.00		<4.00	mg/kg DW		
Leaching Per ISEN12457-4 2002- 10/1								
Dry Weight Sample used		GLP027	0.000		0.069	kg		
Sample Volume (litres)		GLP027	0.00		0.70	L		
Metals-Leachate								
Arsenic-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
Barium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Cadmium-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
Chromium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Mercury-Total (Leachate)		EW188	0.002		<0.002	mg/kg DW		
Molybdenum-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Nickel-Total (Leachate)		EW188	0.05		<0.05	mg/kg DW		
Lead-Total (Leachate)		EW188	0.03		<0.03	mg/kg DW		
Antimony-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
Selenium-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
Zinc-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Copper-Total (Leachate)		EW188	0.3		<0.3	mg/kg DW		
Organic Carbon-Dissolved (TOC Filtered at Source)								
Dissolved Organic Carbon-Leachate (Calc-Leachate)		EW123	0		63	mg/kg DW		
Phenols Index-(Analytico SubLiquid-FF03Y-1)								
Phenol Total (Converted to mg/kg by ELS)	*	Default	0.1		<0.1	mg/kg DW		
Total Dissolved Solids (TDS)								
Total Dissolved Solids -Leachate (Calc)		EW046			101.40	mg/kg DW		

Signed : _____ 21/08/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132924 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132924/003
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	21/08/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP5 0.3m (Suite I Leach)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
AQ2-UP2 Leachate									
	Chloride (Calc-Leachate)		EW154M-1	260.00		<260.00	mg/kg DW		
	Sulphate (Calc-Leachate)		EW154M-1	100.00		139.48	mg/kg DW		
Ion Chromatography									
	Flouride Leachate (Calc-Leachate)		EW137	4.00		<4.00	mg/kg DW		
Leaching Per ISEN12457-4 2002- 10/1									
	Dry Weight Sample used		GLP027	0.000		0.069	kg		
	Sample Volume (litres)		GLP027	0.00		0.70	L		
Metals-Leachate									
	Arsenic-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
	Barium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Cadmium-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
	Chromium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Mercury-Total (Leachate)		EW188	0.002		<0.002	mg/kg DW		
	Molybdenum-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Nickel-Total (Leachate)		EW188	0.05		<0.05	mg/kg DW		
	Lead-Total (Leachate)		EW188	0.03		<0.03	mg/kg DW		
	Antimony-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
	Selenium-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
	Zinc-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
	Copper-Total (Leachate)		EW188	0.3		<0.3	mg/kg DW		
Organic Carbon-Dissolved (TOC Filtered at Source)									
	Dissolved Organic Carbon-Leachate (Calc-Leachate)		EW123	0		40	mg/kg DW		
Phenols Index-(Analytico SubLiquid-FF03Y-1)									
	Phenol Total (Converted to mg/kg by ELS)	*	Default	0.1		<0.1	mg/kg DW		
Total Dissolved Solids (TDS)									
	Total Dissolved Solids -Leachate (Calc)		EW046			405.60	mg/kg DW		

Signed : _____ 21/08/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
EXCELLENCE THROUGH ACCREDITATION

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.elsltd.com
email:info@elsltd.com

Contact Name	Glen Byrne	**Report Number**	**132924 - 1**
Address	OCB Geotechnical Unit 1 Carrigogna	**Sample Number**	132924/004
		Date of Receipt	13/07/2018
		Date Started	13/07/2018
Tel No		**Received or Collected**	ELS-PickUp
Customer PO	1807-122	**Date of Report**	21/08/2018
Quotation No	QN008263	**Sample Type**	Soil
Customer Ref	Baldoyle Portmarnock Greenway TP6 0.5m (Suite I Leach)		

