

WHITECHURCH STREAM FLOOD ALLEVIATION SCHEME

Environmental Report



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Contents

1	INTRODUCTION	1
2	DESCRIPTION OF THE PROPOSED DEVELOPMENT.....	3
2.1	Study Area.....	3
2.2	Proposed Development.....	3
2.2.1	Advance Works.....	5
2.2.2	Construction Phase	5
2.3	Operational Phase	8
2.4	Preliminary Construction Environmental Management Plan	9
3	EIA LEGISLATIVE CONTEXT AND GUIDANCE	10
3.1	Planning and Development Regulations 2001 (as amended)	10
3.2	Schedule 5 and EIA Screening	10
3.2.1	Sub Threshold Development	10
3.2.2	Schedule 7 and Schedule 7a	11
3.3	EIA Screening	12
3.4	Scope of the Environment Report.....	13
3.4.1	Environmental Report Structure	13
4	POPULATION & HUMAN HEALTH	14
4.1	Introduction.....	14
4.2	Receiving Environment	14
4.2.1	Population	14
4.2.2	Affluence & Deprivation	15
4.2.3	Human Health.....	15
4.3	Potential for Significant Impact - Construction Phase.....	15
4.4	Potential for Significant Impact – Operational Phase.....	15
4.5	Mitigation Measures	16
5	BIODIVERSITY	17
5.1	Introduction.....	17
5.2	Receiving Environment	17
5.2.1	European Sites	17
5.2.2	Nationally Designated Sites.....	17
5.2.3	Non-Designated Sites.....	18
5.2.4	Habitats.....	18
5.2.5	Invasive Species.....	21
5.2.6	Protected Species.....	21
5.3	Potential for Significant Impact – Construction Phase.....	25
5.4	Potential for Significant Impact – Operational Phase.....	25
5.5	Mitigation Measures	25
6	LAND & SOILS	27
6.1	Introduction.....	27
6.2	Receiving Environment	27
6.2.1	Geology.....	27
6.2.2	Soil, Subsoils and Soil Deposits	28
6.2.3	Landslides.....	30
6.2.4	Geological Heritage Sites	30
6.3	Potential for Significant Impact – Construction Phase.....	30
6.3.1	Land	30
6.3.2	Soil	31
6.4	Potential for Significant Impact – Operational Phase.....	31
6.5	Mitigation Measures	31

7	WATER (HYDROLOGY & HYDROGEOLOGY)	32
7.1	Introduction	32
7.2	Receiving Environment - Hydrology	32
7.2.1	Marine Environment	32
7.2.2	Surface Water Environment	32
7.2.3	Surface Water Quality and Risk Characterisation	33
7.2.4	Water Quality	33
7.2.5	Flooding	34
7.3	Receiving Environment – Hydrogeology	35
7.3.1	Aquifer Type and Classification	36
7.3.2	Aquifer Vulnerability	36
7.3.3	Groundwater Resources	37
7.4	Potential for Significant Impact – Construction Phase	38
7.5	Potential for Significant Impact – Operational Phase	38
7.6	Mitigation Measures	39
8	AIR & CLIMATE	41
8.1	Introduction	41
8.2	Receiving Environment	41
8.3	Potential for Significant Impact – Construction Phase	43
8.4	Potential for Significant Impact – Operational Phase	43
8.5	Mitigation Measures	43
9	NOISE & VIBRATION	45
9.1	Introduction	45
9.2	Receiving Environment	45
9.3	Potential for Significant Impact – Construction Phase	46
9.4	Potential for Significant Impact – Operational Phase	47
9.5	Mitigation Measures	47
10	MATERIAL ASSETS (TRAFFIC AND UTILITIES)	49
10.1	Introduction	49
10.2	Receiving Environment	49
10.2.1	Traffic & Transportation	49
10.2.2	Services & Utilities	49
10.3	Potential for Significant Impact – Construction Phase	50
10.3.1	Traffic & Transportation	50
10.3.2	Services & Utilities	51
10.4	Potential for Significant Impact – Operational Phase	51
10.4.1	Traffic & Transportation	51
10.4.2	Services & Utilities	51
10.5	Mitigation Measures	51
10.5.1	Traffic & Transportation	51
10.5.2	Services & Utilities	52
11	MATERIAL ASSETS (CULTURAL HERITAGE)	53
11.1	Introduction	53
11.2	Receiving Environment	53
11.3	Potential for Significant Impact – Construction Phase	57
11.4	Potential for Significant Impact – Operational Phase	57
11.5	Mitigation Measures	57
12	LANDSCAPE AND VISUAL	60
12.1	Introduction	60
12.2	Receiving Environment	60
12.2.1	Baseline Landscape Character – St Enda's Park	60

12.2.2	Baseline Landscape Character – Whitechurch Road Urban Area (from St Enda’s Park to junction of Ballyboden Road	61
12.2.3	Baseline Visual Amenity	61
12.3	Potential for Significant Impact – Construction Phase	62
12.3.1	Landscape and Landscape Character – St. Enda’s Park.....	63
12.3.2	Landscape and Landscape Character - Whitechurch Road Urban Area	63
12.4	Potential for Significant Impact – Operational Phase.....	63
12.4.1	Landscape and Landscape Character – St. Enda’s Park.....	63
12.4.2	Landscape and Landscape Character - Whitechurch Road Urban Area	63
12.4.3	Visual Amenity	63
12.5	Mitigation Measures	64
12.5.1	Other Measures Relevant to Landscape and Visual	64
13	CUMULATIVE IMPACTS.....	66
14	CONCLUSION	70

Tables

Table 4-1:	Population Breakdown by Small Electoral Division within the Study Area.....	14
Table 4-2:	Proportion of the Population in Good Health.....	15
Table 5-1:	Ecological Surveys & Dates	17
Table 5-2:	Habitat Types Recorded & Ecological Valuation.....	18
Table 5-3:	Bird Species Observed during the Surveys	24
Table 7-1:	Summary of WFD status for the Owendoher_010	33
Table 7-2:	Historic Flood Records	34
Table 7-3:	GSI Vulnerability Mapping Guidelines.....	37
Table 8-1:	EPA Air Monitoring Data for Zone A (Rathmines Monitoring Station) in 2018.....	42
Table 9-1:	Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property	48
Table 11-1:	Known cultural heritage assets in the vicinity of the Whitechurch FAS	53
Table 11-2:	Cultural heritage sites and related features (F#) recorded in the vicinity of the Whitechurch FAS	55
Table 11-3:	Impacts and archaeological mitigation associated with the features identified within the proposed works area of the Whitechurch FAS	57
Table 12-1:	Viewpoints and Existing Visual Amenity	61
Table 13-1:	Proposed developments near Whitechurch Stream.....	66
Table 13-2:	Enabling Works, Demolition and Construction Summary of Impacts and Mitigation	67
Table 13-3:	Summary of Impacts and Mitigation	69

Figures

Figure 2-1:	Site Location and Survey Area.....	4
Figure 2-2:	Areas 1, 2 and 3.....	6
Figure-2-3:	Areas 4, 5, and 6.....	7
Figure 2-4:	Areas 7 & 8.....	8
Figure 5-1:	Habitat Map	20
Figure 6-1:	Bedrock Geology (Source: GSI, Bedrock Geology 100k).....	28
Figure 6-2:	Soils (Source: GSI, Soils).....	29
Figure 6-3:	Subsoils (Source: GSI, Quaternary Sediments)	30
Figure 7-1:	Past Flood Events (Source: OPW).....	35
Figure 7-2:	Aquifer Classification (Source: GSI)	36
Figure 7-3:	Aquifer Vulnerability (Source: GSI)	37

Figure 7-4: Groundwater Wells and Springs (Source: GSI)38

Figure 9-1: Strategic Noise Mapping of the Study Area46

Figure 10-1: Proposed Location of Site Compound and Welfare Facilities.....50

Figure 11-1: Extract from Project Drawing with ADCO Features (F1 – F26) and NIAH sites
superimposed (Source: ADCO Report)56

1 INTRODUCTION

The Office of Public Works (OPW) in partnership with South Dublin County Council (SDCC) and Dublin City Council (DCC) carried out a Catchment Flood Risk Assessment and Management (CFRAM) Study for the River Dodder Catchment¹. Whitechurch Stream was included as part of the study as it is a sub catchment of the Dodder Catchment. The River Dodder Catchment Flood Risk Management Plan (CFRMP), which was published in November 2014, identified a preferred flood risk management option for the Area of Potential Significant Risk (APSR), named as Tara Hill and St. Enda's, now referred to as Whitechurch Stream.

The OPW and SDCC have initiated the development of a Flood Relief Scheme for Whitechurch Stream to alleviate fluvial flooding for the Tara Hill and St. Enda's APSR. The proposed Whitechurch Stream Flood Alleviation Scheme (FAS) (hereafter referred to as the proposed development), which is being designed and funded by the OPW consists of a number of measures to improve the flood defences and improve conveyancing of flood water.

RPS were instructed by SDCC to prepare an Environmental Report to support an application for approval under Section 177AE of the Planning and Development Act 2000 (as amended). This application is being made to An Bórd Pleanála under Section 177AE of the Act.

An EIA screening assessment was undertaken by RPS in 2020. The overall determination of the EIA Screening Report is that the proposed development individually and cumulatively with associated existing and approved development will not result in the potential for significant impacts to arise on the environmental receptors as a result of the proposed development. As such it is concluded that an EIAR is not required for the proposed development.

The proposed development site is located in South Dublin and comprises a corridor of land centred on the Whitechurch Stream extending north from St Enda's Park towards Willbrook Road. The site is located within a wider context comprised of the built-up residential areas of Rathfarnham and Willbrook. The southern end of the corridor lies adjacent and immediately west of St Enda's Park.

Although an Environmental Impact Assessment Report (EIAR) is not required, this Environmental Report has been prepared having regard to relevant national and EU environmental legislation to ensure a comprehensive planning pack to accompany the application. This report details an assessment of the potential impacts of the proposed development on the environment to demonstrate SDCC's commitment to environmental protection.

Supporting documents (including stand-alone specialist reports) not included in this report but available for consideration to ensure a robust review of the proposed development on the selected site included the following:

- Preliminary Design Report, prepared by OPW;
- Preliminary Outline Construction Environmental Management Plan, prepared by OPW;
- Environmental Impact Assessment Screening Report, prepared by RPS;
- Ecological Impact Assessment, prepared by RPS;
- Screening for Appropriate Assessment, prepared by RPS;
- Natura Impact Statement (NIS), prepared by RPS;
- Archaeological Impact Assessment, prepared by ADCO;
- An Arboriculture Assessment of the Tree Vegetation (Tree Survey Report); prepared by Arborist Associates Ltd; and

¹ RPS (2014)

- Landscape & Visual Impact Assessment Report prepared by RPS.

The remainder of this Environmental Report is set out as follows:

- Section 2 – Description of the Proposed Development;
- Section 3 – EIA Legislative Context;
- Section 4 – Population and Human Health;
- Section 5 – Biodiversity;
- Section 6 – Land & Soils;
- Section 7 – Water;
- Section 8 – Air & Climate;
- Section 9 – Noise & Vibration;
- Section 10 – Material Assets (Traffic & Utilities);
- Section 11 – Material Assets (Cultural Heritage);
- Section 12 – Landscape & Visual;
- Section 13 – Cumulative Impacts; and
- Section 14 – Conclusion

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development is located in Rathfarnham in South County Dublin. It extends from the south-western corner of St. Enda's Park, downstream under Sarah Curran Road where it continues for approximately 700m alongside the Whitechurch Road, flowing under a number of variously sized culverts before its arrival at the confluence with the Owendoher River at Ballyboden Road. With the exception of St. Enda's Park, the proposed development is located in a largely urban environment. The location and extent of the proposed project development is illustrated in **Figure 2.1**.

The objective of the project is to provide security from flood events and improve conveyance of flood waters. A 2019 Preliminary Design Report² prepared by the OPW identified the viable options for the proposed work. The report provided an assessment of the feasibility of the various options and identified a preferred option which is described below and is the subject of this assessment.

2.1 Study Area

The Preliminary Design Report² indicates a study area for the purpose of the flood alleviation scheme illustrated in **Figure 2.1**. This extends from the upstream end of St. Enda's Park at Taylor's Lane to the stream's confluence with the Owendoher River where Whitechurch Road merges onto Willbrook Road.

No flood risk management measures are considered upstream of St. Enda's Park or for the Owendoher River as part of this flood alleviation scheme.

2.2 Proposed Development

This section sets out a description of the proposed development and contains information on the project site, design, size and other relevant features in order to establish the characteristics of the project.

The proposed development, which is being designed and funded by the Office of Public Works, consists of a number of measures to improve the flood defences and improve conveyance of flood water.

A Preliminary Design Report has been prepared by the OPW (July 2019) which identified the viable options for the proposed work and identified a preferred option which is described below. The proposed development comprises a series of flood alleviation measures including debris management and the introduction of direct defences at various locations along Whitechurch Stream between St Enda's Park and the tie-in of the Whitechurch Stream to the Owendoher River. The extent of the proposed project development is illustrated in **Figure 2.1** below.

² OPW (2019). Whitechurch Stream Flood Alleviation Scheme – Preliminary Design Report (July 2019) 2800/PDR/001/B



Figure 2-1: Site Location and Survey Area

2.2.1 Advance Works

Advance works for the proposed development will entail a temporary works compound, to be located in a corner of the existing car park at the front of St. Enda's Park, off Sarah Curran Road. This facility will be secured from unauthorised access for the duration of the works and will include offices, welfare facilities, parking for site vehicles and plant at night, storage of equipment materials used in the construction phase and also temporary storage of material to be re-used or awaiting removal by licenced waste contractor. Contaminated wastes, e.g. spoil containing third schedule Invasive Alien Plant species material, will be removed under appropriate waste collection permit and NPWS licence to a facility licenced to accept such waste therefore no quarantine area is required. Advance clearance of vegetation along and adjacent to the Whitechurch Stream in preparation for construction phase may also be required and material may be temporarily stored at the temporary works compound until disposal.

2.2.2 Construction Phase

The estimated utimeframe for construction works is approximately 12 months. The works will be phased in sections due to accessibility and seasonal constraints with regard to instream works (where needed). There will be a requirement for traffic management measures to be implemented for sections of the proposed works, particularly where the Whitechurch Stream runs alongside the narrow Whitechurch Road. The proposed works at each area are outlined in the following sections.

2.2.2.1 Area 1 - Area downstream of Taylor's Lane and within St Enda's Park (Ch.: 0+000- 0+510.10),

- No flood alleviation measures proposed for this area.

2.2.2.2 Area 2 - Area between St Enda's Park and Sarah Curran Bridge Inlet(Ch.: 0+510.10- 0+572.25),

- Localised bank raising with rip rap erosion protection on the left bank to the design Level of 65.1m OD for approx. 50m length,
- Woodland planting on the left bank of Whitechurch Stream in St Enda's Park;
- Removal of trees and bankside vegetation to accommodate the proposed Works,
- Debris Trap and slipway at a suitable location upstream of Sarah Curran Bridge.

Area 3 - Area downstream of Sarah Curran Bridge outlet to Whitechurch Road Bridge Inlet (weir) (Ch.: 0+578.80- 0+688.70),

- Tree removal along the left bank to reduce blockage risk at Whitechurch Rd. Bridge,
- Bank protection measures on the left bank,
- Replacement of the wooden foot bridge approximately at Ch. 620. The replacement bridge will be a timber bridge of similar size and in the same location as the existing.

Areas 1,2 and 3 are outlined in **Figure 2.2**.

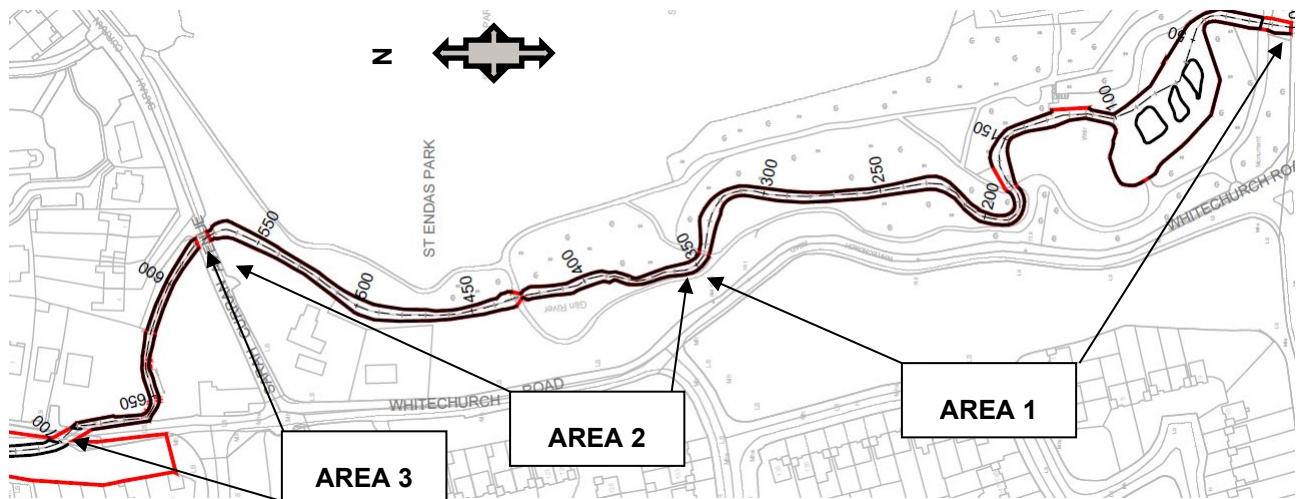


Figure 2-2: Areas 1, 2 and 3

2.2.2.3 Area 4 – Area from Whitechurch Road Bridge Outlet to St Gatiens Culvert inlet (Ch.: 0+700- 0+803.03),

- Tree clearing and vegetation removal on the right bank will be required to reduce blockage risk and to accommodate new flood defence walls.
- Bank protection will be required on the left bank.
- Underpinning will be required on the left bank.
- Proposed tree planting, bulb planting and grass seeding on Whitechurch Road – south of St Gatiens Court.
- New flood wall on the right bank side tying to existing stone wall (Level 62.95mOD) approximately 27m downstream of Whitechurch Rd. Bridge Outlet.
- New head wall at culvert inlet at level 62mOD with return wall on left bank which will replace existing railing.
- New right bank flood wall replacing existing fence. Design level at 62mOD. Wall height 1.1m-1.3m.
- Permanent sheet piling underneath new walls at St. Gatiens culvert inlet, extended upstream for approximately 30m.

2.2.2.4 Area 5 - Area from St Gatiens Court Culvert outlet to the inlet of the Garage Culvert at Rathfarnham Ford (Ch.: 0+828.07- 0+918.61)

- Removal of existing trees and vegetation from the right bank of Whitechurch Stream will be required to facilitate the works
- New head wall at St. Gatiens Court culvert outlet at level 61.8mOD with return wall left bank replacing railing and tying into existing wall
- New right bank flood wall replacing existing low wall and fence. Wall height generally 1.2m but raising to 1.9m at the Garage culvert
- Permanent sheet piling underneath new walls at St. Gatiens culvert outlet, extended downstream for 30m
- New head wall at culvert inlet level 60.4 mOD with return wall left bank tying into existing left bank wall. Wall height 1.9m
- New right bank flood wall tying into new head wall at Garage Culvert inlet at level 60.4mOD

- Permanent sheet piling underneath new wall at Garage Culvert inlet, extended upstream for 30m
- Proposed tree planting, bulb planting and grass seeding on Whitechurch Road – North of St Gatiens Court.
- Staged Trash screen with water level gauge to be provided at Garage Culvert inlet

2.2.2.5 Area 6 - Area from Garage Culvert at Rathfarnham Ford to Willbrook Lawn Twin Culvert Inlet (Ch.: 0+983.91- 1+132.91)

- Removal of existing trees and vegetation from both sides of Whitechurch Stream will be required to facilitate the works;
- Increase concrete plinth around culvert opening to 600mm above ground level and install new railing,
- New head wall to culvert outlet level 58.25mOD. Flood wall left and right bank tying into head wall to design level 58.25mOD. Wall height 1.2m above path level. Right bank wall to tie into existing wall downstream of existing bridge.
- Permanent sheet piling underneath new walls left and right bank, at Garage Culvert outlet, extended downstream for approximately 30m
- Retention of existing right bank walls downstream of existing bridge at Capri Site. Wall to be cladded with stone.
- Proposed beech hedgerow within existing open space upstream of Willbrook Lawn twin culvert
- Replace metal railing at parking area off Whitechurch Stream Bridge with low level 400mm defence wall and railing to tie into bridge parapet and railing.
- Replace left bank existing metal railing with low level defence wall with railing on the left bank, upstream of the inlet of Whitechurch Stream Bridge with wall height 600mm above existing ground levels. Wall and railing to tie into bridge parapet and railing.

Areas 4,5 and 6 are outlined in **Figure 2.3** below.

