





RIVER PODDLE FLOOD ALLEVIATION SCHEME

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME 2 – MAIN REPORT

PART II - ASSESSMENT OF ENVIRONMENTAL EFFECTS AND PROPOSED MITIGATION MEASURES (CHAPTERS 6-17)



FEBRUARY 2020



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6 POPULATION AND HUMAN HEALTH

6.1 Introduction

This chapter considers the impact of the proposed development in the context of employment, human health, amenity, and health and safety. It determines significant impacts, if any, of the proposed development on the receiving environment in respect of population and human health and, where applicable, proposes measures to avoid, reduce or remedy these impacts.

6.2 Methodology

The methodology for this chapter involves examination and compilation of all relevant population and socio-economic data collected by the Central Statistics Office (CSO) and any other relevant bodies. This is based on a desktop study and draws on information contained in other chapters in this EIAR (*i.e.* landscape, air and climate, traffic and transport, *etc.*), and in from published sources including the statutory development plans of SDCC and DCC.

After describing the baseline, this chapter provides an assessment of the potential impacts of the proposed development on population and human health, then sets out mitigation measures that are required to lessen such impacts, if necessary.

6.3 Existing Environment

This section provides a brief overview of the existing environment in and around the proposed Scheme as it relates to population and human health.

6.3.1 Site and Development Context

The proposed works are at several points along the River Poddle from Tymon Park to Harold's Cross as shown in **EIAR Volume 3**. Refer to **Chapter 5** *The Proposed Development* for a detailed description of the proposed development and proposed construction methods, and the accompanying planning drawings.

There are three areas where more substantial works are proposed including Tymon North and Tymon Park in Tallaght, Whitehall/Wainsfort Manor Crescent in Terenure, and Ravensdale Park in Kimmage. During the construction phase, this would be the part of the Scheme most likely to have the greatest impact on the local population and human health.

The construction of the Flood Alleviation Scheme at these locations will involve excavation and importation of earth material, movement of vehicles and personnel, and construction work, all of which have the potential to give rise to impacts in relation to noise and vibration, dust, delays and congestion on the public roads, restricted pedestrian access in the Parks, and visual amenity impacts.

The proposed Flood Alleviation Scheme will result in permanent changes to the local environment in the three substantial works areas that will impact access and enjoyment of public spaces by the local population.

- Tymon Park earthen embankments and a flow control structure, replacement footbridge, ICW, tree removal, changes to pedestrian paths.
- Whitehall Park/Wainsfort Manor Crescent channel diversion and land re-profiling.

• Ravensdale Park – flood protection walls, replacement footbridge, and tree removal.

The remaining works in the Flood Alleviation Scheme are walls or embankments at a number of locations along the River, and removal of trees at some locations. In one location at Kimmage Road West, works will require access through private property. The impacts that will be experienced by the local population during the construction of the embankments and walls, and removal of trees at these locations will be temporary in duration. In locations where removal of trees is proposed, this will result in a permanent alteration of the local environment.

6.3.1.1 Land Use

With the exception of Tymon Park, the works for the Flood Alleviation Scheme are located in a highly urbanised setting. The main land uses along the River Poddle where works are proposed are primarily recreation and open space and residential, and a builder's providers and KCR Industrial estate nearby Ravensdale Park.

6.3.1.2 Land take

The land take for the proposals is approximately 12ha, taking in all works areas, including construction traffic routes and temporary stockpiling in Tymon Park, and temporary works/set down areas at Whitehall/Wainsfort Manor Crescent and Ravensdale Park. For the remainder of the Scheme the works areas are confined to the banks of the River and in the public roads. The actual footprint of the built elements of the Scheme (embankments and flood protection walls) is minimal when compared to the land take required for the construction phase.

6.3.1.3 Generalised Land Use Zonings and Planning Policy

The working areas in the proposed Poddle River Flood Alleviation Scheme is in an urban / suburban setting in the south-west of Dublin City in the administrative areas of SDCC and DCC. The Poddle River passes through areas of industrial, commercial, residential and open space/recreational uses. Much of the area in the vicinity of the proposed works is urban and well developed.

In South Dublin County Council area the works planned at Tymon Park and Whitehall Park are located within areas zoned Open Space which has as its objective in the CDP "*To preserve, provide and improve recreational amenity and open space and green networks.*" The proposed works are necessary to provide flood protection to properties nearby in a 1% AEP flood event, and to provide some flood storage. The remainder of the works in the South Dublin County Council administrative area involve tree removal and replacement or reinforcement of existing walls in areas that are zoned Residential.

The works planned at Ravensdale Park are located within an area zoned Amenity/Open Space Lands/Green Network (Zone Z9) in the Dublin City Development Plan which has as its objective "*To* preserve, *provide and improve recreational amenity and open space and green networks."* The proposed works are necessary to provide flood storage in a 1% AEP flood event, and alleviate flooding experienced by local residents in Ravensdale. The provision of flood management is a function of open space as green infrastructure which is recognised in Chapter 10 of the Dublin City Development Plan 2016 – 2022. The remainder of the works in Dublin City administrative area entail tree removal and replacement or reinforcement of existing walls for flood alleviation in areas that are zoned Residential.