CERTIFICATE OF ANALYSIS

TEST ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
AQ2-UP2 Leachate								
Chloride (Calc-Leachate)		EW154M-1	260.00		<260.00	mg/kg DW		
Sulphate (Calc-Leachate)		EW154M-1	100.00		<100.00	mg/kg DW		
Ion Chromatography								
Flouride Leachate (Calc-Leachate)		EW137	4.00		<4.00	mg/kg DW		
Leaching Per ISEN12457-4 2002- 10/1								
Dry Weight Sample used		GLP027	0.000		0.069	kg		
Sample Volume (litres)		GLP027	0.00		0.70	L		
Metals-Leachate								
Arsenic-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
Barium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Cadmium-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
Chromium-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Mercury-Total (Leachate)		EW188	0.002		<0.002	mg/kg DW		
Molybdenum-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Nickel-Total (Leachate)		EW188	0.05		<0.05	mg/kg DW		
Lead-Total (Leachate)		EW188	0.03		<0.03	mg/kg DW		
Antimony-Total (Leachate)		EW188	0.01		<0.01	mg/kg DW		
Selenium-Total (Leachate)		EW188	0.02		<0.02	mg/kg DW		
Zinc-Total (Leachate)		EW188	0.1		<0.1	mg/kg DW		
Copper-Total (Leachate)		EW188	0.3		<0.3	mg/kg DW		
Organic Carbon-Dissolved (TOC Filtered at Source)								
Dissolved Organic Carbon-Leachate (Calc-Leachate)		EW123	0		36	mg/kg DW		
Phenols Index-(Analytico SubLiquid-FF03Y-1)								
Phenol Total (Converted to mg/kg by ELS)	*	Default	0.1		<0.1	mg/kg DW		
Total Dissolved Solids (TDS)								
Total Dissolved Solids -Leachate (Calc)		EW046			709.80	mg/kg DW		

Signed : _____ 21/08/2018

Domenico Giliberti-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

APPENDIX 2.3

LQM/CIEH S4UIs COMPARISON TABLES

AWN CONSULTING (2021)