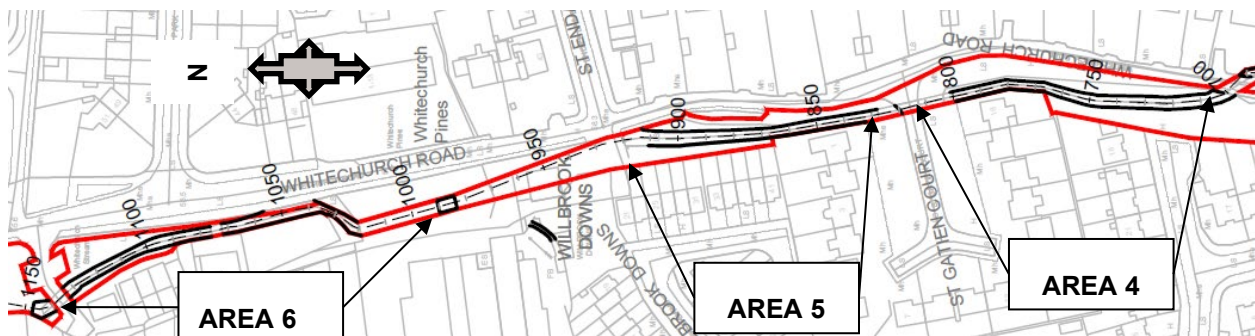


Figure-2-3: Areas 4, 5, and 6

2.2.2.6 Area 7 - Area from the outlet of the Twin Culvert at Willbrook Lawn to the Inlet of Bridge crossing Whitechurch Road (Ch.: 1+140.41- 1+410.43).

- Return wall around dual culvert inlet to tie into bridge parapet and existing boundary wall.
- Proposed tree planting on Whitechurch Road within existing open space immediately south of the junction between Whitechurch Road and Willbrook Lawn
- Localised left bank raising with rip rap erosion protection and permanent supports to be provided to decked structures along the bank.
- Left bank wire mesh fence panels at 1.2 m height above the footpath
- Proposed beech hedgerow along left bank fence.

- Right bank railing to be placed above existing wall. Top of railing at 1.2 m height above the footpath.
- Removal of existing trees and vegetation from both sides of Whitechurch Stream will be required. Existing walls right bank to be maintained at current level, however remedial works will be required.
- Suitably designed staged trash screen with water level gauge to be provided upstream of bridge/culvert face with access from the funeral home.
- Proposed planting at the open spaces immediately adjacent to the car park, upstream and downstream of the pedestrian bridge in Willbrook Lawn.

2.2.2.7 Area 8 - Bridge crossing Whitechurch Road outlet to Willbrook Road Culvert inlet (confluence with Owendoher) (Ch.: 1+420.20- 1+455)

- Tree and bankside vegetation management to reduce blockage risk to the culvert discharging to Owendoher.

Areas 7 and 8 are outlined in **Figure 2.4** below.

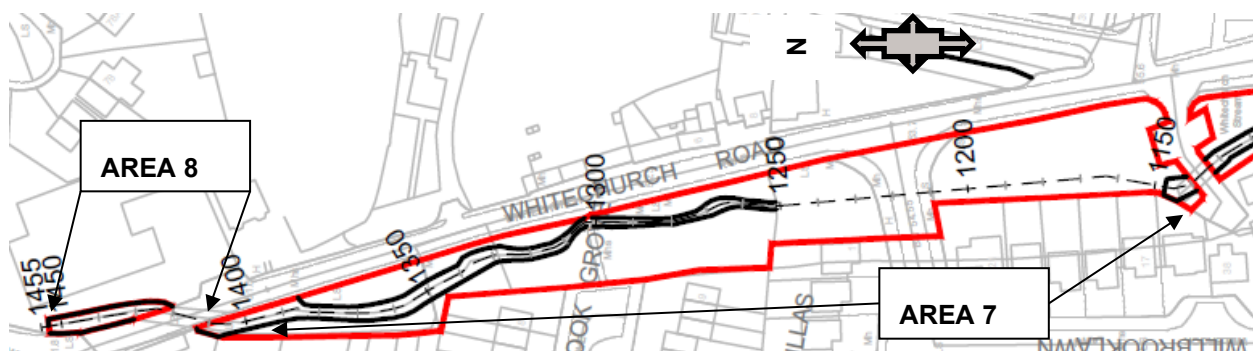


Figure 2-4: Areas 7 & 8

2.2.2.8 Landscape Works

New planting and seeding is proposed in St Enda's Park and at five locations along Whitechurch Road to mitigate adverse landscape and visual effects:

- Woodland planting on the left bank of Whitechurch Stream in St Enda's Park;
- Tree planting, bulb planting and grass seeding on Whitechurch Road, south of St Gatien Court;
- Tree planting, bulb planting and grass seeding on Whitechurch Road, north of St Gatien Court;
- Hedgerow planting within existing open space south of the Willbrook Lawn twin Culvert;
- Tree planting within the existing open space on Whitechurch Road, in the vicinity of Willbrook Lawn; and
- A mixed species hedgerow along the left bank of Whitechurch Stream near Willbrook Grove.

2.3 Operational Phase

The maintenance of the proposed flood alleviation scheme will be the responsibility of SDCC. The following general measures will be required as part of the routine monitoring and maintenance. They include:

- Flood walls - Annual inspection and sealant replacement (every 5 years);
- Flap valves (if any) - Inspection once every 5 years and replacement (every 25 years);
- Bank protection - Inspection once every 5 years and maintenance (as required);
- Tree management – Annual inspection and maintenance (as required);

- Trash screens – Bi-annual inspections and maintenance (as required); and
- Debris traps – Bi-annual inspections and maintenance (as required).

2.4 Preliminary Construction Environmental Management Plan

An outline Construction Environmental Management Plan (CEMP) has been prepared by the OPW as part of the proposed design. The outline CEMP is designed to cover the potential environmental risks and the proposed environmental construction strategies that are to be carried out before and during the proposed works. It includes standard design and construction measures in relation to scheduling of works, preventing impacts to ground and surface waters, invasive species and scheduling of works within close proximity of the sensitive watercourse. The outline CEMP is a live document that will be updated according to changing circumstances on the project and to reflect current activities on site. It is intended that the outline CEMP will be finalised by the OPW, as the likely contractor, to include all mitigation measures identified in both the ECIA and NIS into a detailed CEMP, should the works progress to the construction stage.

3 EIA LEGISLATIVE CONTEXT AND GUIDANCE

EIA requirements derive from EU Directive 2011/92/EU as amended by 2014/52/EU on the assessment of the effects of certain public and private projects on the environment.

The primary objective of the EIA Directive is to ensure that projects which are likely to have ‘significant effects’ on the environment are subject to an assessment of their likely impacts.

3.1 Planning and Development Regulations 2001 (as amended)

In the context of planning, the EIA Directive is given effect in Ireland through the Planning and Development Act 2000 (as amended). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (hereafter the EIA Regulations) transpose Directive 2014/52/EU into Irish Law and give further effect to the 2011 Directive.

3.2 Schedule 5 and EIA Screening

Ireland has implemented the EU EIA Directive(s) by requiring the preparation and submission of an Environmental Impact Assessment Report (EIAR) for projects falling within classes of development prescribed by Article 93 of, and Schedule 5 to, the Regulations. These Regulations are made pursuant to Section 176 of the Planning and Development Act 2000, as amended. In essence, every project listed in Part 1 of Schedule 5 must be subject to an EIA if the stated threshold set therein has been met or exceeded or where no thresholds are set, and accordingly, an EIAR must be submitted to the competent authority with an application for development consent in this regard. Projects listed in Part 2 of Schedule 5, which meet or exceed the thresholds set out, or where no thresholds are set, also require an EIA. Sub-threshold projects in Schedule 5 Part 2 require screening for EIA, except in cases where the likelihood of significant effects can be readily excluded.

The first step is to examine whether the proposed Flood Relief Scheme for Whitechurch Stream is a type that is prescribed in the Regulations. The proposed development, as described in Section 2, comprises a Flood Relief Scheme for Whitechurch Stream to alleviate fluvial flooding for the Tara Hill and St. Enda’s APSR. The scheme comprises a series of measures extending along approximately 1.7km length of the existing stream and hence the proposed development does not fall within Schedule 5 Part 1.

The proposed development is of a type that may occur within Schedule 5 Part 2 (refer Section 3.2.1). This schedule lists a range of development types with thresholds which, if exceeded, constitute development requiring the preparation and submission of an EIAR. Projects that do not exceed the stated thresholds are considered sub threshold development.

3.2.1 Sub Threshold Development

Article 92 (Part 10) of the regulations defines ‘sub-threshold development’ as:

“sub-threshold development” means development of a type set out in Part 2 of Schedule 5 which does not equal or exceed, as the case may be, a quantity, area or other limit specified in that Schedule in respect of the relevant class of development’.

The proposed development specifically falls under Item 10 Infrastructure Projects, subsection f(ii) which states:

‘(ii) Canalisation and flood relief works, where the immediate contributing sub-catchment of the proposed works (i.e. the difference between the contributing catchments at the upper and lower extent of the works) would exceed 100 hectares or where more than 2 hectares of wetland would be affected or where the length of river channel on which works are proposed would be greater than 2 kilometres.’

On the basis that the Whitechurch Stream FAS is less than 2km length and the immediate contributing sub-catchment is approximately 20 hectares and no wetlands are affected, the scheme is considered sub threshold development.

The proposed development would therefore not require a mandatory EIAR, however, an application for a screening for environmental impact assessment in respect of that development is required to be submitted to the planning authority in whose area the development would be situated.

3.2.2 Schedule 7 and Schedule 7a

Schedule 7 of the Regulations refers to criteria for determining whether development listed in Part 2 of Schedule 5 should be subject to an Environmental Impact Assessment. The criteria pertain to the characteristics of the proposed development, the location of the proposed development and the types and characteristics of the potential impacts.

Schedule 7A refers to information to be provided by the applicant or developer for the purposes of screening sub-threshold development for Environmental Impact Assessment. The information required is as follows:

1. A description of the proposed development, including in particular:
 - (a) a description of the physical characteristics of the whole proposed development and, where relevant, of demolition works; and
 - (b) a description of the location of the proposed development, with particular regard to the environmental sensitivity of geographical areas likely to be affected.
2. A description of the aspects of the environment likely to be significantly affected by the proposed development.
3. A description of any likely significant effects, to the extent of the information available on such effects, of the proposed development on the environment resulting from:
 - (a) the expected residues and emissions and the production of waste, where relevant;
 - (b) the use of natural resources, in particular soil, land, water and biodiversity.
4. The compilation of the information at paragraphs 1 to 3 shall take into account, where relevant, the criteria set out in Schedule 7.'

The criteria in Schedule 7 is as follows:

1. Characteristics of proposed development

The characteristics of proposed development, in particular—

- (a) the size and design of the whole of the proposed development,
- (b) cumulation with other existing development and/or development the subject of a consent for proposed development for the purposes of section 172(1A)(b) of the Act and/or development the subject of any development consent for the purposes of the Environmental Impact Assessment Directive by or under any other enactment,
- (c) the nature of any associated demolition works,
- (d) the use of natural resources, in particular land, soil, water and biodiversity,
- (e) the production of waste,
- (f) pollution and nuisances,
- (g) the risk of major accidents, and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge, and
- (h) the risks to human health (for example, due to water contamination or air pollution).

2. Location of proposed development

The environmental sensitivity of geographical areas likely to be affected by the proposed development, with particular regard to—

- (a) the existing and approved land use,*
- (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground,*
- (c) the absorption capacity of the natural environment, paying particular attention to the following areas:*
 - (i) wetlands, riparian areas, river mouths;*
 - (ii) coastal zones and the marine environment;*
 - (iii) mountain and forest areas;*
 - (iv) nature reserves and parks;*
 - (v) areas classified or protected under legislation, including Natura 2000 areas designated pursuant to the Habitats Directive and the Birds Directive and;*
 - (vi) areas in which there has already been a failure to meet the environmental quality standards laid down in legislation of the European Union and relevant to the project, or in which it is considered that there is such a failure;*
 - (vii) densely populated areas;*
 - (viii) landscapes and sites of historical, cultural or archaeological significance.*

3. Types and characteristics of potential impacts

The likely significant effects on the environment of proposed development in relation to criteria set out under paragraphs 1 and 2, with regard to the impact of the project on the factors specified in paragraph (b)(i)(I) to (V) of the definition of ‘environmental impact assessment report’ in section 171A of the Act, taking into account—

- (a) the magnitude and spatial extent of the impact (for example, geographical area and size of the population likely to be affected),*
- (b) the nature of the impact,*
- (c) the transboundary nature of the impact,*
- (d) the intensity and complexity of the impact,*
- (e) the probability of the impact,*
- (f) the expected onset, duration, frequency and reversibility of the impact,*
- (g) the cumulation of the impact with the impact of other existing and/or development the subject of a consent for proposed development for the purposes of section 172(1A)(b) of the Act and/or development the subject of any development consent for the purposes of the Environmental Impact Assessment Directive by or under any other enactment, and*
- (h) the possibility of effectively reducing the impact.*

3.3 EIA Screening

An EIA screening exercise was undertaken by RPS in 2020. The overall determination of the EIA Screening Report is that the proposed development individually and cumulatively with associated existing and approved development will not result in the potential for significant impacts to arise on the environmental receptors as

a result of the proposed development. As such it is concluded that an EIAR is not required for the proposed development.

Although an Environmental Impact Assessment Report (EIAR) is not required, this Environmental Report has been prepared having regard to relevant national and EU environmental legislation to ensure a comprehensive planning pack to accompany the application.

3.4 Scope of the Environment Report

While this report is not an Environmental Impact Assessment Report (EIAR) it follows generally the format and for clarity and consistency uses the impacts and effects terminology of an EIAR and as set out in the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft August 2017' (EPA 2017).

The purpose of this report is to identify the environmental impacts, both positive and negative for the proposed Whitechurch Stream Flood Alleviation Scheme (FAS), to ensure the integration of environmental considerations, in the form of mitigation measures, into the construction and operation of the project.

A range of environmental topics have been covered in this Environmental Report, including population and human health, biodiversity, land and soils, water, air quality and climate, noise and vibration, traffic and transportation, cultural heritage, waste management and landscape and visual.

3.4.1 Environmental Report Structure

Section 2 provides a description of the proposed development, including the construction and operational phases. Section 3 provides a description of the EIA Legislative Context and a summary of the EIA Screening Process.

Potential impacts to the environment resulting from the proposed project alone and in combination with other plans and projects are examined under the following topics in Sections 4 to 13.

The format of this Environmental Report is set out as follows:

- Section 4 – Population and Human Health;
- Section 5 – Biodiversity;
- Section 6 – Land & Soils;
- Section 7 – Water;
- Section 8 – Air Quality & Climate;
- Section 9 – Noise & Vibration;
- Section 10 – Material Assets (Traffic & Utilities);
- Section 11 – Material Assets (Cultural Heritage);
- Section 12 – Landscape & Visual;
- Section 13 – Cumulative Impacts; and
- Section 14 – Conclusion

4 POPULATION & HUMAN HEALTH

4.1 Introduction

This section of the Environmental Report (ER) describes the potential impacts of the proposed development on human beings, population and human health.

The study included an examination of the population and employment characteristics of the area. This information was sourced from the most recent census, the Census of Ireland 2016 from the CSO website, www.cso.ie.

4.2 Receiving Environment

The proposed development is located in South County Dublin and extends from the south-western corner of St. Enda's Park downstream under Sarah Curran Road where it continues for approximately 700 m alongside the Whitechurch Road, flowing under a number of variously sized culverts before its tie-in with the Owendoher River at Ballyboden Road. With the exception of St. Enda's Park, the remainder of the proposed development is located in a largely urbanised environment.

The Pearse Museum (formerly the Hermitage) at St. Enda's Park borders the proposed works location and is under the stewardship of the Office of Public Works. The Hermitage and its formal gardens and designed landscape in Haroldsgrange townland, are designated National Inventory of Architectural Heritage (NIAH) sites.

The proposed site is located along Whitechurch Road in a predominantly residential area, between Willbrook and St Enda's Park. According to the South Dublin County Council Development Plan 2016 - 2022, the site is located within lands zoned in accordance with Objective RES - To protect and/or improve residential amenity. The zoning Objective OS - To preserve and provide for open space applies to open space areas adjacent to the site including St Enda's Park.

4.2.1 Population

South Dublin County Council is the third largest of the four Dublin Local Authorities covering an area of 222.74 square kilometres. South Dublin has a population of 278,767 people living in 92,523 homes according to the 2016 census, a 5.1% population increase from the previous census in 2011.

The proposed development is located within the electoral division of Rathfarnham - St. Enda's (CSO Area Code ED 03025) and at the time of Census 2016, was designated as having a population of 3,877³ as outlined in **Table 4-1**. Further to this information, the total housing stock was 1,527, of which vacant households (excluding holiday homes) numbered 46.

Table 4-1: Population Breakdown by Small Electoral Division within the Study Area

District Electoral Division	ED Population (2011)	ED Population (2016)	% Population Change (2011-2016)
Rathfarnham - St. Enda's	3843	3877	0.9%

According to Pobal Childcare Services mapping⁴, there are 4 no. private enterprise childcare facilities located within the ED of Rathfarnham - St. Enda's. There are 2 no. schools located within the ED, Loreto High School Beaufort and St Mary's Boys National School located along Grange Road.

CSO (2020)³ <http://census.cso.ie/sapmap/> . Accessed 30/01/2020

⁴ <https://maps.pobal.ie/WebApps/ChildcareFacilities/index.html> . Accessed 03/02/2020

4.2.2 Affluence & Deprivation

The Pobal Deprivation Index is Ireland's most widely used social gradient metric, which scores each small area (50 – 200 households) in terms of affluence or disadvantage. The index uses information from Ireland's census, such as employment, age profile and educational attainment, to calculate this score. In the 2016 census, the Rathfarnham - St. Enda's ED has a deprivation score of 8.85 is classified as '*marginally above average*'. Data from the previous census in 2011 for the ED had a deprivation score of 8.14 and a classification as '*marginally above average*'.

4.2.3 Human Health

From the results of the 2016 census and as set out in **Table 4-2**, 60% of the population in South Dublin reported themselves to be in good health, while conversely 1% reported themselves to be in bad health. This compares closely to the Rathfarnham - St. Enda's ED figure of 64% in good health and 1% in bad health. In the Rathfarnham - St. Enda's, 12.1% of the population (468 persons) reported themselves as having a disability and 4.6% of the population classified themselves as a carer (179 persons) in the 2016 census. A breakdown of the health of the population is provided in **Table 4-2**.

Table 4-2: Proportion of the Population in Good Health

Area	Very Good (%)	Good (%)	Fair (%)	Bad (%)	Very Bad (%)	Not Stated (%)	Total
South Dublin	60%	27%	7%	1%	0%	4%	278,767
Rathfarnham - St. Enda's ED	64%	27%	7%	1%	0%	2%	3,877

4.3 Potential for Significant Impact - Construction Phase

There will be limited employment opportunities as a result of the construction of the proposed development which will result in some slight beneficial impact in relation to population.

Impacts associated with the construction of the proposed flood relief structures will require intermittent traffic management measures as outlined in **Section 4.5** in order to facilitate the construction related traffic on the public roadway which may result in temporary impacts on local residents. Construction works may result in impacts relating to the generation of noise and dust.

During construction there may be adverse effects on air quality, including generation of dust, as a result of construction activity. Effects are anticipated to be localised, slight and temporary in nature. There will be no resultant emissions to air from the operation of the proposed development. A CEMP will be put in place for the control of emissions from construction activities.

The construction phase may lead to a temporary increase in background noise levels through operation of plant machinery, underpinning of river walls and during the installation of sheet pile structures. Mitigation measures are outlined in **Section 4.5**. A CEMP will be put in place for the control of noise from construction activities.

4.4 Potential for Significant Impact – Operational Phase

Overall the proposed development will have a positive impact on human beings in the wider area in terms of alleviating the risk of flooding in the future. Residents, visitors and business owners in the vicinity will benefit from a reduced risk of flooding of the banks of the Whitechurch Stream.

During operation, it is considered extremely unlikely that a pollution event would occur of a magnitude that would have any significant negative impact on water quality and therefore it is considered that there are little or no risks to human health as a result of the proposed scheme.

4.5 Mitigation Measures

A preliminary CEMP has been prepared by the OPW as part of the Preliminary Design Report. A detailed CEMP which will be developed in Stage IIb (Detailed Design) of the project by the appointer contractor following agreement on suitable construction methodologies and sequencing of works for the project. The preliminary CEMP outlines the requirement for a Health and Safety Plan. Implementation of a Health and Safety Plan will ensure no risks to human beings working on the site or living/working adjacent to the site during construction. A traffic management plan will be produced by the appointed contractor, this will mitigate risk associated with construction traffic.

Operations on the more intrusive aspects of construction such as vegetation removal, underpinning of river walls, and sheet piling will by nature be more likely to affect the residential population within the vicinity of these works and so must be performed with these sensitivities in mind. The CEMP should outline mitigation measures in detail. These measures will avoid and minimise impacts of noise and dust on human health and the local population during the construction stage.

5 BIODIVERSITY

5.1 Introduction

This section of the report describes the potential impacts of the proposed development on biodiversity in the vicinity of the development. An Ecological Impact Assessment (EclA) of the proposed development has been carried out by RPS, the purpose of which is to:

- Establish the ecological baseline conditions at the proposed development location;
- Determine the ecological value of ecological features identified;
- Identify and describe all potentially significant negative ecological impacts that may arise from the proposed development; and
- Recommend mitigation measures for any identified potential significant negative ecological impacts and recommend enhancement measures where possible.

The findings of the EclA have been summarised in this section of the report.

5.2 Receiving Environment

The proposed study area was visited on various dates between November 2018 and April 2019 to carry out ecological surveys. The dates, along with a summary description of the work are included in **Table 5-1**.

Table 5-1: Ecological Surveys & Dates

Survey	Dates	Summary Description
Walkover	5 th November 2018	Site walkover with Client and Designers
Survey	17 th December 2018	Site meeting with OPW St. Enda's Park staff Instream Otter Survey Badger survey & mapping of overwintering Japanese Knotweed
Walkover	30 th January 2019	Site walkover to discuss IAPS management with SDCC & identify potential areas for replanting.
Aquatic Assessment	9 th April 2019	Aquatic survey
Terrestrial Ecology		Multidisciplinary ecology survey
Protected Species	24 th April 2019	Bat Survey #1
Protected Species	2 nd May 2019	Bat Survey #2

5.2.1 European Sites

The proposed development is not located within any European site of conservation importance. There are seven Special Areas of Conservation (SACs) and four Special Protection Areas (SPAs), collectively referred to as European sites, located within 15km of the proposed development. Of these sites, five were deemed to be potentially susceptible to effects from the proposed development and were brought forwards to Stage 2 AA screening. These sites are North Dublin Bay SAC, Wicklow Mountains SAC, North Bull Island SPA, South Dublin Bay and River Tolka Estuary SPA.

5.2.2 Nationally Designated Sites

The proposed development is not located within any nationally designated site. There are twenty-three proposed Natural Heritage Areas (pNHAs) and no Natural Heritage Areas (NHAs) located within 15km of the proposed development site.

5.2.3 Non-Designated Sites

The Whitechurch Stream, despite its highly modified nature provides an ecological corridor or stepping stone within a highly urbanised area. No specific conservation designation pertaining to Local Authority designations were identified, although a 2012 community biodiversity project report⁵ noted the local importance of the watercourse (referred to in that report as the River Glynn) as it flowed through St. Enda's Park and connected to the Owendoher and Dodder Rivers. Inland Fisheries Ireland (IFI) also confirmed during a consultative meeting of the aquatic sensitivity of the Whitechurch Stream owing to its direct connectivity to the Owendoher River and Dodder River.

As search of the Wetlands Surveys Ireland database⁶ ranked the artificial pond (WMI_DU146) at St. Enda's Park of local conservation value (moderate value).

The OPW maintain this Heritage Park, primarily in respect of its connection to Patrick Pearse. However, St. Enda's Park also has an education centre and staff have, in tandem with environmental non-governmental organisations, e.g. Dublin Bat Group, commenced documenting the parks biodiversity.

5.2.4 Habitats

A number of habitat types were recorded within the study area. Habitats on site were classified using 'A Guide to Habitats in Ireland' (Fossitt, 2000) and mapped in accordance with the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.*, 2011). These are listed in **Table 5-2** with corresponding ecological evaluation and are illustrated in **Figure 5-1**. None of the habitats surveyed in the study area correspond to Annex I habitats. All of the habitats are highly modified through a combination of suburban nature the landscape outside St. Enda's Park.

Table 5-2: Habitat Types Recorded & Ecological Valuation

Habitat Type	Fossitt Category	Ecological Valuation	Rationale
Eroding/Upland River	FW1	Local (Higher)	Despite being a highly modified (within much of the study area), spate river, the value of this watercourse lies in the corridor that it provides to local ecology and the connectivity between areas of higher potential e.g. St Enda's park and the Dodder Valley.
Other Artificial Lakes and Ponds	FL8	Local (Higher)	Although a man-made and largely managed planted feature, the diversity and cover associated with of this habitat provide habitat for bird and bats species in particular.
Amenity Grasslands	GA2	Local (Lower)	Habitat is of low botanical importance, owing to its management. However, it may provide a foraging habitat for some species of fauna e.g. badgers and birds (passerine and wintering).
Dry Calcareous and Neutral Grassland	GS2	Local (Higher)	Poorly represented, and often in transition with Amenity grasslands near housing estates, these grasslands generally tend to be more botanically diverse than intensively managed estate grasslands. The habitat may provide a foraging habitat for some species of fauna e.g. passerine birds.
Wet Grassland	GS4	Local (higher)	Although limited in extent and often overshadowed by woodland vegetation, these grasslands generally tend to be more botanically diverse than amenity grasslands. The habitat may provide a habitat for some species of fauna or foraging habitat for some species of fauna e.g. bats and passerine birds.

⁵ Tubridy & Associates (2012). The Owendoher and River Glynn Community Biodiversity Project: Progress Report. Report E03166 prepared for Glendoher & District Residents Association

⁶ <http://www.wetlandsurveysireland.com/>

Habitat Type	Fossit Category	Ecological Valuation	Rationale
Mixed (Broadleaved) Woodland	WD1	Local (higher)	The value of this habitat lays not in the fact that it is comprised of narrow linear woodland feature, but rather the diversity of species, particularly in St. Enda's Park.
Riparian Woodland	WN5	Local (higher)	Habitat is of moderate botanical importance; however, it may provide breeding habitat for passerine birds and forage territory for bats.
Scrub	WS1	Local (higher)	Habitat is of low botanical importance; however, it may provide breeding habitat for passerine birds or habitat for badgers.
Ornamental and Non-Native Shrub	WS3	Local (Lower)	This habitat is of low botanical importance and is often managed. Some dispersal of species from gardens along Whitechurch Stream banks.
Hedgelines	WL1	Local (higher)	As standalone habitat, this is well represented, in the suburban setting and I often found in mosaic with treelines, riparian woodland and Ornamental and Non-Native Shrub. Nonetheless it provides cover for birds and foraging potential for mammals.
Treelines	WL2	Local (Higher)	Similar to hedgelines, treelines are typically represented in garden boundaries and or as remnant from historical planting in St. Enda's Park. Nonetheless it provides cover for birds and foraging potential for mammals including bats.
Flower Beds ad Borders	BC4	Local (lower)	This habitat is locally distributed and subject to regular change. The only area to be impacted is likely to be within St. Enda's park car park where the proposed temporary compound is to be located.
Stone Walls and other stonework	BL1	Local (lower)	These features have the potential to support roosting bat and nesting birds e.g. Sarah Curran Roadbridge. However, the rubble stonewalls to be modified replaced would not be considered suitable.
Earth Banks	BL2	Local (lower)	This habitat is poorly represented in the proposed development, although elements of earth banks were noted under woodland copse within St. Enda's Park.
Buildings and artificial surfaces	BL3	Local (lower)	This habitat is of limited botanical importance although buildings may provide habitat for fauna (in the wider landscape) e.g. roosting bats.
Spoil and Bare Ground	ED2	Local (lower)	This habitat is of limited botanical importance and is often indicative of areas where cut vegetation is temporarily stored or where pedestrian access along sections of the Whitechurch Stream is unhindered, such as in parts of St. Enda's Park.
Recolonising Bare Ground	ED3	Local (lower)	This habitat is of limited botanical importance and is often indicative of recent disturbance in suburban areas.



Figure 5-1: Habitat Map

5.2.5 Invasive Species

Surveys to identify the presence Invasive Alien Plant Species (IAPS) were carried out over the course of a number of dates during 2018 and 2019. A number of third schedule IAPS occur along the watercourse and within the work area.

During the preliminary ecological walkover for the project, a number of stands of Japanese Knotweed (*Fallopia japonica*) were identified. A single clump was noted alongside the upper pond in St. Enda's Park and it was also noted along four other areas. The largest infestation recorded was along the eastern bank of the Whitechurch Stream, a short distance upstream where the Whitechurch Stream discharges into the Owendoher River. There is a proposed development for construction of four houses with eight parking spaces with new bridge to Whitechurch Road and associated landscaping and drainage works (SDCC Planning application Reg. Ref. SD13B/0219) at this location which may require on site measures to ensure the containment of IAPS and that this does not spread into the OPW controlled works area.

There is some development of Three-cornered garlic (*Allium triquetrum*) alongside the watercourse in a number of areas. The main area is beneath the riparian woodland towards the lower part of the proposed development, immediately upstream of the main Japanese knotweed infestation.

Other invasive species included the high impact invasive species Cherry laurel (*Prunus laurocerasus*) which was locally abundant, particularly in woodland understorey in St. Enda's Park. The remaining IAPS are largely medium impact species associated with watercourse edge and verges included: Sycamore (*Acer pseudoplatanus*) as well as locally abundant patches of Travellers joy (*Clematis vitalba*), Buddleia (*Buddleia davidii*) and occasional Winter heliotrope (*Petasites fragrans*). None of these species are listed on the Third Schedule of the Birds and Natural Habitats Regulations, although it is often recommended in urban areas that their spread is minimised, owing to their rapid establishment.

5.2.6 Protected Species

Badger, Otter, Red Squirrel and Pine Marten surveys were carried out in accordance with the National Roads Authority publication '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*'.

5.2.6.1 Badger

Badgers (*Meles meles*) are legally protected under the Wildlife Act 1976 (as amended). No badger setts were identified in the vicinity of the proposed development, although there is historical evidence of badger within St. Enda's Park.

5.2.6.2 Otter

Otters (*Lutra lutra*) are protected under the Wildlife Act (as amended) and are listed on Annex II and Annex IV of the EU Habitats Directive. Otters are widespread in Ireland and are documented from the Dodder catchment. There was evidence of otter commuting/ foraging along sections of the Whitechurch Stream and the adjacent Owendoher River. The bulk of the activity was noted at the Owendoher River immediately downstream of the tie-in, or in St. Enda's Park upstream of the proposed development, where more semi-natural riverbank habitat, rather than the canalised watercourse for much of its length outside the Park.

5.2.6.3 Hedgehog

Hedgehog (*Erinaceus europaeus*) are protected under the Wildlife Act 1976 (as amended). There is potential for hedgehog to occur within the study area particularly within the wooded areas in St. Enda's Park. No hedgehogs were observed, although a small cluster of dropping, were attributed to Hedgehog owing to the size and dimensions, approximately 4.5cm long.

5.2.6.4 Bats

All bats and their roosting sites are legally protected under the EU Habitats Directive as transposed by the Habitats Regulations, as well as under the Wildlife Act (as amended).

There were a number of trees along the proposed development boundary identified as having moderate to high bat roost potential. No bat roosts were confirmed within the proposed development boundary for the proposed development.

There is evidence of bat activity, primarily commuting along the watercourse. The activity survey found that the lands were used by a small number of bats species: Soprano Pipistrelle (*Pipistrellus pygmaeus*), Common Pipistrelle (*Pipistrellus pipistrellus*), Leislars (*Nyctalus leisleri*) and Daubentons (*Myotis daubentonii*). High flying Leisler bat were noted flying into St. Enda's Park. There was evidence of Daubenton activity over the watercourse immediately upstream of Sarah Curran bridge, whilst Soprano and Common Pipistrelle were noted locally along the Whitechurch Road.

There was no evidence of Daubenton's bat recorded from the Whitechurch Stream downstream of St. Enda's Park, but this absence may be attributed to the modified nature of the watercourse and the density of the low woodland canopy over the watercourse which might impede access by bats along the watercourse.

5.2.6.5 Other Mammals

There was some evidence of activity mammal activity in the area, with most of it concentrated in St. Enda's Park. Non-protected species, for which evidence was locally common in the study areas included: Rabbit (*Oryctolagus cuniculus*); Fox (*Vulpes vulpes*), Grey Squirrel (*Sciurus carolinensis*); Brown Rat (*Rattus norvegicus*) and American Mink (*Mustela vison*).

5.2.6.6 Amphibians & Reptiles

Common frog (*Rana temporaria*), Smooth newt (*Lissotriton vulgaris*) and Viviparous lizard (*Zootoca vivipara*) were not encountered during the site walkover survey, however the presence of all three cannot be ruled out and there are records of the presence of from the NBDC online database. No frogs or spawn were noted along the watercourse or in adjacent grassland mosaics. Frogs have previously been noted by OPW staff in the upper pond in St. Enda's Park.

5.2.6.7 Avifauna

All birds are protected under the Wildlife Act 1976 (as amended). A large number of bird species are also afforded protection under the EU Birds Directive. There is considerable suitable habitat for breeding birds throughout the proposed study area including St. Enda's Park, where they are attracted by the trees, stream and lake and woodland shrubs. In addition, there is a network of linear wooded features and scrub and residential garden planting along the Whitechurch Road, which is typical of the suburban setting and provides habitat for birds.

Discussion with OPW Parks staff on bird diversity from St. Enda's Park have been supplemented by *ad hoc* survey records, particularly alongside the Whitechurch Road corridor during site visits. These are detailed in

Table 5-3. The range of birds known to make use of St. Enda's Park and those noted from the NBDC database is considerably greater than that which was recorded during the current survey.

Table 5-3: Bird Species Observed during the Surveys

Common Name	Scientific Name	Conservation Status	Comment
Blackbird	<i>Turdus merula</i>	Green	Common
Chaffinch	<i>Fringilaa coelebs</i>	Green	Occasional
Dipper	<i>Cinclus</i>	Green	Occasional, but regularly seen
Kingfisher	<i>Alcedo atthis</i>	Amber	Several sightings along the Owendoher and 1 sighting in St. Enda's Park on Whitechurch Stream. Historical record from Whitechurch Stream tie in to Owendoher River (Author's records)
Herring Gull	<i>Larus argentatus</i>	Bird Directive Annex, Annex I	Occasional in St. Enda's Park
Grey Wagtail	<i>Motacilla cinerea</i>	Green	One sighting
Moorhen	<i>Gallinula chloropus</i>		Upper ponds
Great Black-backed Gull	<i>Larus marinus</i>	Amber	St. Enda's Parkland
Black Headed Gull	<i>Chroicocephalus ridibundus</i>	Green	St. Enda's Parkland
Hooded Crow	<i>Corvus cornix</i>	Green	Common
Jackdaw	<i>Corvus monedula</i>	Green	Common
Magpie	<i>Pica</i>	Green	Common
Robin	<i>Erithacus rubecula</i>	Amber	Occasional
Rook	<i>Corvus frugilegus</i>	Green	Common
Starling	<i>Sturnus vulgaris</i>	Amber	Numbers increasing
Swallow	<i>Hirundo rustica</i>	Amber	Old nests under Sarah Curran Roadbridge
Woodpigeon	<i>Columba palumbus</i>	Bird Directive Annex I, II & III. Green	Common
Wren	<i>Troglodytes</i>	Green	Common
Mallard	<i>Anas platyrhynchos</i>	Green	Upper ponds and 1 pair in Whitechurch Stream at St. Gatiens estate
Little Egret	<i>Egretta garzetta</i>	Bird Directive Annex I	Immediately upstream of Sarah Curran roadbridge
Heron	<i>Ardea cinerea</i>		Downstream of tie -in to Owendoher River

5.2.6.8 Aquatic Environment

Aquatic surveys were carried out by RPS on the 9th April 2019. The survey comprised four sampling stations in total. The findings of this assessment are detailed further in **Section 7.2.4**.

Salmonid and lamprey spawning habitat varied from *Poor to None* to *Good* along the Whitechurch Stream and juvenile salmonid habitat also varied from *Poor to None* to *Very Good*. While there is potential habitat for salmon within the Whitechurch Stream it is noted that their upward migration is restricted to the lower reaches of the Dodder and salmon cannot access the Owendoher and Whitechurch Stream. There is suitable habitat (both spawning and juvenile) for brown trout within the stream, in particular within St. Enda's Park with Good to High ecological quality and where the stream has not been as heavily modified and confined.

No brown trout were observed on the day of survey even in pools investigated. A series of large weirs within the Whitechurch Stream would make colonisation from the Owendoher unlikely. If these barriers were removed, then there would be suitable habitat available for trout to move into. An isolated resident population

may be present within the upper reaches of the Whitechurch Stream and early research conducted in the 1980's highlighted the stream being an important brown trout nursery stream.

Brown trout are known to occur within the Owendoher with *Good* spawning and *Very good* juvenile habitat observed. This river is seen to be important brown trout nursery. Lamprey spp. are also known to occur within the Owendoher with *Good* spawning habitat and *Fair* nursery habitat observed.

5.3 Potential for Significant Impact – Construction Phase

The EclA report states that *'There will be changes in vegetation composition, notable tree and scrub vegetation but no appreciable loss of habitat as the bulk of the works are linear in nature. Works will occur in close proximity to, and at times within sections of the watercourse, but there should be no long-term alteration of instream habitat. Most of the habitats, by virtue of their location, are considered of local (Lower) importance'*.

'There will be a requirement to remove trees and bankside screening vegetation and sections of hedgerow and scrub to facilitate access and permit installation of the proposed flood measures. In the absence of mitigation, the alteration of the riparian zone and the loss of trees could result in a permanent, irreversible, negative impact significant at the local level. Furthermore, the loss of hedgerow and mature trees could result in a permanent, irreversible, negative impact significant at the local level'.

5.4 Potential for Significant Impact – Operational Phase

It is not considered likely that during operation of the proposed development that there would be any significant negative impact on habitats, particularly aquatic habitats within the footprint of the development or downstream habitats. There are two habitats that the NIS lists as having the potential for *'temporary negligible disturbance of SCI species (Black-headed Gull 'Chroicocephalus ridibundus') outside core forage area'*: North Bull Island SPA and Dublin Bay and River Tolka Estuary SPA.

Best practice construction methodology for the proposed development will be employed for the proposed development (including TMP and CEMP), therefore it is considered unlikely that there will be any significant residual impacts on biodiversity as a result of the proposed development.

5.5 Mitigation Measures

The EclA has described a number of mitigation measures which have been developed to minimise negative impacts where they are likely to arise on the identified ecology of the Whitechurch Stream as a result of the proposed development. The intent of the measures has been reproduced in the outline CEMP. The appointed contractor will be obliged to include all measures included in the outline document into a final CEMP, for the approval of SDCC and IFI (where required).

An outline Invasive species Management Plan has also been prepared as part of the EclA which is provided under separate cover. This will be further developed as the detailed design is progressed, in order to prevent the introduction and / or spread of invasive species.

Over time the loss of wooded vegetation alongside the Whitechurch Stream will be a) compensated for as new planting becomes established, and b) other vegetation, particularly in privately-owned gardens matures and overhangs the watercourse.

A separate Natura Impact Statement (NIS) in support of Appropriate Assessment has been carried out to determine the potential for likely significant effects as a result of the proposed development. It has been concluded in the NIS, *'the proposed development, either individually or in combination with other plans or projects, will not have an adverse effect on the integrity of any European site(s), given the implementation of mitigation measures outlined'*. The NIS also makes the point that in order *'To limit the potential impact of construction on breeding birds, any vegetation removal/trimming (including individual trees, treelines and hedgerows) will not be permitted during the breeding bird season'*. Appropriate measures to mitigate the risk to avifauna by this project will be outlined in the CEMP and are likely to include measures such as season

and time restricted timeframes (depending on species present) for works, or operation limitations to landscape interference, underpinning, or piling activities.

The NIS describes mitigation measures to comply with the legal protection afforded to otters in the area, as there was a holt and couch identified upstream of the works. Otter may be unlikely to establish holts downstream (closer to the proposed works) due to their propensity to avoid human activity, but *'if an active holt is confirmed within 150m of the proposed works, then works within this ZOI will be immediately halted and the local NPWS conservation ranger will be contacted'* (NIS), enforced by an Environmental Clerk of Works.

In order to minimise excessive disturbance to the Whitechurch Stream and to reduce the potential for significant impacts on the environment, all works shall be in the first instance be cognisant of the mitigation measures listed in the NIS and outline CEMP prepared for the project. The CEMP will be developed in Stage IIb (Detailed Design) of the project by the appointed contractor and will include a Construction Traffic Management Plan and Project Emergency Response Plan.

In respect of the proposed sheet piling operations, these are construed as instream works and as such all instream works along the Whitechurch Stream can only be undertaken during the period July to September. Thus to minimise the potential impact on otter commuting territory including potentially that of young, fledgling otter, it is proposed that sheet piling operations where required be carried out in the latter half of the IFI-approved season, which would reduce the potential disturbance to commuting territory of fledgling otters.

The contractor will appoint a suitably qualified person, or persons, to the role of Environmental Clerk of Works (EnCoW) to monitor the construction works. The EnCoW will work closely with the contractor's site supervisors to monitor activities and ensure that all relevant environmental legislation is complied with and that the requirements of the finalised CEMP are implemented.

A list of potential trees has been developed, for which the landscape and visual impact assessment has taken cognisance in developing the replacement planting measures. Replacement soft landscaping, comprising small areas of shrub planting and trees, will be located in four locations. Specifying the nursery stock for the four areas proposed for replanting is provided in the Landscape And Visual Assessment Report and the locations of the replanting shown on accompanying drawings appended to that report. As part of the finalised CEMP, a management specification for the proposed planting will be developed.

6 LAND & SOILS

6.1 Introduction

This section of the ER describes the potential impacts of the proposed development on land and soils. A desktop study was undertaken using the following sources of information:

- Geological Survey of Ireland (GSI) – Geology, soils and hydrogeology www.gsi.ie; and
- A review of Ordnance Survey (OS) maps and ortho-photography www.osi.ie

6.2 Receiving Environment

South Dublin has three main geological areas. The northern half of the county is formed of Carboniferous Limestone rocks deposited in a deep marine basin. These rocks were formed around 340 million years ago and are faulted against the older rocks along the base of the mountains. The limestone deposited in this basin is a muddy limestone with few fossils, as it was generally a deeper water environment. This limestone underlies most of Dublin and is known as Calp limestone or ‘the Calp’⁷. The site levels vary from 72.5m OD at Taylors Lane Bridge in St Enda’s Park to 49.5m OD at the northern boundary just upstream of the confluence with the Owendoher River.