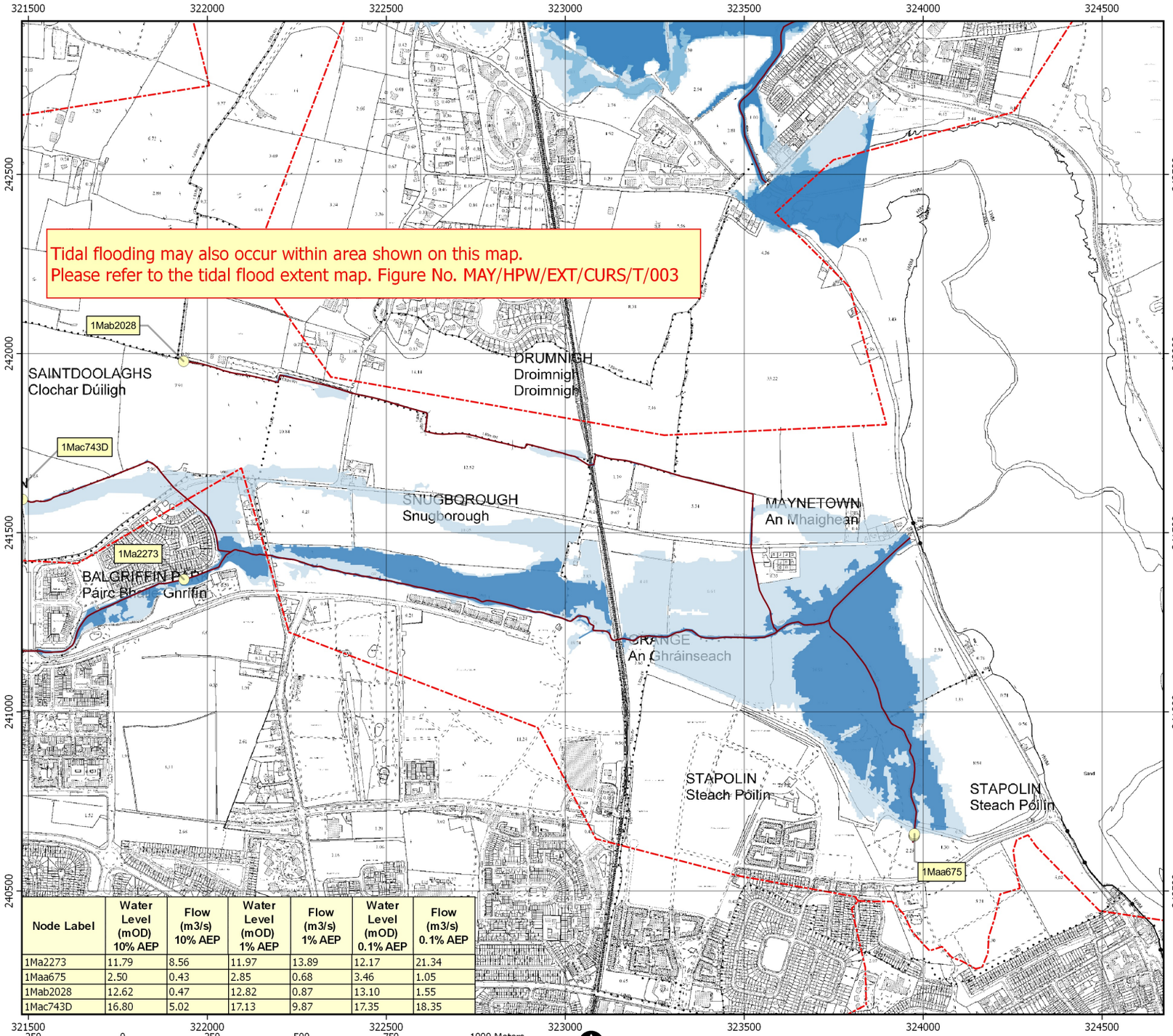
Baldoyle Racecourse Park

Sample Type				SOIL	SOIL	SOIL	SOIL
Sample ID				**TP2**	**TP3**	**TP5**	**TP5**
Sample Depth (m)				0.5	0.5	0.3	0.5
Year Sampled				2018	2018	2018	2018
Parameters	**Units**	**LOD**	**LQM/CIEH S4ul for HHRA POS_{park} Threshold (mg/kg)**				
Arsenic	mg/kg	0.01	170	4.22	3.19	7.05	2.47
Cadmium	mg/kg	0.005	532	0.317	0.457	1.136	1.802
Chromium III	mg/kg	0.1	33000	5.2	3.8	5.3	3.2
Copper	mg/kg	0.015	44000	16.4	21.32	31.07	26.03
Mercury	mg/kg	0.001	68^{Methyl}	0.088	0.102	0.132	0.05
Nickel	mg/kg	0.05	3400	3.07	3.46	12.55	10.53
Selenium	mg/kg	0.01	1800	2.54	2.500	3.020	2.90
Zinc	mg/kg	0.1	170000	26.9	22.6	151.1	22.5
Benzene	mg/kg	0.05	110	<0.05	<0.05	<0.05	<0.05
Toluene	mg/kg	0.05	100000	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg	0.05	27000	<0.05	<0.05	<0.05	<0.05
m & p-Xylene	mg/kg	0.05	6630	<0.05	<0.05	<0.05	<0.05
o-Xylene	mg/kg	0.05	2620	<0.05	<0.05	<0.05	<0.05
Napthalene	mg/kg	0.01	3000	0.06	0.07	0.02	<1.0
Phenanthrene	mg/kg	0.01	6300	0.32	0.44	0.13	0.04
Benzo(a)anthracene	mg/kg	0.01	62	0.19	0.15	0.08	0.13
Benzo(a)pyrene	mg/kg	0.01	13	0.18	0.2	0.1	0.15

APPENDIX 3.1

OPW FLOOD MAPS

OPW (2021)



Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
1Ma2273	11.79	8.56	11.97	13.89	12.17	21.34
1Maa675	2.50	0.43	2.85	0.68	3.46	1.05
1Mab2028	12.62	0.47	12.82	0.87	13.10	1.55
1Mac743D	16.80	5.02	17.13	9.87	17.35	18.35

Location Plan:

LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Fluvial Extent (High Risk)
- 1% AEP Fluvial Extent (Medium Risk)
- 0.1% AEP Fluvial Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 — Node Label
- x.x% AEP — Standard of Protection of Flood Defence

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

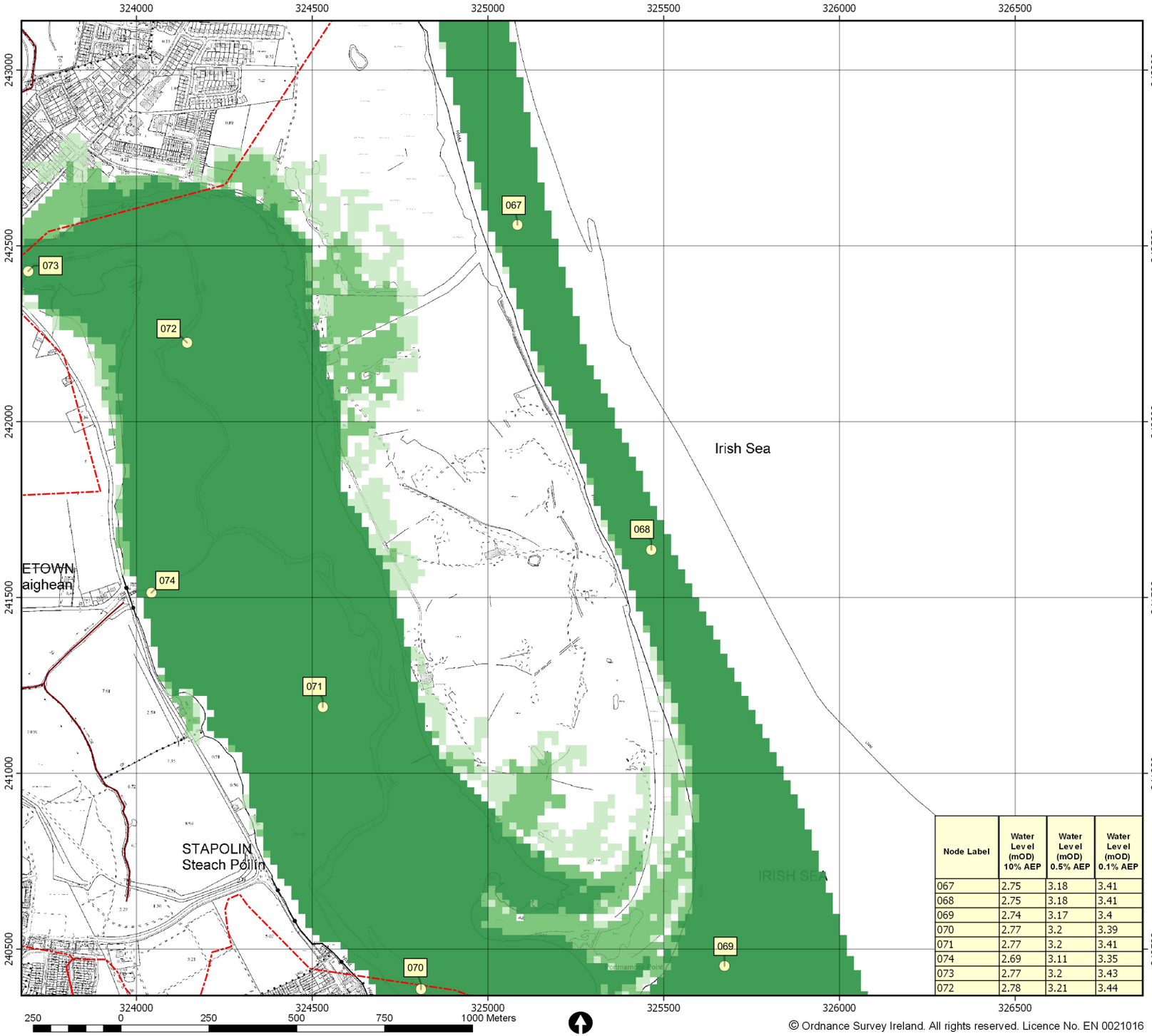
The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
FINGAL EAST MEATH FRAM STUDY