6.2.1 Geology

The underlying geology is shown in Figure 6-1 within the study area and its surroundings. The study area is predominately underlain by Carboniferous bedrock of the Lucan Formation. The GSI’s 100k bedrock series describes it as comprising dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar.

To the south of the study area is the Butter Mountain Formation comprising of Dark slate-schist, quartzite & coticule and the Type 2p microcline porphyritic Formation which is described as Granite with microcline phenocrysts.

⁷ The Geological Heritage of South Dublin County An audit of County Geological Sites in South Dublin County (GSI, 2014). Retrieved: https://secure.dccae.gov.ie/GSI_DOWNLOAD/Geoheritage/Reports/South_Dublin_Audit.pdf

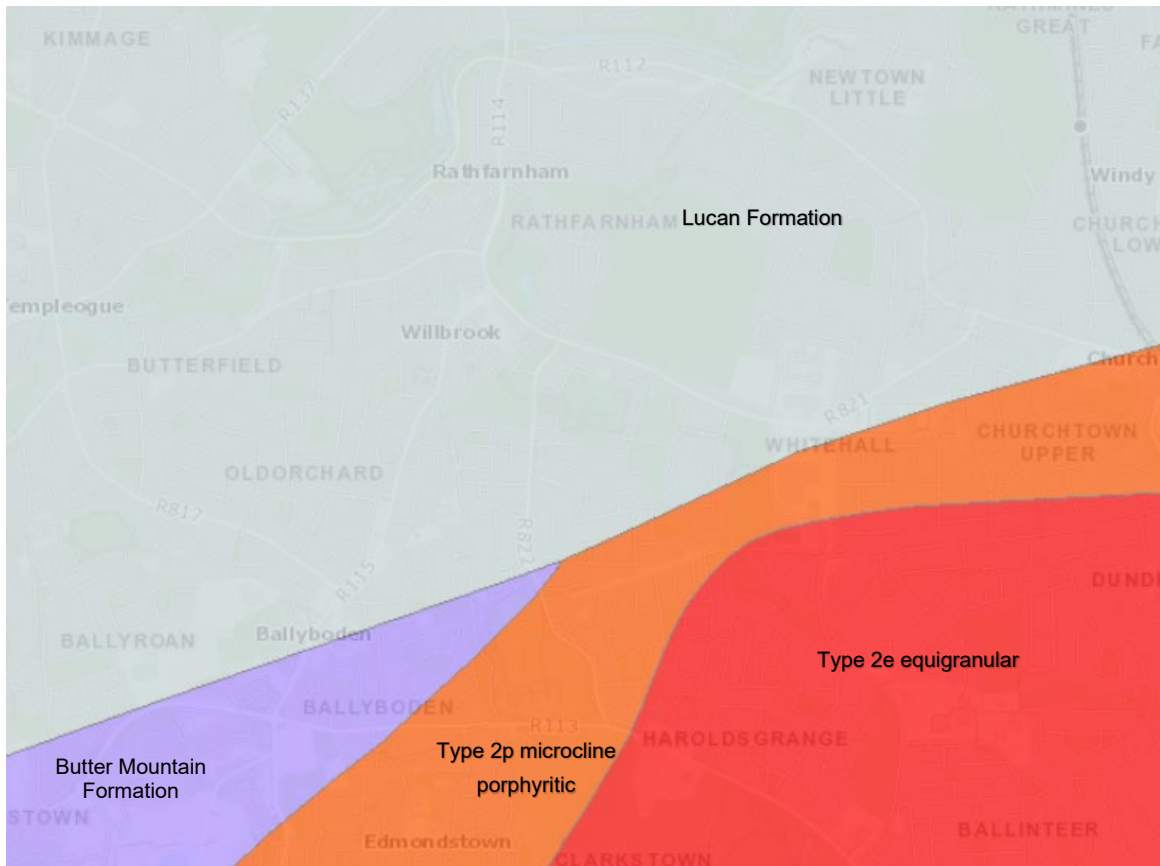


Figure 6-1: Bedrock Geology (Source: GSI, Bedrock Geology 100k)

6.2.2 Soil, Subsoils and Soil Deposits

The soils in the study area are mainly comprised of made ground. There is some grey brown podzolics/brown earths, which are deep well-drained mineral soils derived from mainly basic parent materials (BMinDW). There is a strip of poorly-drained basic mineral soils comprising mainly surface gleys (BminPD). Made ground is present to the south of the proposed scheme comprising the built-up areas as shown in **Figure 6-2**.

The underlying subsoil or quaternary sediments comprise primarily of Gravels derived from Limestones (GLs) as shown in **Figure 6-3**. To the south of the study area there are also small areas of Till derived from limestones (TLs).

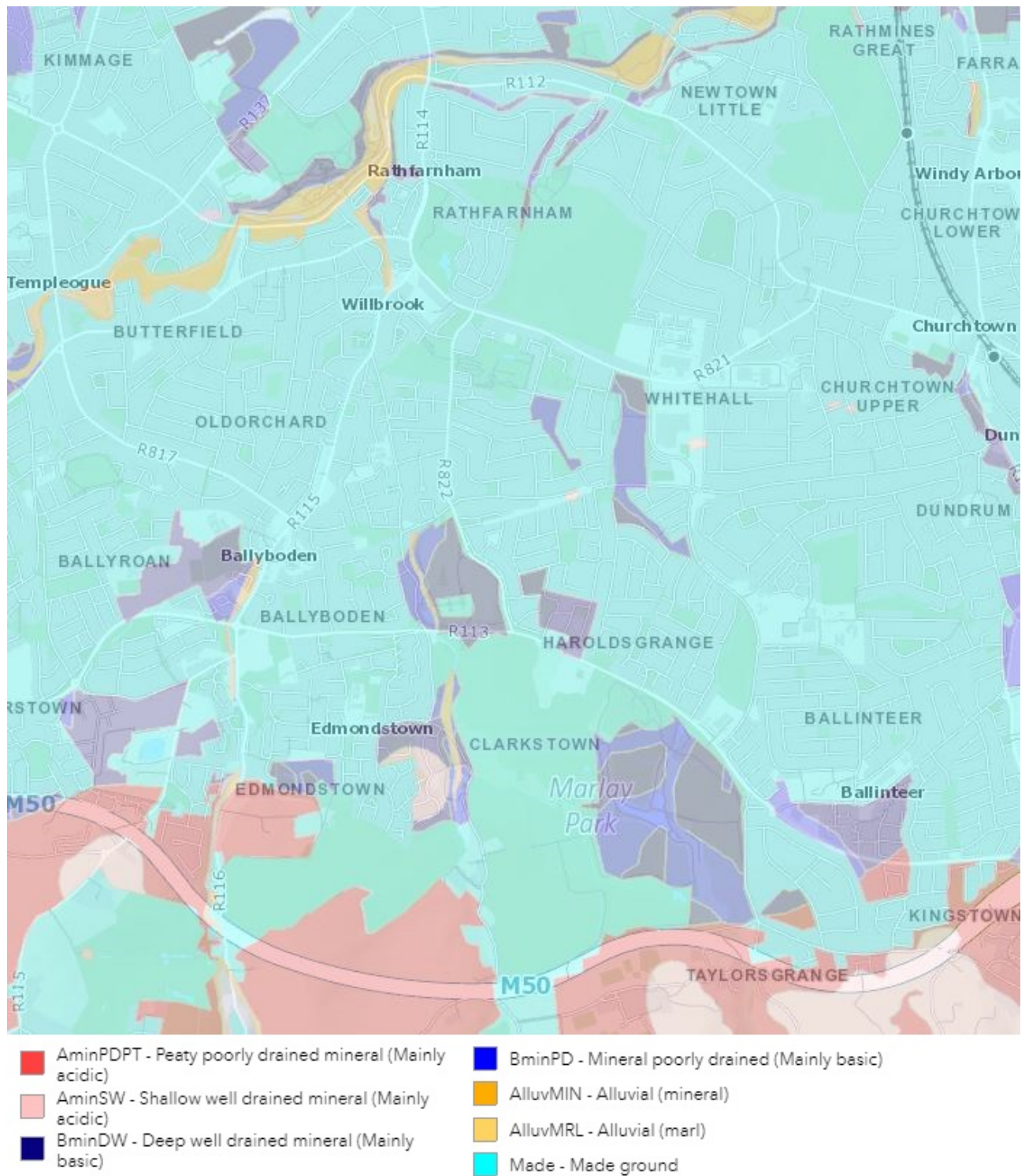


Figure 6-2: Soils (Source: GSI, Soils)

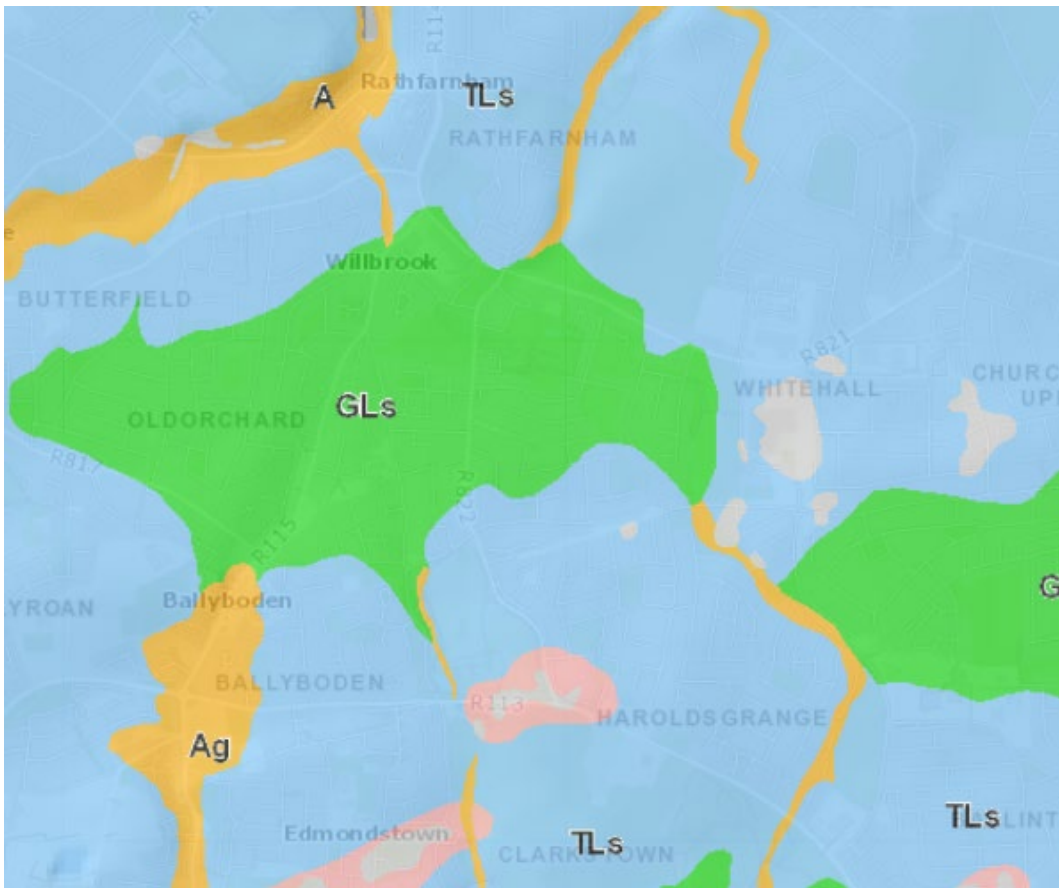


Figure 6-3: Subsoils (Source: GSI, Quaternary Sediments)

6.2.3 Landslides

There are no recorded landslide events located within the study area according to the GSI Maps.

6.2.4 Geological Heritage Sites

The Irish Geological Heritage (IGH) Programme is a partnership between the GSI and the NPWS. In Ireland, geological heritage is assessed under a framework of 16 themes which cover different time periods and aspects of geology. Some of these sites have been selected or recommended for eventual designation as Geological Natural Heritage Areas (NHAs). The remainder are being considered as County Geological Sites (CGS) which have no statutory protection but can be included in County Development Plans.

South Dublin has a number of CGSs which are referenced in the South Dublin County Council Development Plan (2016-2022). There are no CGS's within or in close proximity to the study area.

6.3 Potential for Significant Impact – Construction Phase

6.3.1 Land

The proposed development has been designed to avoid impacting services (and no disruption to services) is envisaged during the construction of the proposed development. From a 'land' perspective there is not considered to be a significant impact on land.

6.3.2 Soil

The proposed development will include an excavation programme during construction works, which will be designed to take cognisance of the ground conditions existing within parts of the site. Construction of the proposed scheme will also require engineering fill for concrete for retaining walls. Exact quantities of material required have not been determined at this point, however, it is considered that there will be no significant effects on the environment given the scale and nature of the work proposed.

Material will be reused as far as possible. Excavated material is to be incorporated into the embankments and final landscaping of the works area or spread locally. This will depend however on the suitability of the excavated material, and unsuitable material will be removed off site for disposal in permitted facilities. If low levels of contamination are encountered during the construction works, soil testing and a risk assessment of material shall be undertaken to assess its potential for use.

Any material requiring disposal offsite will be disposed of at an appropriate permitted or licensed facility based on Waste Management Acts 1996 as amended. In the event that disposal offsite is required, the material shall be tested for disposal at an appropriate waste management facility in accordance with the Waste management Act 1996 as amended. Therefore, it is considered that there will be no significant impact on soils.

6.4 Potential for Significant Impact – Operational Phase

The impacts predicted from the proposed development are not regarded to be significant in nature and with adequate mitigation measures these should not pose a risk to the underlying soil strata. Although there will be excavations performed as part of the works, these are to be managed by a CEMP and supervised by on site personnel, with particular focus on hydrocarbon and plant lubricant security.

6.5 Mitigation Measures

In order to minimise excessive disturbance to the Whitechurch Stream and to reduce the potential for significant impacts on the environment, all works shall be in the first instance be cognisant of the mitigation measures listed in the outline CEMP prepared for the project. The CEMP will be developed in Stage IIb (Detailed Design) of the project by the appointed contractor and will include a Construction Traffic Management Plan and Project Emergency Response Plan.

The measures included in the CEMP for soil management control include the following:

- Works will be undertaken in accordance with CIRIA 650 'Environmental good practice on site';
- To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within specially constructed dedicated temporary bunded areas;
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area, away from surface water gullies or drains. Plant used on haul roads within the channel shall be moved to the top of bank to a designated refuelling location;
- Spill kits and hydrocarbon adsorbent packs will be stored in a designated area and operators will be fully trained in the use of this equipment;
- Biodegradable hydraulic fluid will be used on all OPW owned and hired plant; and
- Where excavations are undertaken <5m from existing structures, the design may require a number of measures to provide stability of the excavations including sheet piling or propping to existing structures. In some cases, it may be necessary to underpin the foundations of existing structures where excavations are in close proximity and to a level which is lower than that of the existing foundation. A detailed condition survey should be conducted on properties within 5m of the works prior to and post construction.

7 WATER (HYDROLOGY & HYDROGEOLOGY)

7.1 Introduction

This section of the ER describes the potential impacts of the proposed development on surface water and groundwater resources (hydrology and hydrogeology).

A desktop study was undertaken using the following sources of information:

- Office of Public of Works (OPW) Flood hazard Mapping <https://www.floodinfo.ie/>;
- OPW Flood Event Mapping <http://www.floodmaps.ie/View/Default.aspx>;
- Geological Survey of Ireland (GSI) hydrogeology data <https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>; and
- Environmental Protection Agency (EPA) water body, water quality and catchments data <https://gis.epa.ie/EPAMaps/> and <https://www.catchments.ie/maps/>.

7.2 Receiving Environment - Hydrology

7.2.1 Marine Environment

7.2.1.1 North Dublin Bay SAC

As per NIS for the proposed development which states that the 'SAC centred on the inner part of Dublin Bay, with good examples of nine coastal habitats (both sand-dune and saltmarsh) that are listed on Annex I of the E.U. Habitats Directive; one of which is a priority habitat. The terrestrial part of the SAC supports a number of rare and scarce plants including some which are legally protected (e.g. *Petalophyllum ralfsii*), as well as some of the invertebrates are of national importance. Given the range of habitats, the SAC which overlaps with SPA and supports internationally important numbers of some wintering bird species.'

7.2.1.2 North Bull Island SPA

Like North Dublin Bay SAC, this SPA occupies much of the same territory. The presence of extensive intertidal flats could with saltmarsh and inner lagoon make this an attractive site for birds. Despite its proximity to the Greater Dublin Area and the pressure and disturbance of considerable recreational activity, this estuarine complex, it is an important site for wintering wildfowl. It is of international importance for a number of wintering birds, but also supports nationally important numbers of other birds and the regular presence of a number of Annex I bird species.

7.2.1.3 South Dublin Bay and River Tolka Estuary SPA

This is an extensive estuarine complex that covers much of Dublin Bay, both the southern sections of the bay along with Booterstown marsh and the discharge of the Tolka River to the immediate south of Bull Island (North Bull Islands SPA). The SPA includes extensive areas of intertidal flats. For this reason, the site is of considerable ornithological importance given its extent, diversity of habitat and availability of feeding resource. It supports an internationally important population of Light-bellied Brent Goose and nationally important populations of a further nine wintering species. Furthermore, the site supports a nationally important colony of breeding Common Tern and is an internationally important passage/staging site for three tern species.

7.2.2 Surface Water Environment

The site of the flood alleviation works is located within the Whitechurch Stream (EPA Code: 09K06, EPA River Waterbody Code IE_EA_09O011700). The EPA name for this watercourse is the Kilmashogue (also

called the Glynn River) but is herein referred to as the Whitechurch Stream. This stream rises from Kilmashogue and Tibbradden Mountains and flows in a northerly direction. It flows under the M50, through Marley Park, Grange Golf Club and Saint Enda's Park. It then runs parallel with the Whitechurch Road being diverted underground for short sections and then enters the Owendoher River (EPA Code: 09O01, EPA River Waterbody Code: 09O11700) at the Whitechurch/Ballyboden /Willowbrook roads junction.

There are a number of weirs located along the length of Whitechurch Stream (4 weirs and 6 culvert/bridge structures). The Owendoher flows north for another 0.84km before flowing into the Dodder River and it too has a number of weirs along its length (10 weirs and 16 culverts)⁸.

Both the Whitechurch Stream and the Owendoher River become urbanised in their lower reaches and are spate rivers characterised by rapid increases in water levels. Both form part of the Dodder_SC_010 WFD sub-catchment.

The Dodder, Owendoher River and Whitechurch Stream are the only dynamic surface waters in the immediate vicinity. There are two ponds in close proximity to the development, one in Rathfarnham Castle Park, and one in St. Enda's Park. These are not used for drinking water abstraction and are not stocked with fish, although they are likely to support bird populations.

7.2.3 Surface Water Quality and Risk Characterisation

Work for the Whitechurch Flood Alleviation scheme will be carried out within the Whitechurch Stream upstream of the Owendoher River confluence. The waterbody Owendoher_010 incorporates both the Whitechurch Stream and Owendoher River. The Owendoher_10 has been at Moderate WFD Status for the last two monitoring cycles (2010-2012 and 2010-2015) which represents an improvement from its previous Poor WFD status in 2007-2009 (**Table 7-1**). Both waterbodies are 'At Risk' of not achieving WFD objectives and the Owendoher_010 is part of the Dodder Area for Action, which is a prioritised water body within the current River Basin Management Plan 2018-2021. One of the reasons it has been prioritised is because the Dodder is an important trout fishery, recruitment, salmon in the lower reach and ongoing work for removal of weirs to allow salmon to pass.

Table 7-1: Summary of WFD status for the Owendoher_010

EPA Waterbody Name	Code	Risk	WFD Status 2007-2009	WFD Status 2010-2012	WFD Status 2013-2015
Owendoher_10	IE_EA_09O011700	At Risk	Poor	Moderate	Moderate

7.2.4 Water Quality

An aquatic survey was completed as part of the Ecological Impact Assessment (EclA). On the 9th April 2019, an RPS aquatic ecologist carried out a survey at three sites within the Whitechurch Stream and one site on the Owendoher River downstream of the Whitechurch Stream confluence. Q-value surveys (macroinvertebrates) were conducted at all four sites. The full Aquatic Ecology Survey Report can be found under separate cover in Appendix F of the Ecological Impact Assessment (EclA) Report.

Water quality results (Q-values) at the sampled locations indicate Moderate ecological quality within the Owendoher River and Good (Q4) to High (Q4-5) ecological quality in parts of the Whitechurch Stream. Travelling upstream, the Q-value score improved in the Owendoher and up the Whitechurch Stream. Of particular note is the High ecological quality within St. Enda's Park which is indicative of the potential this urbanised stream can achieve.

⁸ RPS (2016). Dodder CFRAM Study – Flood Risk Management Plan. Available online at <http://www.dublincity.ie/main-menu-services-water-waste-and-environment-water-projects/river-dodder-catchment-flood-risk>

7.2.5 Flooding

Following a review of the Office of Public Works (OPW) Flood Maps, it is noted there have been a number of floods event recorded within the study area (see **Figure 7-1**). The mapping may be viewed on the OPW website⁹.

The Whitechurch Stream catchment is approximately 7.3km² with an estimated Qmed value of 3.26m³/sec. The average slope of the catchment is 1:18 (i.e. 5.6%), which is close to the highest end (6%) of a typical flashy (torrential) catchment with a basin response time of less than 3 hours and flow velocities more than 3m/sec. Because of this, the stream is susceptible to the occurrence of sudden, short and violent flood events that leaves little or no response time for flood warning systems to be effective.

A draft Hydrology Report¹⁰ has been prepared by the OPW as part of the proposed project. The purpose of the hydrology report was to inform Stage I (Development of a number of flood defence options and the identification of a preferred Scheme) of the project and presents the findings of the hydrological assessment of the Whitechurch Stream study area. As part of the Hydrology Report, a review of historic flood data was undertaken, and the results of this review are presented in **Table 7-2** and **Figure 7-1**. The report concluded that the Whitechurch Stream study area is vulnerable to both fluvial and pluvial flooding and has several recorded incidents of flooding particularly in 2007 and 2011.

Table 7-2: Historic Flood Records

Historic Flood Event	Description	Flood Mechanism	Source
29 th October 2002	Taylor's Lane in Rathfarnham and the main Dublin to Enniskerry road are closed after the heavy rain last night. Among those roads partly flooded are two in Rathfarnham - Grange Road and Whitechurch Road.	Pluvial	https://www.rte.ie/news/2002/1029/31396-floods01/
22 nd June 2007	Significant flooding on Whitechurch Stream, roads and properties effected.	Fluvial, Blockage of hydraulic structures, pluvial	RPS, 2008. Whitechurch River Interim Modelling Report: Dodder Catchment Flood Risk Assessment and Management Study. RPS; Dublin City Council; South Dublin County Council & Office of Public Works
25 th October 2011	South Dublin County Council report that a number of roads are barely passable including Whitechurch Road.	Fluvial, Blockage of hydraulic structures, pluvial	http://www.thejournal.ie/floodwaters-recede-but-disruptions-still-in-place-across-dublin-262747-Oct2011/#slide-slideshow1
27 th October 2011	South Dublin county council report that a number of roads in South Dublin were either closed or barely passable of which Whitechurch Road was included. The report suggests a number of properties in Rathmines and Rathfarnham were under water.	Fluvial, Blockage of hydraulic structures, pluvial	https://www.rte.ie/news/2011/1025/307845-weather_updates_tuesday/
17 th October 2012	Reports of flooding on the Willbrook Road at the Whitechurch Road Junction.	Pluvial	https://www.irishtimes.com/news/localised-flooding-hits-many-areas-1.743428

Source: OPW (Feb 2019), Draft Hydrology Report

⁹ <https://www.floodinfo.ie/map/floodmaps/#>

¹⁰ OPW (Feb 2019), Whitechurch Flood Alleviation Scheme, Hydrology Report, Draft (Ref: 2800/HYDROLOGY/001/A)

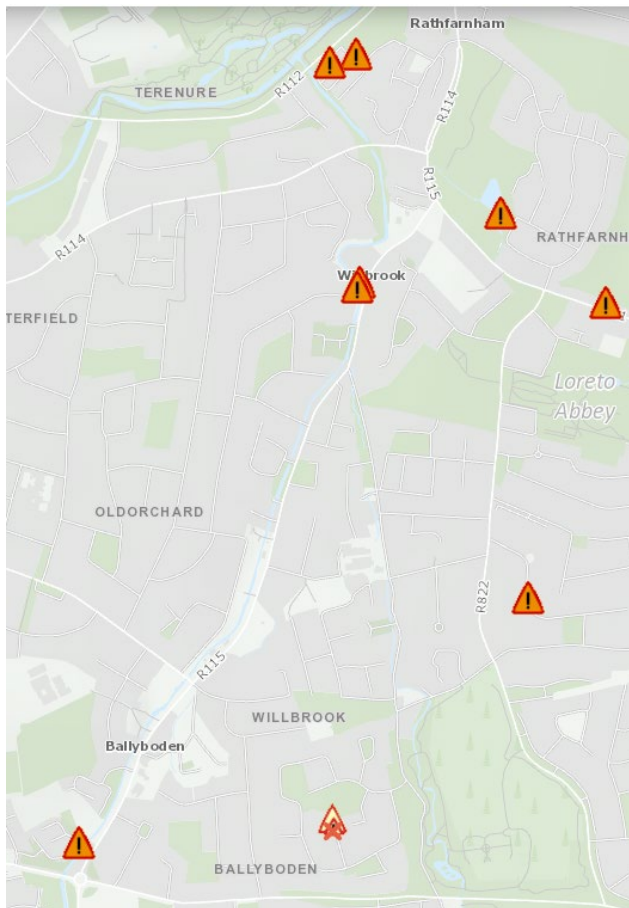


Figure 7-1: Past Flood Events (Source: OPW)

7.3 Receiving Environment – Hydrogeology

The majority of the site lies within the Dublin Groundwater Body (Code: IE_EA_G_008). This GWB is located in the Greater Dublin City area and extends southwest towards Kildare. The area is generally low-lying, with areas of higher elevation surrounding to the south and to a lesser extent to the north. Elevations decrease towards the various river estuaries around Dublin city. At the boundaries of the GWB the highest elevations are to the south at the foothills of the Dublin Mountains and to the northwest where the Namurian rocks form an area of higher elevation to the southwest of Dunshaughlin¹¹.

Dublin City essentially acts as a cement cap on the GWB, with limited recharge in the city compared to rural areas of the GWB. Groundwater flow is generally towards the coast to the east where it will discharge directly to the Irish Sea, and also towards Dublin City and the River Liffey, and the aquifers are not expected to maintain regional groundwater flow paths. Ground and surface water interactions are highly varied across the GWB and are dependent on local conditions such as slope, depth and permeability of overlying subsoils, etc¹¹.

St Enda's Park lies within the Kilcullen Groundwater Body (Code: IE_EA_G_003). This large GWB contains areas of Northeast Wicklow, Northwest Kildare and South Dublin. The area has a varied topography with the Wicklow and Dublin mountains defining the topographic boundary to the south and east and the very flat areas of the Kildare lowlands. This variety in topography will have a significant influence on all aspects of the groundwater system¹².

¹¹ https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/DublinGWB.pdf

¹² https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/KilcullenGWB.pdf

Neither of these groundwater bodies are at risk according to the EPA dataset relating to WFD Ground Waterbody Approved Risk attributed to ground waterbody features. The Dublin Groundwater body whose status for the period 2010-2015 is ranked as 'Good' whilst for the Kilcullen Ground water body whose status for the same period is ranked as 'Good'.

7.3.1 Aquifer Type and Classification

The bedrock aquifer classification that occurs in the constraints study area applies to the rock types as discussed in **Section 6.2.1 Geology**. The GSI bedrock aquifer mapping (as presented in **Figure 7-2**) identifies that the study area is underlain by a locally important aquifer (LI) that is bedrock which is moderately productive only in local zones, corresponding to the Lucan Formation and Butter Mountain Formation. There is a strip of poor aquifer (PI) that is Bedrock which is Generally Unproductive except for Local Zones to the south of the study area at St. Enda's Park corresponding to the Type 2p microcline porphyritic Formation.



Figure 7-2: Aquifer Classification (Source: GSI)

7.3.2 Aquifer Vulnerability

The GSI Groundwater Vulnerability map is recorded as having low aquifer vulnerability as outlined in **Figure 7-3** and this is based on the GSI aquifer vulnerability criteria presented in **Table 7-3**.

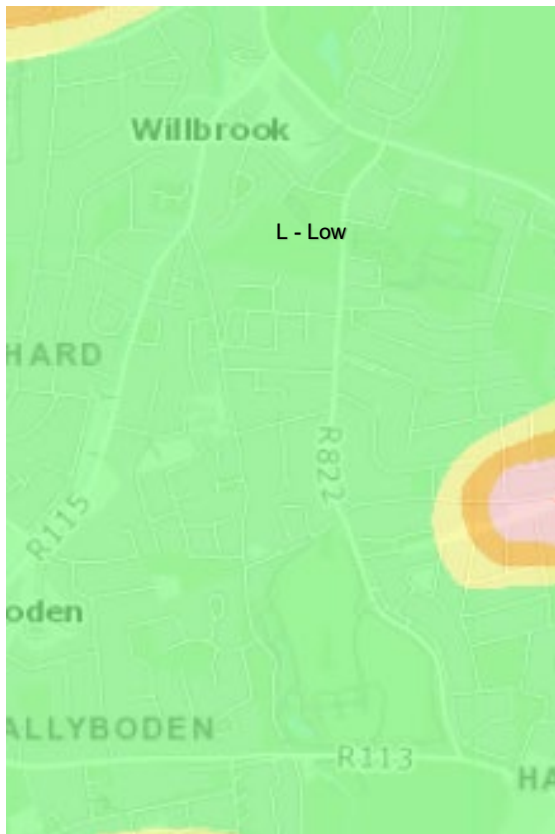


Figure 7-3: Aquifer Vulnerability (Source: GSI)

Table 7-3: GSI Vulnerability Mapping Guidelines

Vulnerability Rating	Hydrogeological Conditions				Karst Features
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	
	High permeability (sand/gravel)	Moderate permeability (e.g. sandy subsoil)	Low permeability (e.g. clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	
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

7.3.3 Groundwater Resources

Groundwater resources include the aquifers themselves, particularly close to any feature which can be used for abstraction. This includes wells, boreholes, springs, spas and other surface water features that are either fed by or contribute to groundwater.

GSI mapping of groundwater wells indicate that there is one groundwater well (2921NEW009) located within the grounds of Castle Golf Course at Rathfarnham with a drill date of 1988 (**Figure 7-4**). This is classed as having an unknown use, and for having a good yield class. The locational accuracy of the well is noted to be 200m.

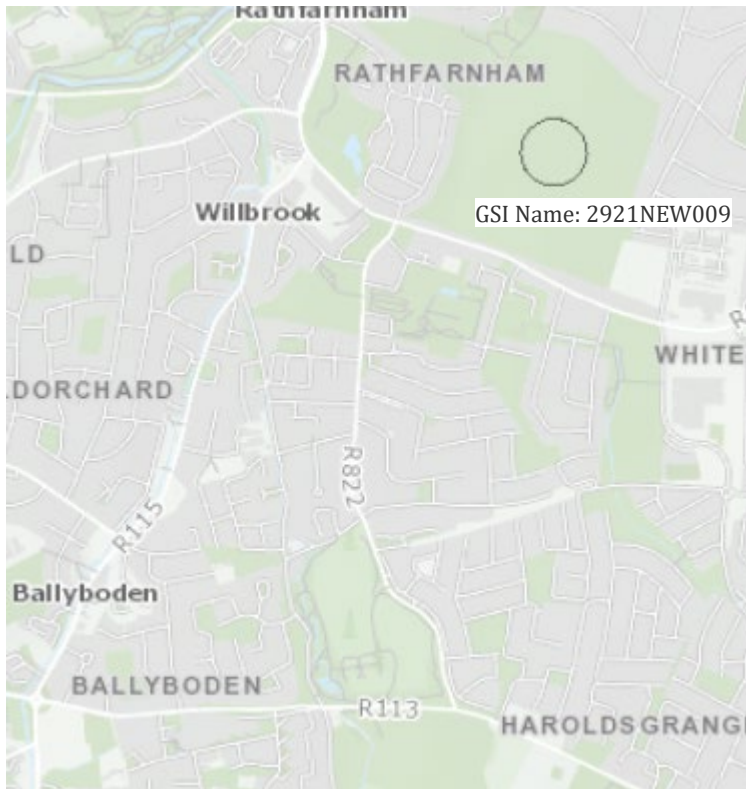


Figure 7-4: Groundwater Wells and Springs (Source: GSI)

7.4 Potential for Significant Impact – Construction Phase

A temporary works compound will be set-up and will remain operational for the duration of the works. to be located in a corner of the existing car park at the front of St. Enda's Park, off Sarah Curran Road. This facility will be secured from unauthorised access for the duration of the works and will include offices, welfare facilities, parking for site vehicles and plant at night, storage of equipment materials used in the construction phase and also temporary storage of material to be re-used or awaiting removal by licenced waste contractor. There is not likely to be a requirement for any substantial water use.

Pollutants arising from poor on-site construction practices (e.g. accidental spillages, machinery movements) could potentially enter the Whitechurch Stream and the hydrologically connected Owendoher River. This could impact salmonid/lamprey populations directly through toxicity or indirectly through water quality and habitat alterations. Where mobilised sediment finally deposits downstream, there is the potential for salmonid and lamprey spawning habitat loss. Therefore, in the absence of appropriate mitigation measures, there could be significant direct and indirect negative impact upon brown trout and lamprey spp. populations within the Whitechurch Stream and the hydrologically connected Owendoher River

Best practice construction methodology has been prepared for the proposed development that includes the necessary measures to ensure protection of water quality and pollution control for sensitive habitats, including measures to control the release of silt laden run-off, and which must be adhered to. It also requires development of a detailed construction methodology for bankside or in-stream works required for construction of flood relief measures or temporary crossing structures that may be required in consultation with IFI, to input into the development of the methodology and highlight any requirements, which may include specific designs, surveys in advance of works or requirement for licences.

7.5 Potential for Significant Impact – Operational Phase

There are no forecasted significant impacts on the local ground and surface water bodies aside from the providing of flood relief in the area. This is expected to be a positive impact.

7.6 Mitigation Measures

In order to minimise excessive disturbance to the Whitechurch Stream and to reduce the potential for significant impacts on the environment, all works shall be in the first instance be cognisant of the mitigation measures listed in the outline CEMP prepared for the project. The CEMP will be developed in Stage IIb (Detailed Design) of the project by the appointed contractor.

The measures included in the CEMP for Soil Management Control are discussed in **Section 6.5**. The measures included in the CEMP for Water Management Control include the following:

- Any raw materials, fuels and chemicals, will be stored within bunded areas to guard against potential accidental spills or leakages;
- All equipment and machinery will have regular checking for leakages and quality of performance and will also be maintained in accordance with the manufacturer's instructions (including preventative maintenance);
- Biodegradable hydraulic fluid will be used in all OPW owned and hired plant;
- Measures to be used to protect the water environment during the construction works will follow the relevant section of the NRA's documents '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (NRA, 2005). The fisheries board documents '*Maintenance and protection of the inland fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board*' (Kilfeather, 2007) and '*Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites*' (Murphy, 2004) and '*Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*' (IFI, 2016) would also be followed where relevant;
- The installation of sheet piling at discrete locations and outside the IFI designated fish breeding season would not result in a significant impact on local fisheries, given the nature of the works and the aquatic potential.
- The river in-channel works will be carried out during dry weather and halted during heavy rainfall events to reduce suspended solids in the river. Equally, works will not be carried out on submerged haul roads during times of elevated river levels/flows;
- Spoil and removed vegetation material from the river is to be stored no less than 5m back from the river and vegetation within this 5m buffer zone is to be retained, in order to reduce the run-off of suspended solids back into the watercourse. Where this is not practicable due to space constraints, suitable bunding shall be put in place;
- All in-stream works must be carried out in accordance with an approved method statement and under the direction of IFI personnel; and
- Works will not be permitted to commence until such time that the design and methodology have been approved by IFI.

In addition, the aquatic survey report identifies the following mitigation measures:

- Works to facilitate flood alleviation would need to be conducted in accordance with IFI guidance and with plans and timing of works agreed;
- Given the importance of brown trout in the Owendoher, any instream works should be avoided. If required, this should be conducted outside of the spawning season (July to September) and with IFI approval;
- Obligations under WFD should maintain the current status of the Whitechurch Stream and Owendoher river and degradation prevented. Therefore, the necessary measures to protect water quality should be incorporated into the implementation of the flood alleviation works;

- If de-watering is necessary to allow works to proceed, water pumped from the contained area should be passed through a settlement pond or pre-fabricated settlement tanks with oil interceptor before being discharged to the river;
- If required, areas which may be temporarily dammed and dewatered should be kept to the minimum required. Except where absolutely necessary, machinery should operate from the bankside and not instream;
- If the removal of any structures within the stream is required, it should be first assessed whether large volumes of sediment have not accumulated behind the structure as this will be released downstream upon removal. If this is the case, then measures will be required to prevent this. The method should be agreed with IFI and sediment disposed of correctly;
- Where possible precast concrete should be used;
- Any wash down from trucks, machinery should be conducted away from the watercourse and trapped on site, allowed to settle and reach neutral pH before release; and
- For construction activities close to the riverbank, eroded sediments should be retained on site with erosion and sediment control structures such as sediment traps, silt fences and sediment control ponds. Sediment ponds and grit/oil interceptors should be placed at the end of drainage channels.

8 AIR & CLIMATE

8.1 Introduction

This section of the ER describes the potential impacts of the proposed development on air quality and climate.

8.2 Receiving Environment

Air Quality constraints on a proposed project are largely concerned with the potential for human health impacts on sensitive receptors. In the assessment of constraints, the sensitive receptor locations for Air Quality include areas of residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present.

As part of the EU Framework Directive (96/62/EC) on air quality monitoring, assessment and management, four air quality zones have been defined for Ireland as part of the Air Quality Regulations (2002).

The four zones in Ireland are:

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

The proposed project is located within air quality Zone A, the Dublin Conurbation. Existing sources of pollution in the area include road traffic (the R821, R115, R822, L4020 and local interconnecting roads) and space heating (e.g. domestic heating systems).

Baseline air quality data assessment for nitrogen dioxide (NO₂), nitrogen oxides (NO_x) and particulate matter (PM₁₀ and PM_{2.5}) are reported by the EPA on a continuous basis at a series of monitoring stations around Ireland.

From the EPA report on ambient air quality in 2018 the most representative monitoring station in terms of the subject site is Rathmines, County Dublin, which is c.3km north east from the study area. It is noted that where ambient air quality parameters are measured at the Rathmines monitoring station all annual mean value concentrations were below the threshold limit values with the exception of nitrogen oxide (NO_x), as outlined in **Table 8-1**. However, NO_x exceedances are more concerning in areas of sensitive ecosystems due to potential effects on vegetation and are not a specific concern for human health.

The main receptors will be local residents and recreational visitors to St Enda's Park located adjacent and east of the southern section of the study area.

Overall, from the all data available it can be concluded that the study area currently experiences 'good' air quality with the absence of any major sources of pollution.

Table 8-1: EPA Air Monitoring Data for Zone A (Rathmines Monitoring Station) in 2018

Pollutant	Unit	Annual Mean Concentration in 2018	Annual Limit for Protection of Human Health or Ecosystems	WHO Guideline for Protection of Human Health
Nitrogen Dioxide (NO ₂)	µg/m ³	20.0	40	40
Nitrogen Oxide (NO _x)	µg/m ³	33.0	30	-
Sulphur Dioxide (SO ₂)	µg/m ³	2.3	-	20 (Daily)
Particulate Matter (PM ₁₀)	µg/m ³	15.0	40	20
Particulate Matter (PM _{2.5})	µg/m ³	9.0	20	10
Carbon Monoxide (CO)	mg/m ³	0.2 ^{NOTE 1}	10	
Benzene	µg/m ³	0.3	5	-

Note 1: No data available for Rathmines, data for Winetavern Street (Zone A) used.

In relation to climate, the weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer. The site of the proposed development is approximately 6km west of the east coast would experience a higher frequency of easterly winds than more inland locations or those on the west coast.

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

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

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

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

In addition to the emissions mitigation strategies in national and local policy, the need for climate adaption is also addressed. Ireland's first statutory National Adaptation Framework (NAF) was published in January 2018 and sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change, such as flooding, and to avail of positive impacts.

South Dublin County Council has published its Climate Change Action Plan (CCAP) 2019-2024. Action F17 under the flood defence element of the plan is the implementation of the Whitechurch Flood Alleviation Scheme.

8.3 Potential for Significant Impact – Construction Phase

There is potential for dust generation during the construction phase from plant and construction traffic associated with excavation, piling, shuttering and concrete works. There is also potential for material in temporary exposed soil/stockpiles to become airborne and impact on human health. The dust associated with the construction works have potential to impact on the neighbouring residential properties for the duration of construction works.

Emissions of construction generated greenhouse gases (GHG) will arise from embodied emissions in site materials, direct emissions from plant machinery/equipment as well as emissions vehicles delivering material and personnel to the construction site. Use of locally sourced recycled materials (such as aggregates or steel) or low carbon alternatives (such as Ground Granulated Blast Furnace Slag cement) can mitigate these impacts to some extent.

8.4 Potential for Significant Impact – Operational Phase

There will be no resultant emissions to air or greenhouse gases from the operation of the proposed development and hence so significant impact is predicted.

The operation of the proposed development will be positive in terms of climate adaption and the achievement of Action F17 of the SDCC Climate Change Action Plan (CCAP) 2019-2024. The development will provide a more resilient infrastructure to the local community against potential future flood events.

8.5 Mitigation Measures

The preliminary CEMP includes measures for the management of dust during construction. The measures included in the CEMP for Management of Dust during construction include the following:

- Site roads shall be regularly cleaned and maintained as appropriate;
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development works;
- Any un-surfaced roads shall be restricted to essential site traffic only;
- Any road that has the potential to give rise to fugitive dust may be regularly watered, as appropriate, during extended dry and/or windy conditions;
- On-site speed limits will be stipulated to prevent unnecessary generation of fugitive dust emissions;
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind;
- A complaints register will be maintained on-site and any complaints relating to dust emissions will be immediately dealt with;
- In periods of dry weather when dust emissions would be greatest, a road sweeper, which would also dampen the road, will be employed in order to prevent the generation of dust;
- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; and
- If appropriate, dust monitoring will be carried out during the construction phase of the scheme. If the level of dust is found to exceed 350mg/m²day in the vicinity of the site, further mitigation measures will be incorporated into the construction of the proposed flood relief scheme.