Map: **Mayne Model**
FLUVIAL FLOOD EXTENT MAP

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn by:	IH	Date:	Nov - 2017
Checked by:	JM	Date:	Nov - 2017
Approved by:	JM	Date:	Nov - 2017

Map No.:
MAY/HPW/EXT/CURS/003
Revision: F1
Map Scale: 1:10,000 Plot Scale: 1:1 @ A3



Node Label	Water Level (mOD) 10% AEP	Water Level (mOD) 0.5% AEP	Water Level (mOD) 0.1% AEP
067	2.75	3.18	3.41
068	2.75	3.18	3.41
069	2.74	3.17	3.4
070	2.77	3.2	3.39
071	2.77	3.2	3.41
074	2.69	3.11	3.35
073	2.77	3.2	3.43
072	2.78	3.21	3.44

Location Plan:

LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Tidal Extent (High Risk)
- 0.5% AEP Tidal Extent (Medium Risk)
- 0.1% AEP Tidal Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 — Node Label
- x.x% AEP — Standard of Protection of Flood Defence

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
FINGAL EAST MEATH FRAM STUDY

Map: **MALAHIDE TIDAL FLOOD EXTENT MAP**

Map Type:	EXTENT		
Source:	TIDAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn by:	IH	Date:	Sep - 2016
Checked by:	MC	Date:	Sep - 2016
Approved by:	JM	Date:	Sep - 2016

Map No.: E09MAL_EXCCD_F0_44
Revision: F0
Map Scale: 1:10,000 Plot Scale: 1:1 @ A3

APPENDIX 6.1

BALDOYLE RACECOURSE SKATE PARK – NOISE IMPACT ASSESSMENT

AWN (2021)

TECHNICAL NOTE

Project	**Baldoyle Racecourse Skate park**
Subject	**Noise Impact Assessment**
Author	**Aoife Kelly**
Date	**08 February 2021**
Ref.	**AK/19/10738NT01a**

awnconsulting
A Trinity Consultants Company

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

1.0 INTRODUCTION

Fingal County Council has commissioned AWN Consulting Limited to assess the potential noise impact associated with the proposed skate park at Baldoyle Racecourse Park, Dublin 13. Figure 1 illustrates the proposed location of the park.