Mitigation measures to minimise greenhouse emissions from the construction phase include the following:

- Implementation of a Traffic Management Plan (TMP) which will form part of the specification for the construction works. This will outline measures to minimise congestion and queuing, reduce distances of deliveries and eliminate unnecessary loads;

- Reducing the idle times by providing an efficient material handling plan that minimizes the waiting time for loads and unloads. Reducing idle times could save up to 10% of total emissions during construction phase;
- Turning off vehicular engines when not in use for more than five minutes. This restriction will be enforced strictly unless the idle function is necessary for security or functionality reasons;
- Regular maintenance of plant and equipment. Technical inspection of vehicles to ensure they will perform the most efficiently.
- Materials with a reduced environmental impact may also be incorporated into the construction design through re-use of materials or incorporation of recycled materials in place of conventional building materials. The following materials should be considered for the construction phase:-
 - Ground Granulated Blast Furnace Slag (GGBS) & Pulverised Fuel Ash - Used as replacements for Portland cements to increase sustainability and carbon footprint of civil and structural works; and
 - Steel - The recovery rates associated with using recycled steel are high and research exists which shows that 99% of structural steel arising from demolition sites is recycled or re-used. The carbon emissions emitted during the production of virgin steel can be higher than some other structural materials on a tonne by tonne basis, and recycled steel should be used where possible.
- As part of the Construction Environmental Management Plan, the Contractor will be required to implement an Energy Management System for the duration of the works. This Energy Management system may include such measures as:-
 - The use of thermostatic controls on all space heating systems in site buildings to maintain optimum comfort at minimum energy use;
 - The use of sensors on light fittings in all site buildings and low energy lighting systems;
 - The use of adequately insulated temporary building structures for the construction compound fitted with suitable vents;
 - The use of low energy equipment and 'power saving' functions on all PCs and monitors in the site offices;
 - The use of low flow showers and tap fittings; and
 - The use of solar/thermal power to heat water for the on-site welfare facilities and contamination unit (sinks and showers).

The control of pollution and nuisances will generally be exercised with reference to best practice construction methodology and adherence to a detailed CEMP which will be developed in Stage IIb (Detailed Design) of the project by the appointer contractor following agreement on suitable construction methodologies and sequencing of works for the project.

9 NOISE & VIBRATION

9.1 Introduction

This section of the ER describes the potential impacts of noise and vibration from the proposed development on the local populations. Similar to air quality, the constraints relating to noise and vibration on a proposed development are largely concerned with the potential to impact sensitive receptors as they are identified within the study area.

9.2 Receiving Environment

The Environmental Noise Directive (END) (2002/29/EC) sets out the obligation of member states to assess and manage environmental noise and is the main EU instrument to identify noise pollution levels. The Directive mandates that Member States must prepare and publish, every five years, noise maps and noise management action plans for:

- Agglomerations with more than 100,000 inhabitants;
- Major roads (more than 3 million vehicles a year);
- Major railways (more than 30,000 trains a year); and
- Major airports (more than 50,000 movements a year, including small aircrafts and helicopters).

The Round 3 Strategic Noise mapping of major roads in the study area is presented in **Figure 9-1**. The following are the target values for undesirable high sound levels ($> 55 \text{ dB(A)} L_{\text{night}}$, $> 70 \text{ dB(A)} L_{\text{day}}$) in the South Dublin County Council Noise Action Plan 2018-2023.

The main source of noise in the area is currently the road traffic. The noise levels on Whitechurch Road are of the order of 55-59dB L_{den} . Along Grange Road (R822), the noise levels are of the order of 65-69dB L_{den} . Night time levels are of the order of 50-54dB L_{night} along Grange Road (R822).

South Dublin County Council operates a permanent ambient sound monitoring network. The network consists of 10 no. permanent units which are designed to operate continuously, recording sound levels and statistical information to allow analysis of trends in noise emissions. The closest unit in operation to the study area is located at Butterfield Crescent, a residential area close to Dodder Valley Park. Environmental noise at this location is from traffic on the R114. Recent daily averages for January 2020 for this location ranged from 54.4dB (A) during the daytime to 62.8dB (A). During this 31-day period, the average daytime noise levels fell within the range of 65-75 dB(A) on two occasions, fell within the range of 45-55 dB(A) on one occasion with the remainder of the monthly daily noise levels falling within the range of 55-65 dB(A).

The receiving environment is a mostly residential area, with St. Enda's Park representing the most significant green space in the locality. The EPA defines a noise sensitive location (NSL) as:

'Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires absence of noise at nuisance levels.'

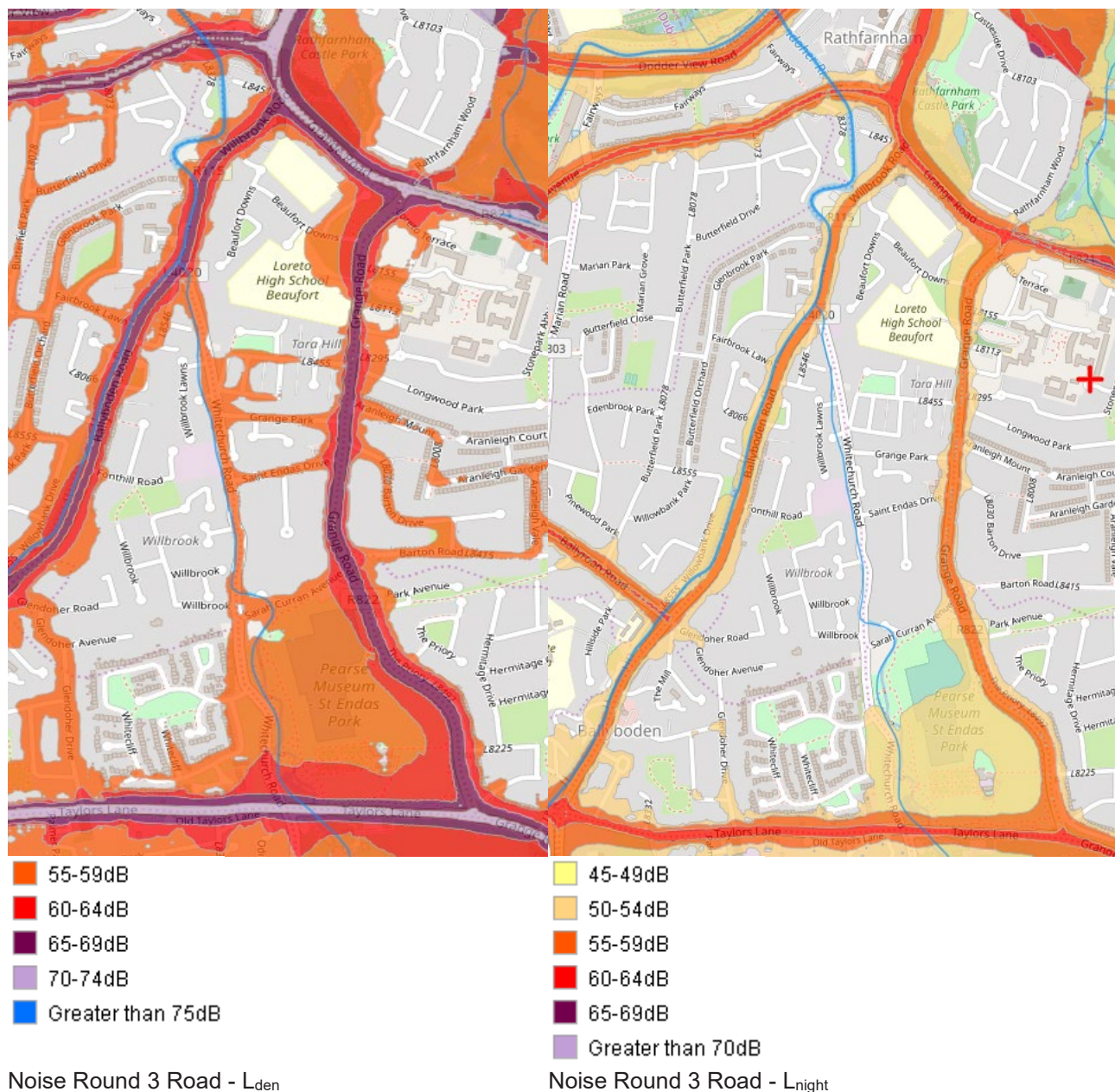


Figure 9-1: Strategic Noise Mapping of the Study Area

9.3 Potential for Significant Impact – Construction Phase

The main pollution and nuisances relating to the proposed development are considered to be noise from mobile plant, construction operations and construction traffic. The main receptors will be local residents and recreational visitors to St Enda's Park located adjacent and east of the southern section of the study area. Other receptors include road users along Whitechurch Road.

Construction activity will lead to temporary increases in road traffic along Whitechurch Road and along Sarah Curran Avenue where the works compound, to be located in a corner of the existing car park at the front of St. Enda's Park, off Sarah Curran Road will be accessed. This is estimated to last approximately 12 months.

Temporary haul roads are unlikely to be needed due to the restricted nature of the works however some improvement works may be required within St. Enda's Park where existing walking tracks are required to accommodate construction traffic. The Principal Contractor shall prepare a Traffic Management Plan for approval by the OPW and SDCC once detailed project designs are available and in advance of any construction works commencing.

There is potential for noise impact during the construction phase from mobile plant and construction traffic associated with excavation, piling, shuttering and concrete works. The noise associated with the construction works have potential to impact on the neighbouring residential properties for the duration of construction works. However, construction operations will only be undertaken during daytime hours and will be subject to standard operating practices and the CEMP in relation to managing noise impact.

In particular, noise and vibration impacts may arise from sheet piling or underpinning which are included as a part of the final project plan. There is approximately 150m of sheet piling recommended for the project and each recommended section of piling extends for approximately 30m of which there are five sections. As with general operations, the sheet piling can be undertaken using a series of controls and monitoring to ensure that there will be no significant adverse noise and vibration impact for properties in the area.

9.4 Potential for Significant Impact – Operational Phase

There are no significant negative impacts forecasted from the operational phase of the development. The development is forecast to be a positive addition to the local infrastructure by the mitigation of flood risks for the locality.

9.5 Mitigation Measures

The preliminary CEMP includes measures for the management of noise during construction. The measures included in the CEMP include the following:

- It is proposed that working hours during the construction phase will be confined to the day time period, between at 0730 and 1630, Monday to Friday. No work shall be planned for outside these hours including weekends or Public Holidays. It should be noted that in some instances, approval to vary the prescribed hours may be sought based on the following considerations:
 - Nature, location and extent of work to limit potential nuisance;
 - Location of the site in relation to 'sensitive' zones;
 - The urgency or emergency nature of the works;
 - Safety requirements such as risk to the public/workers;
 - Sequential/timing issues;
 - Traffic management considerations;
 - Noise reduction measures;
 - Measures taken to address any potential complaints;
 - Requirements of other authorities (e.g. ESB, Eircom); and
 - Public interest.
 - Emergency flood response/forecast activities.
- The construction methods and selection of plant will at all times comply with the guidelines set out in BS5228 (2009) '*Code of practice for Noise & Vibration Control on Construction and Open Sites*';
- The OPW and their subcontractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations;
- All plant items used during the construction phase should comply with standards outlined in the 'Safety, Health and Welfare at Work (Control of Noise at Work) Regulations' and the 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations'. Reference will be made to BS 5228: Part 1: 2009 (Noise Control on Construction and Open Sites - Part 1. Code of Practice for Basic Information and Procedures for Noise Control) and will include the following mitigation measures:

- Training of site staff in the proper use and maintenance of tools and equipment;
 - The positioning of machinery on site to reduce the emission of noise and to site personnel;
 - Sources of significant noise will be enclosed where practicable;
 - Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum;
 - Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise sensitive areas; and
 - Plant and/or methods of work causing significant levels of vibration at sensitive premises will be replaced by other less intrusive plant and/or methods of working where practicable.
- Inherently quiet plant will be selected where appropriate particularly in the case of pump sets which will invariably be required to run continuously throughout the working shift;
 - Screening and enclosures will be utilised in areas where construction works are continuing in one area for a long period of time or around operations such as sheet piling or items such as generators or high duty compressors. For maximum effectiveness, a screen will be positioned as close as possible to either the noise source or receiver. The screen will be constructed of material with a mass of $>7\text{kg/m}^2$ and should have no gaps or joints in the barrier material. This can be used to limit noise impact to any noise sensitive receptors;
 - Advance notice will be provided to all adjacent residents prior to undertaking any sheet piling. The notice will include the dates and durations of sheet piling to inform residents accordingly;
 - Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery and mobile equipment will be throttled down or switched off when not in use;
 - Accordingly, where possible all construction traffic to be used on site will have effective well-maintained silencers; and
 - All mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds.

The following measures are outlined in the CEMP for the management of vibration during construction:

- Any construction works that have the potential to cause vibration at sensitive receptors (e.g. sheet piling) will be carried out in accordance with the limit values set out in **Table 9-1** at the various residential and business properties. Monitoring using a Vibrock vibration monitor will be implemented prior to and throughout the works so as to obtain baseline and construction stage results.

Table 9-1: Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property

Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration, at a frequency of:		
Less than 10Hz	10 to 50Hz	50 to 100Hz and above
8mm/s	12.5mm/s	20mm/s

A CEMP will be put in place for the control of noise from construction activities. Noise and vibration is likely to affect ornithological, otter, and local residential populations and the CEMP will be highly specific to the location and nature of the works undertaken as part of this development and may be subject to amendment as required.

10 MATERIAL ASSETS (TRAFFIC AND UTILITIES)

10.1 Introduction

This section of the report describes the potential impacts of the proposed development on local traffic and transportation and services and utilities.

10.2 Receiving Environment

10.2.1 Traffic & Transportation

The receiving environment is that of mostly urbanisation and residential use, with a public park along the Eastern side of the proposed development. The L4020 Whitechurch Road runs parallel to the Whitechurch Stream and smaller local roads join the L4020, most of which are residential streets. Parallel to this is the Ballyboden Road (R115) which is a main route for several schools and traffic travelling between Rathfarnham Village and Ballyboden. Ballyboden is a hub for traffic travelling from the outer south west suburbs to the South Dublin neighbourhoods and city centre.

Taylor's Lane is a regional road (R113) which intersects with the L4020 and is a main east/west connection between Knocklyon and Firhouse to the west, and Ballinteer and Dundrum to the east. This road serves as an important commuter route for Dublin areas outside of the immediate vicinity.

During the period of construction, the proposed flood alleviation measures will intersect the two semi-urban narrow single carriage way roads, Sarah Curran Avenue (L8032) and Whitechurch Road. A footpath runs along the length of the study area which will be reinstated and made good after completion of the works. During the construction stage machinery will occupy the footpath and partially the carriage way. The proposed works will not amend the existing road network.

There is a parking area on the east of the Whitechurch Stream along Sarah Curran Avenue. This is currently used as parking for the visitors of St. Enda's Park and during construction it will be used partially as a temporary site compound and will remain operational for the duration of the works. This facility will be secured from unauthorised access for the duration of the works and will include offices, welfare facilities, parking for site vehicles and plant at night, storage of equipment materials used in the construction phase and also temporary storage of material to be re-used or awaiting removal by licenced waste contractor. The location of the compound is outlined in **Figure 10-1**.

10.2.2 Services & Utilities

An Engineering Services Report was completed by RPS (Jan 2020), the purpose of which was to identify the existing condition of services and utilities within the study area, identify conflicts with the proposed development and to propose mitigation measures. The services addressed in the Engineering Services Report included Storm Water Drainage, Foul Sewer, Potable Water Supply and other services including gas and telecom. This is based on surveys carried out in between May 2018 and December 2019.

There are a number of known utilities in the study area. Existing services and utilities include buried foul sewer, watermains, storm water lines, combined sewer lines, Virgin / UPC Ducting Lines and gas lines. In addition, there are overhead telecom and electrical lines.

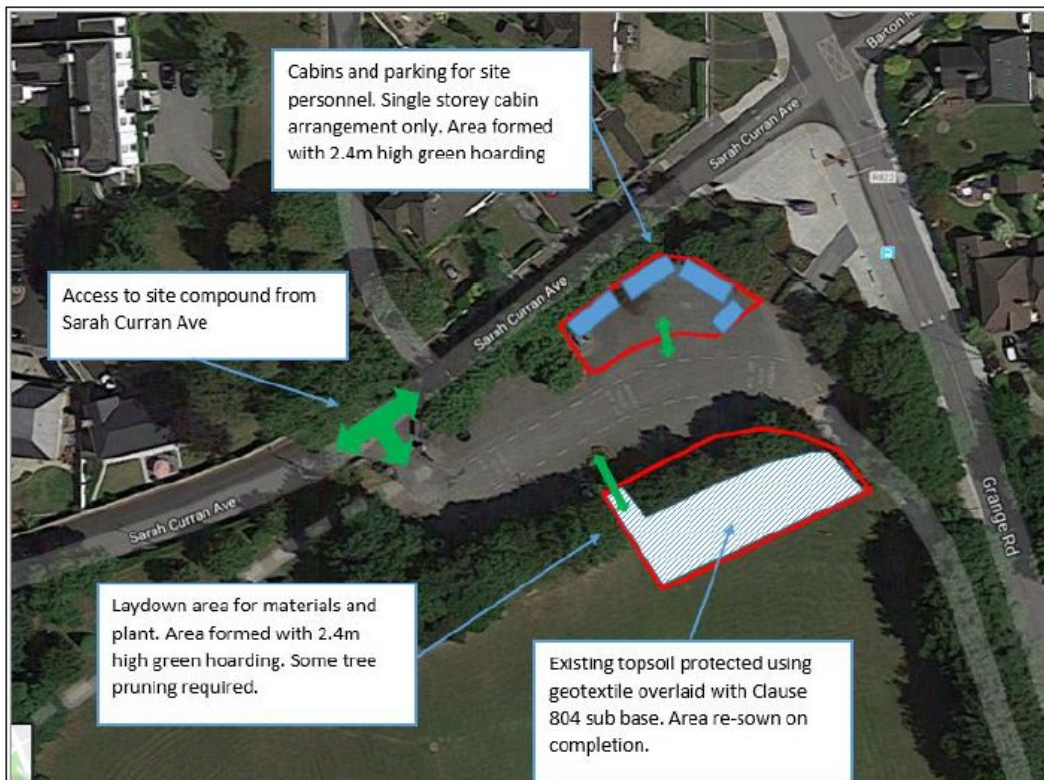


Figure 10-1: Proposed Location of Site Compound and Welfare Facilities

10.3 Potential for Significant Impact – Construction Phase

10.3.1 Traffic & Transportation

One of the nuisances relating to the proposed development is considered to be traffic management arising from the construction phase of the development. The main receptors will be local residents and recreational visitors to St Enda's Park located adjacent and east of the southern section of the study area.

Construction activity will lead to temporary increases in road traffic along Whitechurch Road and along Sarah Curran Avenue where the works compound, to be located in a corner of the existing car park at the front of St. Enda's Park, off Sarah Curran Road will be accessed. This is estimated to last approximately 12 months. Impacts associated with the construction of the proposed flood relief structures will require intermittent traffic management measures as outlined in **Section 10.5** in order to facilitate the construction related traffic on the public roadway which may result in temporary impacts on local residents.

Temporary haul roads are unlikely to be needed due to the restricted nature of the works, however, some improvement works may be required within St. Enda's Park where existing walking tracks are required to accommodate construction traffic.

During the construction period there will be a minor increase in traffic volumes on the local road network as a result of employees travelling to and from the site, construction/delivery trucks of engineering fill and trucks removing/disposing of waste and excess excavated material. It is anticipated that the local road network will be physically capable of accommodating construction trucks with no mitigation works necessary. Material will be removed by heavy goods vehicles (HGV) with a capacity of approximately 10m³. If required, permits for abnormal loads will be sought and obtained where required by the OPW Engineer with the SDCC Resident Engineer prior to construction works.

On restricted sections of bank, it may be likely that tree or shrub removal will be required to access work areas. Tree removal and disposal equipment would likely be used causing significant but manageable increases in traffic disruption.

10.3.2 Services & Utilities

Most of the services identified run along Whitechurch Road parallel to the stream over and underground at times crossing the stream under bridges and culverts. Existing services and utilities include buried foul sewer, watermains, storm water lines, combined sewer lines, Virgin / UPC ducting lines and gas lines. In addition, there are overhead telecom and electrical lines. These services will continue to operate during the course of the works, however, there will be some clashes between the service and utilities lines and the proposed flood defence walls which will require diversion of services.

10.4 Potential for Significant Impact – Operational Phase

10.4.1 Traffic & Transportation

It is not envisaged that the proposed development will cause any significant impacts to the local traffic and transportation operations once works have finished. The development is likely to have a positive impact on traffic and transport conditions in the area by mitigating the risk of floods and overflow on to the road and path network in the area.

10.4.2 Services & Utilities

No proposed operational impacts are predicted as a result of the proposed development.

10.5 Mitigation Measures

10.5.1 Traffic & Transportation

In order to reduce the potential for significant traffic, all works shall be carried out in accordance with a Traffic Management Plan (TMP). The Principal Contractor shall prepare a TMP for approval by the OPW and SDCC once detailed project designs are available and in advance of any construction works commencing. The measures included in the TMP include the following:

- The Whitechurch Stream Flood Alleviation scheme is accessible by several major routes. All deliveries to site should be co-ordinated via the above major routes and this will be briefed to the OPW's own delivery/transport operators as well as the supply chain;
- All construction personnel, subcontractors and consultants will receive training during the site induction and toolbox talks. This will include a traffic management component to reinforce the importance of traffic management issues and the measures that will be implemented to protect the environment and community;
- Site inductions and toolbox talks will highlight the specific environmental requirements for activities being undertaken at each worksite, which will include relevant traffic management matters. All drivers associated with the project are to abide by the relevant driver behaviour requirements and laws including speed restrictions, observation, fatigue management, vehicle maintenance and the onsite drugs and alcohol policy;
- Construction of the proposed scheme will require the delivery to site of significant quantities of construction materials. The bulk of these materials will be engineering fill for concrete for retaining walls. Material will be excavated and disposed off-site to permitted licensed disposal sites. Material will be removed by heavy goods vehicles (HGV) with a capacity of approximately 10m³ capacity. HGV movements will normally be scheduled for between the hours of 10:00 and 15:30hrs to avoid impacting on times of peak traffic;
- All signage shall be provided in accordance with the Department of Transport's Traffic Signs Manual, November 2010 – Chapter 8- Temporary Traffic Measures and Signs for Roadworks;

- Adherence to posted/legal speed limited will be emphasised to all staff and contractors during the induction training;
- Regular visual cleaning surveys of the road network in the vicinity of the site will also be carried out. Where identified/ required, the OPW will carry out road sweeping operations, employing a suction sweeper, to remove any project related dirt and material deposited on the road network by construction related vehicles;
- The deliveries to and from site will be undertaken to minimise disruption to the roads network particularly during times of peak traffic flow;
- Where possible, measures will be adopted to ensure that construction traffic travels minimal distances along sensitive routes (residential or congested roads) and those vehicles will be kept clean when on public highways; and
- The OPW will liaise with SDCC with sufficient advanced notice before any road closures take place.

10.5.2 Services & Utilities

The following mitigation measures are proposed for the proposed development in relation to minimising the disruption to services and utilities:

- Prior to commencement of construction works, including any excavation works, there will be engagement and consultation with all relevant utility providers to identify and verify the exact location of underground services;
- Any necessary rerouting of utilities will be identified and agreed with the relevant utility provider in advance;
- All work being carried out in the vicinity of underground services will be completed in accordance with current relevant guidance and codes of practice;
- All work being carried out in the vicinity of underground services will be completed in accordance with the current HSA '*Code of Practice for Avoiding Danger from Underground Services*';
- Furthermore, the ESB Code of Practice and HSA guidance, including the '*Code of Practice for Avoiding Danger from Overhead Electricity Lines*', regarding exclusion and safe operating distances around electricity infrastructure will be adhered to; and
- Appropriate restriction barriers and equipment will be used onsite to demark electricity and other infrastructure. Liaison with utility providers will continue as required throughout the construction phase.

11 MATERIAL ASSETS (CULTURAL HERITAGE)

11.1 Introduction

This section of the ER describes the potential impacts of the proposed development on the existing archaeological, architectural heritage and cultural heritage environment.

11.2 Receiving Environment

An Archaeological Impact Assessment¹³ of the proposed development has been carried out by the Archaeological Diving Company Ltd (ADCO). The Archaeological Impact Assessment was based on a desktop review and walkover inspection.

The report notes that there are no recorded archaeological monuments within the study area, which is today a residential suburban area with St Enda's Park to the south. There are two features recorded in the National Inventory of Architectural Heritage (NIAH) within the river area and both are part of the same folly feature (NIAH 11216066) in St Enda's Park, and three further NIAH features lie adjacent to the study area that are also protected structures. These features are identified in **Table 11-1**.

Table 11-1: Known cultural heritage assets in the vicinity of the Whitechurch FAS

Reference	Site	Proximity to Development	Impact from Development
NIAH 11216066	Folly	350m South	None
NIAH 11216019, RPS 278	Roseville, House, Outbuildings & Boundary Walls on Road Frontages	40m Southwest	None
NIAH 11216020, RPS 281	Willbrook House, House, Gateway & Railings	65m Southwest	None
NIAH 11216024, RPS 258	Mill House, House	30m East	None

A walkover inspection was conducted from south to north, commencing at the south end of St Enda's Park, and proceeding north along Whitechurch Road to the confluence of the Glin River and Owendoher River, where Whitechurch Road intersects with Ballyboden Road.

The inspection confirmed the presence of the known cultural heritage sites. In addition to the NIAH sites, a series of 26 features were recorded, as presented in

¹³ ADCO (February 2019), Archaeological Impact Assessment Whitechurch Flood Alleviation Scheme Rathfarnham, Co. Dublin

Table 11-2 and presented in Figure 11-1.

These features were catalogued by ADCO and potential impacts identified and mitigation specified as outlined in **Section 11.3** and **Section 11.5** respectively.

Table 11-2: Cultural heritage sites and related features (F#) recorded in the vicinity of the Whitechurch FAS

Reference	Site type	Easting	Northing
F1	Culvert, steel and stone	714444	727088
F2	Bridge, stone	714448	727106
F3	Monument, stone	714384	727112
F4	Pond, Dam	714399	727152
F5	Weir, stone	714409	727165
F6	Bridge, timber	714411	727182
F7	Weir, stone	714409	727188
F8	Outlet	714406	727197
NIAH 11216066	Folly	714416	727195
F9	Weir, concrete	714382	727216
F10	Bridge, timber	714377	727213
F11	Bridge, timber	714372	727332
F12	Bridge, stone	714334	727418
F13	Outfall, concrete	714328	727461
F14	Weir, stone	714339	727500
F15	Bridge, stone, Sara Curran	714334	727424
NIAH 11216019, RPS 278	Roseville, House	714288	727550
NIAH 11216020, RPS 281	Willbrook House	714269	727516
F16	Bridge, steel and timber	714329	727576
F17	Bridge and weir complex, stone	714273	727615
F18	Stone revetment	714268	727643
F19	Red-brick surface across river channel	714269	727664
F20	Stone arch and soffit	714255	727840
F21	Flour mill, former	714230	727818
F22	Weirs x 3, stone	714224	727985
F23	Lintel approaching culvert	714193	728039
F24	Weir, stone	714186	728178
NIAH 11216024, RPS 258	Mill House	714220	728148
F25	Bridge	714180	728228
F26	Bridge, stone	714148	728368

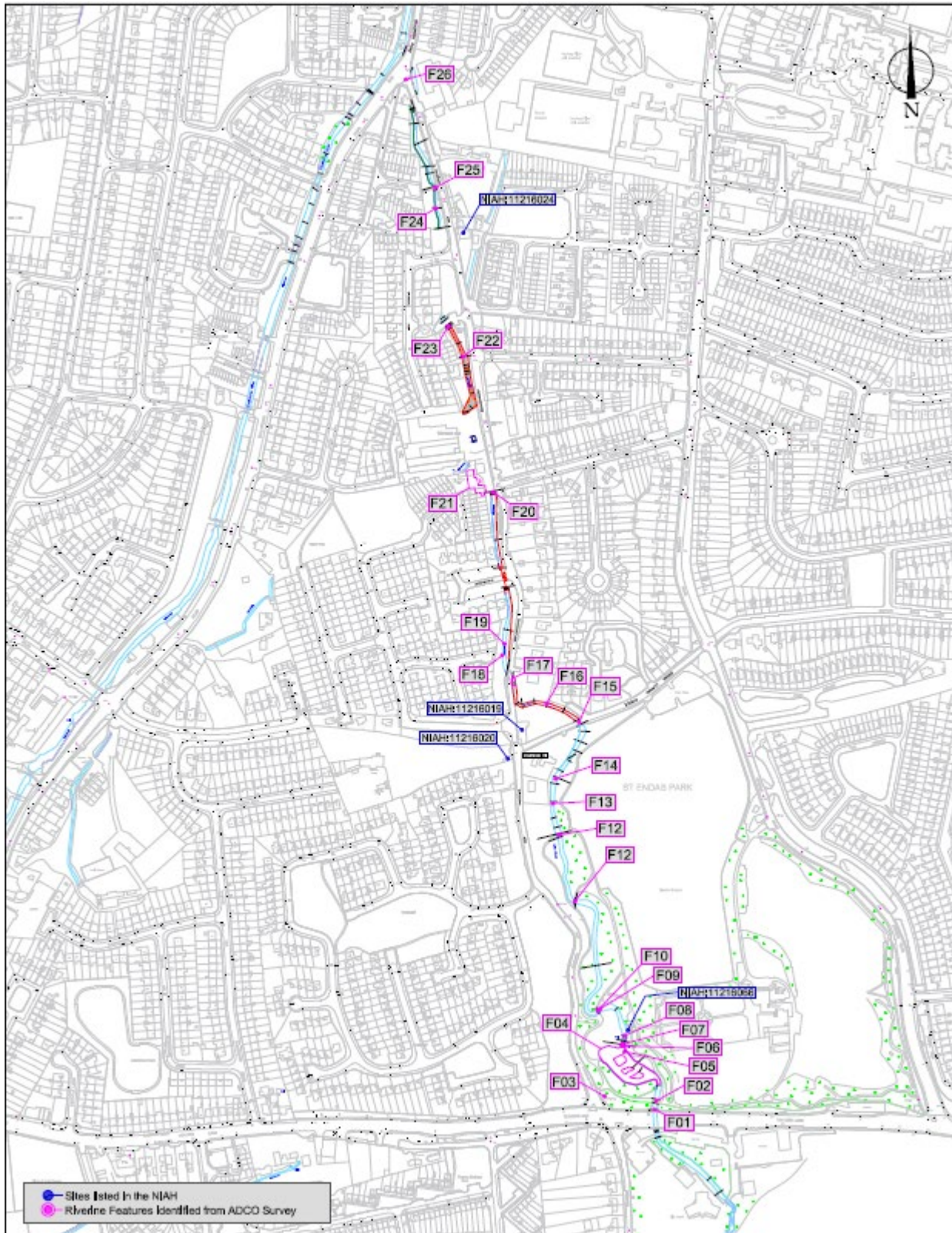


Figure 11-1: Extract from Project Drawing with ADCO Features (F1 – F26) and NIAH sites superimposed (Source: ADCO Report)

11.3 Potential for Significant Impact – Construction Phase

An Archaeological Impact Assessment has been completed for the scheme and concludes that there is no archaeological reason why the proposed flood alleviation works should not proceed.

The impacts on archaeology will occur during the construction phase and will be associated with ground disturbance activities which may identify new archaeology features. The ADCO report noted that there will be no impact on the majority of features identified within St Enda's Park. There will be no impacts on the NIAH features as identified in **Table 11-1**. Impacts will affect the following features identified on the walkover inspection as outlined in **Table 11-3**.

Table 11-3: Impacts and archaeological mitigation associated with the features identified within the proposed works area of the Whitechurch FAS

Reference	Site type	Impact	Mitigation
F14	Weir	Debris Trap	Pre-construction survey Monitoring works
F15	Bridge, Sara Curran	Defence walls to tie into bridge	Pre-construction survey Monitoring works
F16	Bridge	Replaced at soffit level	Monitoring works
F17	Bridge and weir complex	Defence walls to tie into bridge	Pre-construction survey Monitoring works
F19	Red-brick surface across river channel	None	Pre-construction survey
F20	Stone arch and soffit	New head wall at culvert Inlet with return wall left bank replacing railing Right Bank flood wall replacing fencing Trash screen to be inserted at culvert level	Pre-construction survey Monitoring works
F22	Weirs x 3	River defence walls on both banks Channel dredging New weirs required	Pre-construction survey Monitoring works
F23	Linear feature approaching culvert	Trash screen to be provided upstream to face bridge	Pre-construction survey Monitoring works
F24	Weir, stone	Localised bank raising may be adjacent	Pre-construction survey Monitoring works
F25	Bridge, concrete	Localised bank raising may be adjacent	Monitoring works
F26	Stone bridge	None	Pre-construction survey

11.4 Potential for Significant Impact – Operational Phase

No aspect of the operational phase is predicted to have a significant effect on cultural heritage.

11.5 Mitigation Measures

In order to minimise excessive disturbance to the Whitechurch Stream and to reduce the potential for significant impacts on the environment, all works shall be in the first instance be cognisant of the mitigation measures listed in the outline CEMP prepared for the project. The CEMP will be developed in Stage IIb (Detailed Design) of the project by the appointed contractor.

The measures included in the CEMP for Archaeological Monitoring and Archaeological Testing include the following:

- An experienced Project Archaeologist will be appointed by SDCC if required, prior to the commencement of works. Archaeological monitoring will be carried out in areas of moderate archaeological potential including all excavation locations associated with construction works and within the existing river channel;
- All construction related excavation and ground disturbance works will be monitored in full by the appointed Project Archaeologist;
- The OPW will be responsible for communicating a schedule of ground disturbance / excavation works with the appointed Project Archaeologist in a timely manner, such that monitoring may be coordinated with development works;
- If archaeological features or potential archaeological features are found during the course of works, site personnel are required to stop work immediately and contact the OPW Foreman / Engineer and Project Archaeologist for instruction. The appointed Project Archaeologist has the authority to immediately stop works in the area. All instructions/advice provided by the appointed Project Archaeologist must be adhered to unless there are overriding health and safety matters;
- If newly recorded sites are detected they will be fenced off and excluded from construction works. In accordance with the requirements of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, satisfactory arrangements will be provided for the recording and removal of any archaeological material, which may be considered appropriate to remove in consultation with the relevant authorities;
- Upon completion of works, the appointed Project Archaeologist will submit a written monitoring report to the OPW and the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. This report will comment on the degree to which works associated with the proposed flood relief scheme will affect any archaeological remains;
- Archaeological testing will be undertaken where required to ensure that any archaeological deposits are identified as early as possible, thereby ensuring that any loss from the archaeological record is minimised;
- Under licence to the National Monuments Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, the Project Archaeologist will observe normal construction works in this area. Construction works in this area are to be undertaken using toothless grading bucket, thereby ensuring the early identification of archaeological deposits and minimal loss to the archaeological record; and
- If possible, this testing should be undertaken preconstruction, to ensure that sufficient time can be allowed within the construction schedule for the excavation of any archaeological deposits discovered.

In addition, the Archaeological Impact Assessment Report identifies the following mitigation measures to ensure a detailed record is made of the existing features before they are impacted upon, and to ensure that ground disturbance activities associated with the scheme are archaeologically monitored to record any new features or details that might arise at that point. These measures include the following:

- Carry out pre-construction phase detailed archaeological survey of the features identified to be impacted and summarised in **Table 11-3**, to create a detailed record of the features before they are impacted upon;
- Archaeological monitoring is required of the ground disturbance works associated with the scheme, with the proviso to resolve fully any material observed at that point;
- SDCC will appoint an experienced underwater / riverine archaeologist to manage and resolve the archaeological requirement;
- Archaeological interventions (pre-construction and construction phase) are licensed by the DCHG. The Licence applications take four working weeks to be processed and must be granted before archaeology-related site-work can commence. An excavation licence will be required for investigative work ahead of

construction, and for the monitoring element of the construction phase. Since 2017, excavation licence applications must be accompanied by a letter from the client '*confirming that sufficient funds and other facilities are available to [the archaeologist] to complete the archaeological excavation, post-excavation, and preliminary and final reports (including specialist reports)*';

- **The time scale:** for the pre-construction and construction phases will be made available to the archaeologist, with information on where and when the various elements and ground disturbances and dredging will take place;
- **Sufficient Notice:** SDCC will provide sufficient notice to the archaeologist/s in advance of the pre-construction and construction works commencing. This will allow for prompt arrival on site to undertake additional surveys and to monitor ground disturbances. As often happens, intervals may occur during the construction phase. In this case, it will also be necessary to inform the archaeologist/s as to when ground disturbance works will recommence;
- **Discovery of Archaeological Material:** In the event of archaeological features or material being uncovered during the construction phase, any machine work will cease in the immediate area to allow the archaeologist/s to inspect any such material;
- **Archaeological Material:** Once the presence of archaeologically significant material is established, full archaeological recording of such material will be facilitated. If it is not possible for the construction works to avoid the material, full excavation is recommended. The extent and duration of excavation will be a matter for discussion between Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the licensing authorities;
- **Archaeological Team:** It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This will be complimented in the event of a full excavation;
- **Secure temporary site office:** and facilities will be provided on or near those sites where excavation is required within the site boundary;
- **Secure Wet and Dry Storage:** for artefacts recovered during the course of the investigations and monitoring work should be provided on or near those sites within the site boundary where excavation is required;
- **Fencing:** of cultural heritage assets immediately beside the works areas may be necessary during construction to avoid any accidental and indirect impacts on these environs;
- **Machinery Traffic:** during construction will be restricted as to avoid any of the selected sites and their environs;
- **Spoil:** will not be dumped on any of the selected sites or their environs; and
- **Post-Construction Project Report and Archive:** It is a condition of archaeological licensing that a detailed project report is lodged with the DCHG within 12 months of completion of site works. The report will be to publication standard and will include a full account, suitably illustrated, of all archaeological features, finds and stratigraphy, along with a discussion and specialist reports. Artefacts recovered during the works will meet the requirements of the National Museum of Ireland.

12 LANDSCAPE AND VISUAL

12.1 Introduction

This section of the ER describes the landscape and visual effects of the proposed Whitechurch Stream Flood Alleviation Scheme. A Landscape and Visual Impact Assessment has been completed by RPS, which documents the landscape and visual effects of the proposed development. The assessment is informed by a tree survey undertaken by Arborist Associates. The methodology for the landscape and visual impact assessment (LVIA) was informed by best practice guidance.

A study area of up to approximately 0.5km from the edges of the existing Whitechurch Stream from the southern end in St Enda's Park to the junction of Whitechurch Road and Ballyboden Road was identified for the purpose of capturing potential significant landscape and visual effects. The study area was identified having regard for the nature and scale of the development proposed and the baseline conditions.

12.2 Receiving Environment

Site visits were undertaken to assess the existing environment, to establish the existing landscape and visual baseline, to identify sensitive receptors, i.e. residential properties, scenic viewpoints.

The site for the proposed development is located within South Dublin. The South Dublin County Development Plan 2016-2022 is the statutory plan which documents the policies and objectives of relevance to landscape and visual amenity. In this regard, the site is located within an area zoned as Objective RES – '*To protect and/or improve residential amenity*'. Areas of public open space associated with St Enda's Park and smaller areas on Whitechurch Road adjacent to Willbrook Lawn are zoned as Objective OS – '*To preserve and provide for open space and recreational amenities*'.

The site is located within the Urban Landscape Character Area according to the county landscape character assessment. This is described as '*This urban landscape character area includes suburban south Dublin which is described as an area which 'extends east from Tallaght/Oldbawn to Rathfarnham, and north/ north-west along the county boundary to Clondalkin. The LCA retains little of historical significance and the setting of its primary settlements have been radically altered by built developments, notably through the 20th Century.*'

There are no designated landscapes or protected views within the immediate vicinity of the site. Views south to the Dublin Mountains are available from the southern end of the study area. Wider more open views of this mountain skyline are available from within St Enda's Park.

The following sections provide a summary of the baseline as set out in the LVIA Report.

12.2.1 Baseline Landscape Character – St Enda's Park

This comprises an extensive area of public open space with mature trees including native and ornamental species, shrub planting and large areas of open space as amenity grassland. A network of public footpaths extends through the park following an informal pattern, weaving in and out of the mature trees and woodland areas. Whitechurch Stream extends along the park boundary on the western side extending to the north west corner of the park at the corner of Sarah Curran Avenue and Whitechurch Road.

The landscape of St Enda's Park is very much valued in the local area both as a recreational amenity and as a parkland landscape in its own right. The key characteristics of the park would be susceptible to the type of change proposed (low tolerance to change). On this basis, St Enda's Park is considered to be of high sensitivity to the proposed change.

12.2.2 Baseline Landscape Character – Whitechurch Road Urban Area (from St Enda’s Park to junction of Ballyboden Road)

The Whitechurch Stream runs broadly parallel to Whitechurch Road which is a busy route in terms of traffic. The stream is lined with vegetation comprised mostly of scrub, bramble and ivy except in isolated locations where mature trees of variable condition are present. The stream itself features a range of edge treatments including concrete walls, stone walls, embankments and palisade fencing which are usually in a poor state of repair. A number of derelict sites are present including the former Rathfarnham Ford Garage and a derelict property further north of this. These elements together with the poor state of repair of the edges of the stream are detractors overall to the urban character of the area.

This section of Whitechurch Road carries no landscape designation. It is however valued at a local level for its established urban character and the presence of mature trees and, to some extent, the available small areas of open space. It is of variable scenic quality due to the relatively intact urban character of part of this landscape albeit with some notable areas in derelict or run-down condition. It is of medium susceptibility to change. On this basis, Whitechurch Road Urban Area is considered to be of medium sensitivity to the proposed change.

12.2.3 Baseline Visual Amenity

Viewers with existing views of the site for the Proposed Development comprise residents of dwellings, road users, recreational users of St Enda’s Park and pedestrians on Whitechurch Road. The existing visual amenity is described for 11 viewpoint locations, selected for the visual impact assessment. The viewpoint locations are outlined in **Table 12-1**. The table lists the viewer types at each viewpoint and describes the nature of existing views.