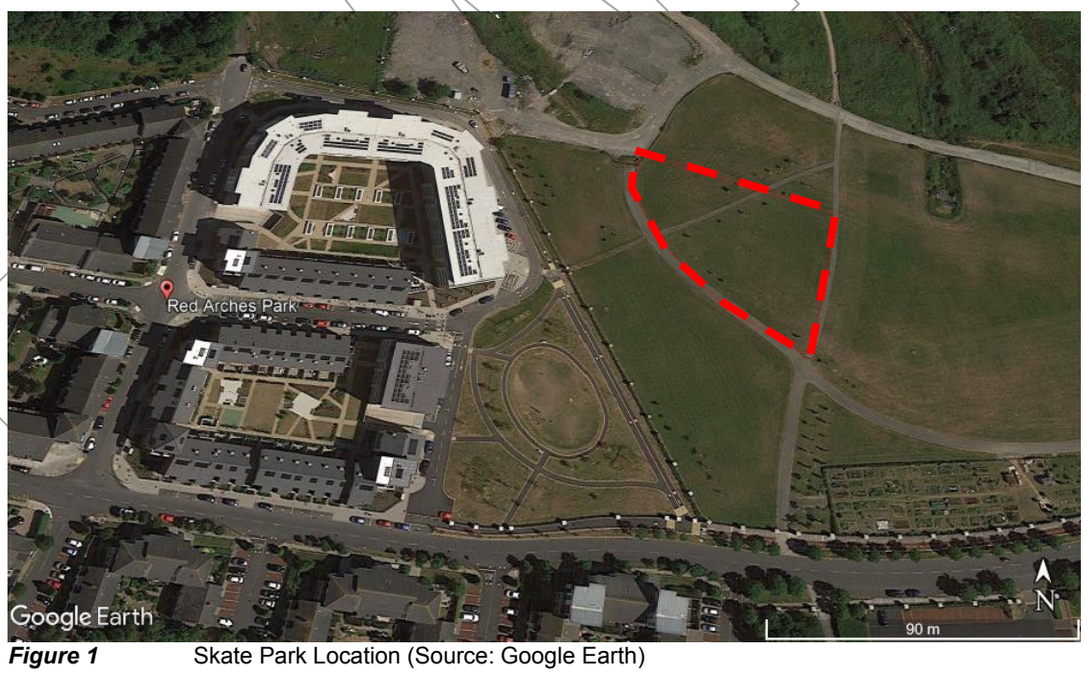


Figure 1 Skate Park Location (Source: Google Earth)

The proposed skate park is located close to the boundary with residential properties, who expressed concern regarding the potential noise from the skate park. AWN Consulting Limited has been commissioned to conduct an assessment into potential noise impact of activities within the skate park.

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: + 353 21 438 7400
F: + 353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812

2.0 RECEIVING ENVIRONMENT

2.1 Environmental Noise Survey

The following noise maps have been referred to when assessing the baseline noise environment,

- Round 3 Noise Maps for Roads – Dublin Agglomeration, and;
- Round 3 Noise Maps for Airports – Dublin Airport.

The above noise maps are provided for the overall day evening night period in terms of L_{den} and for the night-time period in terms of L_{night}. On review the noise levels at adjacent sensitive locations are in the range of <55dB L_{den}. L_{night} levels are not relevant as it is assumed that the skate park will not be used at night.

All data has been taken from the EPA Mapping website http://gis.epa.ie.

3.0 ASSESSMENT CRITERIA

There are no Irish Standards containing guidance that is applicable in this instance. In the absence of such standards, best practice dictates that the potential noise impact of the proposed development is assessed against appropriate British and/or International Standards. In this instance the most appropriate guidance is contained within the World Health Organisation publication *Guidelines for Community Noise*, 1999.

This document states the following,

> *To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} ….to protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq}*

Taking into consideration that the skate park is only used during daytime hours the appropriate criterion in this instance is to ensure that noise levels do not exceed 55dB L_{Aeq} externally at any residential dwelling with the noise level being limited to 50dB L_{Aeq} where possible.

4.0 NOISE IMPACT ASSESSMENT

In order to assess the potential noise impact of the proposed development the noise levels from a similar development have been adopted. The noise sources were derived from surveys conducted by AWN at another skate park currently in operation in Bushy Park, Terenure, Dublin 6.

The following sections discuss the source noise survey and the noise impact results.

4.1 Source Noise Survey

Engineers from AWN carried out a noise survey at the existing skate park in Bushy Park, Terenure, Dublin 6. Attended noise measurements were conducted at a location 1m from the edge of the park over the course of the following survey periods:

- 15:36hrs to 16:19hrs 20 July 2016

Attended noise measurements were conducted using a NTI Audio XL2 Sound Level Meter. The measurement apparatus was check calibrated both before and after each survey using a Brüel & Kjær Type 4231 Sound Level Meter Calibrator.