Table 12-1: Viewpoints and Existing Visual Amenity

ID	Location	Viewer Types Represented	Description of Existing View	Visual Receptor Sensitivity
1	Public Footpath in St Enda’s Park	Recreational visitors to the park	Views are available of the parkland including footpath, mature trees and ornamental planting. Whitechurch Stream is clearly visible at short range together with the banks of the stream, the bridge at Sarah Curran Road and riverside vegetation, some of which has been cleared is also visible..	High sensitivity – Recreational visitors enjoying quiet outdoor recreation who attain parkland views of scenic quality and value.
2	St. Gatien Court Area 4	Residents of dwellings, Pedestrians and Road Users	Views are available in a southerly direction of Whitechurch Road with adjacent footpath, low stone wall, linear grassed open space and second footpath which runs adjacent to the boundary palisade fence at Whitechurch Stream. Mature tree and shrub vegetation extends along the banks of Whitechurch Stream within the palisade fence boundary.	High sensitivity - Residents with proprietary interest in their surroundings attain views of some value at a local level.
3	St Gatien Court (Area 5)	Pedestrians, Road users	Views are available of the small grassed open spaces and dwellings at St Gatien Court. The white concrete culvert headwall associated with Whitechurch Stream is visible in the foreground. The mature ornamental shrub vegetation which extends further north along Whitechurch Stream adjacent to Whitechurch Road is clearly visible.	High sensitivity – Pedestrians with interest in their surroundings attain views of some value.
4	Whitechurch Road, north of St Gatien Court (Area 5)	Residents of dwellings, Pedestrians, Road Users	Views are available of the footpath and grassed open space associated with Whitechurch Road. Whitechurch Stream is clearly identifiable by the boundary concrete walls and sections of palisade fencing. Mature ornamental shrub planting of variable quality is also visible.	High - Residents with proprietary interest in their surroundings. The available views are of limited value derived from mature ornamental planting combined with detracting built elements (concrete walls and fences).

ID	Location	Viewer Types Represented	Description of Existing View	Visual Receptor Sensitivity
5	Whitechurch Road (Area 5) north of St. Gaten Court	Residents of dwellings, Pedestrians, Road Users	Views are available of a line of mature trees and low boundary wall and footpath on the edge of Whitechurch Road. Inside this wall and tree line, a short section of existing footpath and boundary palisade fence at the edge of Whitechurch Stream is also partially visible.	High – Residents with proprietary interest in their surroundings attain views of some value attributed to the presence of mature trees.
6	Whitechurch Road (Area 60 near Rathfarnham Ford	Pedestrians, Road Users	Views are available of Whitechurch Road and Whitechurch Stream along with vegetation on the banks of the stream. A low concrete wall separates the stream and vegetation from the footpath and road carriageway. The hoarding associated with the small bridge further north is clearly visible in the distance, a	Medium - Pedestrians with interest in their surroundings. The available views are of limited value owing to some detracting built elements (concrete walls and hoardings).
7	Whitechurch Road (Area 6) near Capri Site	Residents of dwellings, Pedestrians, Road Users	Views are available of Whitechurch Road and footpath and the concrete boundary to Whitechurch Stream along with some woody vegetation. The timber hoarding around the bridge access is clearly visible in the foreground. Further afield, dwellings associated with Willbrook Lawn are visible.	Medium – Residents with proprietary interest in their surroundings attain views of limited value. The views are not of any notable scenic quality, dominated by built elements and hoardings.
8	Whitechurch Road near Willbrook Lawn culvert (Area 6)	Pedestrians, Road Users	Views are available of a boundary railing and grassed public open space with mature trees and shrub vegetation. Dwellings are clearly visible along the banks of Whitechurch Stream. These elements are visible with driveway /parking / turning area in the foreground.	High – Pedestrians with interest in their surroundings attain views of some value attributed to the presence of mature trees and grassed open space.
9	Willbrook Grove (Areas 7&8)	Residents of dwellings	Views are available of the mature trees and woody vegetation associated with Whitechurch Stream with the small open space at Willbrook Grove in the foreground. The existing bridge crossing over the stream is visible as a small element in the view.	High – Residents with proprietary and continued interest in their surroundings attain views of some value attributed to the presence of mature trees and grassed open space.
10	Whitechurch Road, near Willbrook Grove (Areas 7&8)	Residents of dwellings, Pedestrians, Road Users	Views are available of Whitechurch Road together with mature tree and shrub vegetation which extends along the banks of Whitechurch Stream. A low stone wall separates the stream from the footpath and road carriageway. A small concrete bridge crossing over Whitechurch Stream is clearly visible in the foreground.	High – Residents with proprietary and continued interest in their surroundings attain views of some value attributed to the presence of mature trees and woody vegetation along Whitechurch Stream as the main element in the existing view alongside other built elements.
11	Junction of Whitechurch Road and Ballyboden Road (Area 8)	Pedestrians and Road Users	Views are available at short range of the stone boundary wall associated with Whitechurch Stream. Mature tree and shrub vegetation of varying quality and value is clearly visible inside the stone boundary wall which provides considerable visual screening of the packaging facility behind. The junction of Whitechurch Road and Ballyboden road is visible further afield.	Medium - Pedestrians with some interest in their surroundings. The available views are of limited value

12.3 Potential for Significant Impact – Construction Phase

Direct Impacts will arise during the construction phase as a result of a range of construction activities associated with the scheme. Short term effects on the surrounding landscape and visual amenity will arise from construction activities and the presence of construction plant, machinery and vehicles associated with the proposed works. These activities are expected to be short term lasting 12 months and phased over the length of the proposed works.

12.3.1 Landscape and Landscape Character – St. Enda’s Park

Adverse effects on the landscape of St Enda’s Park will arise as a result of the presence of the temporary compound and the construction activities associated with clearance of existing trees and introduction of proposed debris trap and slipway. These effects will be limited to the north western corner of the park and will be short term (maximum of 12 months).

Considering the adverse effects associated with the construction activities along with the short-term nature of these effects, a negligible magnitude of impact is considered to arise to this landscape of high sensitivity resulting in a minor and not significant adverse effect.

12.3.2 Landscape and Landscape Character - Whitechurch Road Urban Area

Adverse effects on the urban landscape of Whitechurch Road will arise as a result of the range of construction activities. Although these will be short term (maximum 12 months), the activities will be intense for shorter periods of time (weeks) as the works progress in phases along the length of the watercourse.

Taking into account the adverse effects associated with the construction activities along with the short-term nature of these effects, a small magnitude of impact is considered to arise to this landscape of medium sensitivity resulting in a minor and not significant adverse effect.

12.4 Potential for Significant Impact – Operational Phase

Long term effects on landscape and visual amenity associated with the operational phase of the scheme will potentially arise.

12.4.1 Landscape and Landscape Character – St. Enda’s Park

Direct changes will arise to the north western corner of St Enda’s Park (corner of Sarah Curran Avenue and Whitechurch Road). These direct changes will occur to a very limited area within the north western corner of the park, specifically at a short section of Whitechurch Stream. Direct adverse changes to the landscape would result from the loss of trees and the introduction of new built structures. Some beneficial effects would be associated with the proposed mitigation planting. Effects are not expected to be significant.

12.4.2 Landscape and Landscape Character - Whitechurch Road Urban Area

Direct changes will arise to the urban landscape of the Whitechurch Road Area, specifically in the vicinity of Whitechurch Stream immediately north of Sarah Curran Avenue and along Whitechurch Road extending north as far as the junction with Ballyboden Road. Adverse effects will be associated primarily with the tree and shrub vegetation losses. Beneficial effects to the local landscape of Whitechurch Road are anticipated to arise as a result of the proposed flood defence walls, where these are faced in stone and are due to replace concrete structures and palisade fencing in run down condition. Beneficial effects will be derived from the newly introduced tree planting, hedgerow planting, bulb planting and grass seeding. Taking into account the beneficial effects balanced with the adverse effects, an overall moderate and not significant beneficial effect is expected to arise. As the mitigation planting becomes mature in year 15, a moderate significant beneficial effect is expected to arise.

12.4.3 Visual Amenity

During year 1 of operation, significant adverse visual effects will arise at viewpoints 9 and 10 due to the loss of mature trees along Whitechurch Stream. At year 15, significant beneficial effects will arise at viewpoints 2,

3, 5 and 8 due to the mitigation planting which will have reached a level of maturity along with the use of stone finish to the proposed flood defence walls.

12.5 Mitigation Measures

The Landscape and Visual Impact Assessment Report identifies the following mitigation measures which would be implemented during construction along with a range of measures which are an intrinsic part of the proposed development designed to mitigate long term landscape and visual effects:

Construction

- Temporary storage heaps associated with topsoil are not to exceed 1m height;
- Storage compound area will be reinstated to former use within St Enda's Park upon completion of the works;
- Vehicles exiting compound areas will be subject to wheel wash facilities or road sweepers shall be used in order to maintain clean roads;
- Any lighting used will be kept to a minimum, providing for site safety only and shall be directed into the compound and away from adjacent residential properties. Lighting at the site compound shall be shielded to avoid light spill onto adjacent properties and roads;
- Fencing used around site offices, welfare units and parking within the compound area shall be painted green in sympathy with the surrounding park landscape; and
- Protection of existing trees close to the works may be required and the protection measures will be informed by the tree survey undertaken by Arborist Associates. Prior to commencement of construction, existing trees which are to be retained will be protected with fencing to ensure no works or storage of materials occurs within the root protection zone. The tree protection works will be in accordance with BS 5837:2012 Trees in relation to construction.

Operation – proposed planting

New planting and seeding is proposed in St Enda's Park and at five locations along Whitechurch Road to mitigate adverse landscape and visual effects. The proposed landscape works are illustrated in Figures 2a, 2b, 2c, 2d and 2e. These measures include the following:

- Woodland planting on the left bank of Whitechurch Stream in St Enda's Park;
- Tree planting and grass seeding on Whitechurch Road, south of St Gatien Court;
- Tree planting and grass seeding on Whitechurch Road, north of St Gatien Court;
- Hedgerow planting within existing open space south of the Willbrook Lawn Culvert;
- Tree planting within the existing open space on Whitechurch Road, in the vicinity of Willbrook Lawn; and
- Mixed species hedgerow along the left bank of Whitechurch Stream together with bulb planting and grass seeding near Willbrook Grove. .

Additionally, tree planting will take place at a range of locations as directed by South Dublin County Council.. The extent of the proposed planting will be determined, having regard for the extent of tree and woody vegetation that will have to be removed to facilitate Whitechurch Stream FAS.

12.5.1 Other Measures Relevant to Landscape and Visual

In addition to the specific measures above, measures are listed in the outline CEMP prepared for the project. The measures included in the CEMP for Landscape include the following:

- Works will proceed only on the basis of agreed Construction Method statements for each element of the proposed works;
- Vegetation removal (particularly mature trees and tree-lines) will be the minimum required for the construction works – but shall also include for the safe removal of trees where their removal has been recommended on safety grounds;
- Retained trees should be protected by fencing prior to other works commencing ideally to an exclusion zone of at least equivalent to canopy cover – elsewhere to the maximum possible;
- Trees in the vicinity of works (i.e. within root protection area (RPA) as per BS5837) shall be subject of a detailed pre-construction tree survey carried out a qualified Arborist. Any works recommended – including crown reduction/remediation measures – shall be undertaken and the survey shall be made available to the Client;
- Disturbance to private boundaries, gardens, etc. shall be avoided wherever possible and where impacted shall be reinstated prior to completion of the works;
- Machinery shall not enter the river unnecessarily unless it is on a purposely constructed haul road above the river level;
- River banks will be left intact and vegetated wherever possible. Coppicing and/or selective removal of trees may be considered where required in preference to total vegetation removal;
- Existing characteristic features shall be removed prior to other works commencing and set aside for reuse and / or alternative use;
- All landscape, footpath, roads etc., disturbed during the course of the works shall be fully reinstated prior to the completion of the construction works;
- Japanese Knotweed is particularly common along many stretches of the river. Works on river banks should seek to control/eradicate such invasive species. The OPW shall ensure that sufficient controls are in place to prevent the spread of such species within the works area; and
- Restoration and improvement of river channel on completion of the works by implementing a package of enhancement works.

13 CUMULATIVE IMPACTS

This section provides an overview of the plans and projects that have potential for cumulative and in-combination impacts with the proposed development. **Table 13-1** provides an overview of plans and projects close to the wider Whitechurch Stream area. All of the planning applications are located in the area of the Whitechurch Stream and have varying degrees of potential cumulative impacts to the proposed development.

Table 13-1: Proposed developments near Whitechurch Stream

Proposed Developments	Planning reference
Modifications to SD11B/0236 for construction of 4 no. 2 storey semi-detached houses with 8 parking spaces with new bridge to Whitechurch Road and associated landscaping and drainage works	SD13B/0219
Cycling and Walking Scheme. South Dublin County Council, Grange Road	SD158/0013
Change of house type of the approved dwellings to 4 semi-detached, 3 bed dwellings; replacement of existing bridge and 1.2m flood defence walls, internal road and footpaths; 8 car parking spaces and associated site works and landscaping on previously granted site for 4 semi-detached, 2 bedroom with study dwellings and associated works under SD09A/0055 and SD11B/0236.	SD20A/0016
Demolition of existing buildings, closing vehicular access at southern end of site and retaining main vehicular entrance at northern end, construction of new 3 storey building over basement, with storage facilities in basement, two 1 bed apartments on ground floor, two 2 bed apartments on second floor and third floors, a communal roof garden, and all associated site and development works.	SD16A/0247
Housing development (47 detached houses).	D13A/0370/E
Extension to Golf course.	SD17A/0263
Dodder Greenway.	SD178/0003
Private Development on Lands at the former Paper Mills site, bounded by the river Dodder to the east, Clonskeagh Road to the west, Clonskeagh bridge to the South West, Dublin 6	SD3324/19

As per the EIA Screening report (RPS, 2020):

‘There is a project, Reference SD09A/055 & PL06S.235823, for a number of subsequent amendments to an original consent have been sought and refused. Taking a conservative approach, and in the absence of final detail of management of construction and operational management of the earlier consented development at the Capri site, there is a possibility for in-combination pollution to surface water or groundwater to occur, by virtue of its suggested proximity to the Whitechurch Stream (10m), particularly if the consented development were to be undertaken at the same time as the proposed flood alleviation scheme.

Furthermore, for the project SD20A/0016 also at the Capri site, its application contains a proposal for the control of identified invasive alien plant species but in the absence of a final management regime for the invasive plant species, there is a possibility for in-combination impacts.- This development also details the ‘replacement of existing bridge’ as part of the proposed works and as this would take place along Whitechurch Stream there is potential for in-combination impacts. However, where pollution prevention measures are outlined regarding this structural alteration, in-combination impacts can be deemed as null.’

A summary of impacts and mitigation measures is included in **Table 13-2: Enabling Works, Demolition and Construction Summary of Impacts and Mitigation**. This will inform the CEMP to be produced by the appointed contractors for the enabling works and demolition, and construction stages of the proposed development. **Table 13-2** outlines a summary of impacts and mitigation measures for the operational phase of the proposed development.

There are no significant adverse impacts forecast to affect the remaining environmental receptors as a result of the proposed development

Table 13-2: Enabling Works, Demolition and Construction Summary of Impacts and Mitigation

Aspect/ Receptor	Description of impact	Significance of impact	Mitigation	Residual impact
Population and Human Health				
Employment	The development has a slight potential to employ members of the local population	Slight Beneficial	No mitigation measures are considered necessary.	Slight Beneficial
Community	Potential to impact on traffic, noise and air quality, however impacts are minor and temporary.	Not significant	Construction and Traffic Management Plan (CEMP and TMP)	Not significant
Noise	Potential minor temporary impacts from machinery and construction activities	Moderate	Best practice measures in the Construction Environmental Management Plan (CEMP)	Imperceptible
Biodiversity				
North Dublin Bay SAC	Surface water pollution. Dispersal of scheduled invasive species	None predicted as proposed development avoids activity within the habitat.	Best practice measures in the Construction Environmental Management Plan (CEMP)	None predicted as CEMP should mitigate risks to habitat.
Wicklow Mountains SAC	Disturbance to otter habitat. Surface water pollution. Dispersal of scheduled Invasive species.	Moderate	Best practice measures in the Construction Environmental Management Plan (CEMP)	None predicted as CEMP should mitigate risks to habitat. Replanting of lost vegetation to mitigate further impact
North Bull Island SPA	Surface water pollution. Dispersal of scheduled Invasive species.	None predicted as proposed development avoids activity within the habitat.	Best practice measures in the Construction Environmental Management Plan (CEMP)	None predicted as CEMP should mitigate risks to habitat.
South Dublin Bay and River Tolka SPA	Surface water pollution. Dispersal of scheduled Invasive species.	None predicted as proposed development avoids activity within the habitat.	Best practice measures in the Construction Environmental Management Plan (CEMP)	None predicted as CEMP should mitigate risks to habitat.
Land and Soils				
Poor Aquifer/ Locally Important Aquifer. Low Groundwater Vulnerability.	Groundwater pollution. The bedrock aquifer has a potential low risk of pollution to groundwater from piling works.	Low significance of impact	Best practice measures in the Construction Environmental Management Plan (CEMP)	None predicted as CEMP should mitigate risks to habitat.
Landscape and Visual				

WHITECHURCH STREAM FAS-ER

Aspect/ Receptor	Description of impact	Significance of impact	Mitigation	Residual impact
St. Enda's Park	Removal of trees from the immediate vicinity of Whitechurch Stream	Losses will be apparent over a very small part of St. Enda's Park, in the immediate vicinity of the works	Removal of vegetation only as required. Replanting of vegetation when works complete	Replanted vegetation will return to normal after a number of years.
Whitechurch Road Urban Area	Refer to LVIA Document	Tree and vegetation removal, flood defence wall construction and assorted screens for trash removal	Removal of vegetation only as required. Replanting of vegetation when works complete	Replanted vegetation will return to normal after a number of years. Hard engineering works will alter the visual environment, with expected net positive benefits to community.
Cultural Heritage				
St. Enda's Park	Local archaeological and heritage features	Low potential of disturbance	Minimal to zero risk to features forecast	None
Air Quality and Climate				
Community	Possible adverse effects on dust levels and air quality during construction	Moderate impact depending on dust and precipitation levels during construction phase	Best practice measures in the Construction Environmental Management Plan (CEMP)	None
Noise and Vibration				
Community	Possible adverse effects on noise levels during construction	Moderate impact depending on levels of engineering installed during construction phase	Best practice measures in the Construction Environmental Management Plan (CEMP)	None
Biodiversity	Possible adverse effects on noise levels during construction	May impact ornithological and otter populations	Best practice measures in the Construction Environmental Management Plan (CEMP)	None
Community	Tree and woody vegetation removal	Felling and onsite chipping/mulching of material to ease removal	Best practice measures in the Construction Environmental Management Plan (CEMP)	None
Hydrology and Drainage				
Whitechurch Stream	Surface water pollution.	Siltation, lubricant and fuels	Best practice measures in the Construction Environmental Management Plan (CEMP), mitigation measures	Positive
Traffic and Transport				
Community	Construction traffic. Noise, dust. HGV traffic.	Moderate impact due to minor increases in traffic volumes on local roads.	Best practice measures in the Traffic Management Plan and Construction Environmental Management Plan. Traffic mitigation measures	None

WHITECHURCH STREAM FAS-ER

Aspect/ Receptor	Description of impact	Significance of impact	Mitigation	Residual impact
Materials and Waste Management				
Waste generation	Invasive species contaminated materials.	Dependent on management plans and previously implemented measures, to ensure non dispersal of contaminated materials.	Best practice measures in the Construction Environmental Management Plan (CEMP)	Positive
Waste generation	Tree and woody vegetation removal	Felling and onsite chipping/ mulching of material to ease removal	Best practice measures in the Construction Environmental Management Plan (CEMP)	None

Table 13-3: Summary of Impacts and Mitigation

Aspect/ Receptor	Description of impact	Significance of impact	Mitigation	Residual impact
Population and Human Health				
Population health	The development has the forecast effect of improving quality of life for local populations by way of relief from future 1% and more regular flood events	Beneficial	No mitigation measures are considered necessary.	Beneficial

14 CONCLUSION

The Whitechurch Stream Flood Alleviation is not forecast to have any significant environmental effects on the environment and due to the inherent positive impact it will have on surface water bodies and future flood protection it is predicted to have positive impacts for local residents and South Dublin County Council in the long term.

Environmental impacts resulting from construction works are not predicted to be significant, provided that the relevant mitigation measures, CEMP and guidance documents which have been referenced in the various environmental documents supporting the planning application are implemented.

Since a portion of the works are in such close vicinity of and instream of the Whitechurch Stream, itself a tributary of the Owendoher and the Dodder Rivers, construction activities must be managed with the appropriate care.

Silt from instream works, material removal and storage, and machinery fluids such as lubricants and fuels are likely to be the most injurious risks to habitats of on-site activities. Strict management protocols must be followed for the prevention of their release into watercourses, along with frequent communication to stakeholders.

A Clerk of Works, will be appointed to oversee the construction providing stakeholders confidence that the CEMP and other guidelines are followed.

With these standard good working practices as outlined in the CEMP in place, there is no predicted significant effect from the proposed development.