Figure 3 illustrates the measurement position relative to the skate park.

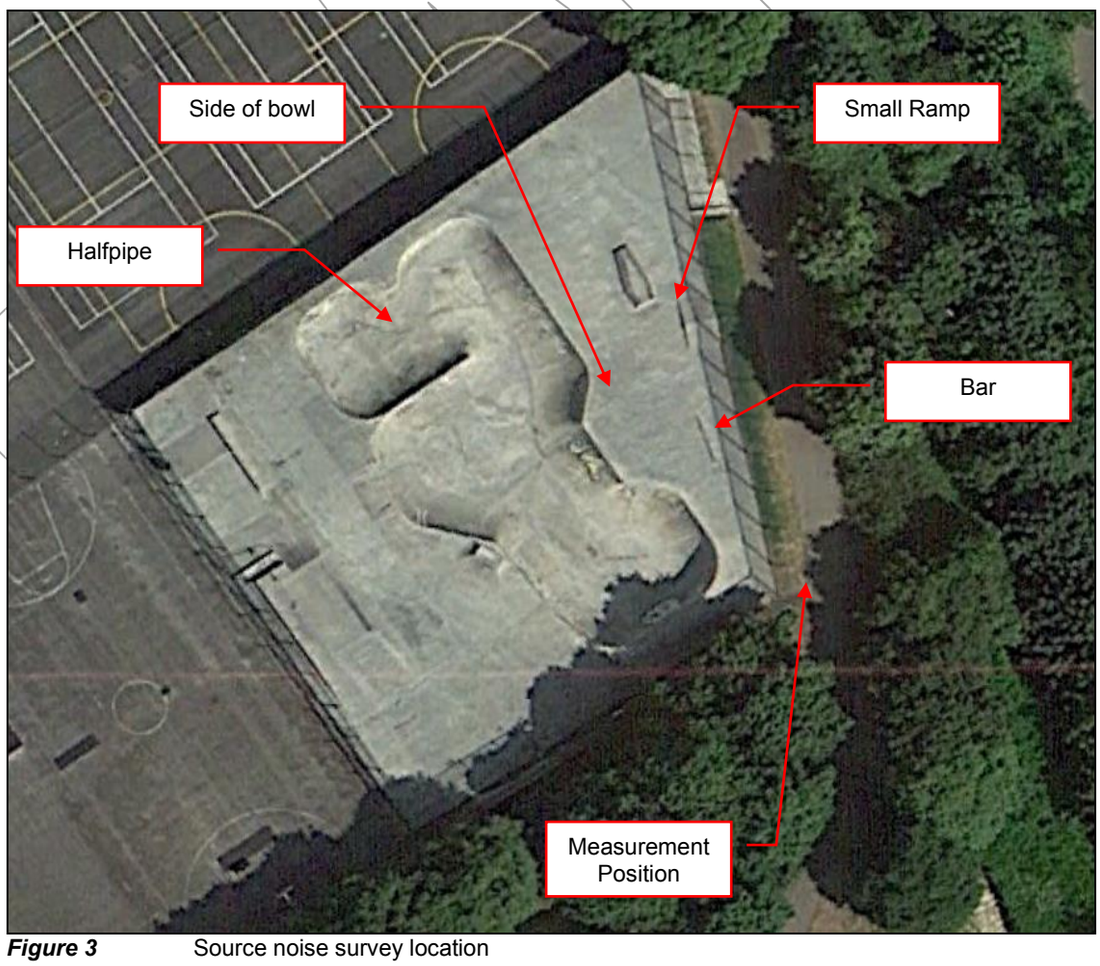


Figure 3 Source noise survey location

During the survey the skate park was busy with continuous bangs and scrapes as boards were dropped or fell to the ground. Noise from wheels on the ground and from

skaters skating in the bowl were hard to discern. Noise came from board edges/ends hitting the ground/ramps/pool edge, or failed flips were more notable. Figure 4 presents the noise levels measured each second over the survey period.

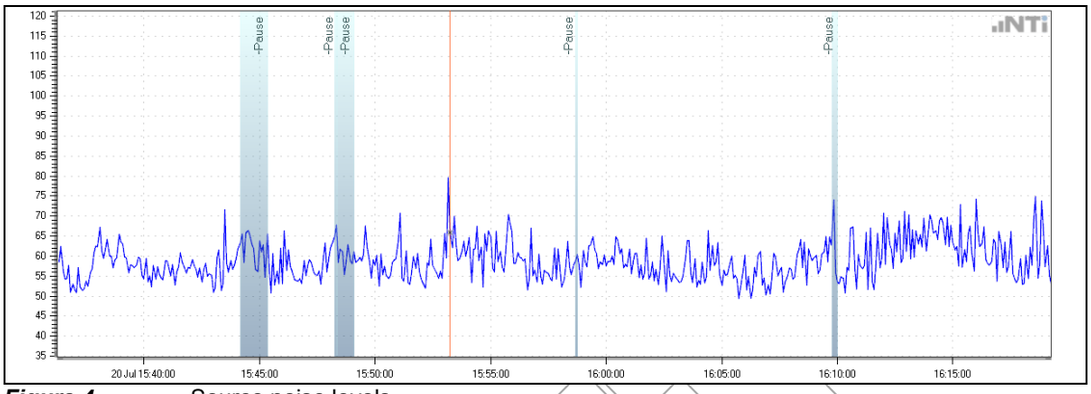


Figure 4 Source noise levels

The measured noise levels generally ranged from 50dB L_{Aeq} during lulls in activity to 70dB L_{Aeq} during the noisy periods. Very occasional noise levels greater than this were recorded, however, they were very infrequent. A source level of 70dB(A) at 1m from the edge of the skate areas will be used in the calculations.

4.2 Noise Results

The nearest noise sensitive location to the skate park is located at 50m distance to northwest of the skate park site boundary. Based on the 70dB(A) source level at 1m identified in the section above the equivalent noise level at the receiver is 36dB(A) due to sound propagation over distance.

5.0 DISCUSSION OF RESULTS

The results have shown that the skate park does not exceed the criterion of 55dB L_{Aeq} at the nearest noise sensitive location. It should be noted that the noise result presented is representative of the worst-case instantaneous noise level but that the average noise level over the course of the day would be much lower. It should also be noted that the skate park will not operate at night-time.

The noise level should also be viewed in the context of the existing baseline noise levels, which were found to be <55dB L_{day} due to road traffic noise in the area, as outlined in Section 2.1. Therefore, it is likely that skate park activity may be just audible during lulls in road traffic noise in the area.

If required, the noise levels could be further reduced by the introduction of suitable landscaping e.g. grass mounds or acoustic screening, however this is not essential as the predicted skate park noise levels are below the noise criterion. Suitable mitigation measures have been outlined in Section 6.0.

6.0 SCHEDULE OF MITIGATION

The following sections discuss the schedule of mitigation measures that can be incorporated into the skate park construction to minimise noise.

6.1 Physical Measures

The park design shall be such that the skate bowls are positioned in carefully chosen locations to minimise the potential impacts on the nearest residential receivers.

A 1.5m earth mound will be constructed along the perimeter of the skate park, which will provide a slight to moderate reduction (3-5 dB) to the noise levels generated during skate park activities at the nearest residential receivers.

6.2 Measures to Mitigate Anti-Social Behaviour

Concerns may be raised over the potential for noise due to anti-social behaviour at the skate park. It is proposed to incorporate the following measures into the skate park to reduce the risk of anti-social behaviour:

- Security system including CCTV cameras;
- Lighting design to illuminate areas and avoid dark corners;
- Seating and landscaping design to encourage groups to congregate away from residential areas, and;
- Main bowl illumination on timers to discourage out of hours use.