6.3.2 Local Population

The impact of the proposed development will be felt in the immediate area surrounding the proposed development in South Dublin County Council and Dublin City Council areas. The population context of these areas is detailed below, showing the current population and population trends for these areas since 2006 to 2016.

6.3.2.1 Population Change

Table 6-1 shows the total population and change for each of the South Dublin County Council and Dublin City Council areas from Census years 2006 to 2016. In the period 2006 – 2011 South Dublin County Council area experienced a rate of population growth nearly twice that of Dublin City Council. The rate of population growth in South Dublin County Council area decreased from 2011 – 2016, but slightly increased for Dublin City Council area.

	2006 Census	2011 Census	2016 Census
South Dublin County Population	246,935	265,205	278,767
Percentage Population Increase	-	7.40%	5.11%
Dublin City Population	506,211	527,612	554,554
Percentage Population Increase	-	3.8%	4.8%

Table 6-1: Population change by council area 2006 to 2016

Source: Central Statistics Office

6.3.2.2 Characteristics of the Population

Table 6-2 provides general population characteristics for the study area which is defined as the electoral divisions (EDs) along the River Poddle covering the areas of the proposed works. This is defined as the study area for the purposes of this baseline description. These statistics provide more detail on the characteristics of the population for the study area, including population change from 2011 – 2016, and the age dependency ratio and relative deprivation scores for 2016.

Electoral Division	2016	Percentage	2016 Age	2016 Relative
	Population	Population	Dependency	Deprivation
		change 2011	Ratio	Score
		2016		
Kimmage C	3,043	-3.36	25.94	8.63
				marginall
				y above
	2.462			average
Kimmage D	2,462	-3./1	28.51	-0.17
				marginali v bolow
				average
Kimmage E	3,395	-4.91	30.73	-0.39
	-,			marginall
				y below
				average
Tallaght-	3,996	-0.55	30.27	-1.09
Kingswood				disadvantaged
Tallaght-Tymon	4,956	-1.39	37.62	-11.30
				disadvantaged
Templeogue-	4,856	-4.72	34.76	13.92 affluent
Kimmage Manor				
TempleogueLimekiln	3,449	1.49	39.07	-2.37
				marginall
				y below
TomplooguoOrwoll	2.056	2 0/	20.96	average
rempleogueorwen	2,030	3.04	39.00	4.09 marginall
				v above
				average
TempleogueOsprey	2,246	3.77	33.54	4.90 marginally
				above average

Table 6-2	Population	Census	Statistics	for	the	Area
TUDIC 0 Z.	ropulation	CCHSUS	Statistics	101	unc	AI CU

Source: Pobal maps portal, <u>https://maps.pobal.ie/</u>

All of the EDs in the study area experienced a decline in population with the exception of three EDs in Templeogue which experienced a small to moderate (1.49% to 3.84%) population increase from 2011 – 2016.

The age dependency ratio shows the number of people aged 0 - 14 and 65+ compared to the working age population (age 16 - 65) for the EDs in the study area for 2016. The average age dependency ratio for the study area is 33.4% with higher age dependency ratios above 39% in parts of Templeogue. The age dependency ratios for the EDs and the average for the study area are much lower than for South Dublin Council and Dublin City Council areas which had overall age dependency ratios of 51.7% and 39.0% respectively, and for the State which was 52.7% in 2016.

The relative deprivation score is a measurement of different factors to determine how affluent or deprived a particular area is based on key indicators including the proportion of skilled professionals, educational attainment, employment levels, age dependency ratio and the number of single-parent households. In the study area the relative deprivation index varies considerably from disadvantaged in Tallaght – Tymon (-11.30) to affluent in Templeogue – Kimmage Manor (13.92). The relative deprivation index for Dublin City Council area overall is 3.1 and for South Dublin County Council it is 0.3 in 2016.

6.3.3 Community Facilities

The community facilities nearest to the proposed main works areas include the Riverview Educate Together National School, which also has a Forestry School in Tymon Park, and the recreational buildings and facilities in Tymon Park including a Cricket Club, playground, and football pitch.

6.3.4 Public Transport

Public transport in the study area is by Dublin Bus which run along the main arterial routes. Some of the proposed works along the River for the Flood Alleviation Scheme have the potential to disrupt public transport from traffic control required for lorries to enter the proposed construction sites at the three main works areas.

6.3.5 Amenity Green Spaces and Parks

There are local amenity green spaces which can be enjoyed by the local population along the stretch of the River where construction works are planned. These green spaces are both formal and informal and can be accessed directly from residential areas by footbridges across the River. Amenity green spaces include the green space at Whitehall Park, informal riverside footpaths such as at Wainsfort Manor Crescent, footbridges such as Mt Argus, and small open spaces and parks in residential areas adjacent to the River such as at St Martin's. More substantial amenity green spaces exist in Tymon Park and Ravensdale Park.

6.3.6 Tourism and Recreation

6.3.6.1 Local Attractions

Tymon Park is the second largest park in Dublin after Phoenix Park. It is over 300 acres of parkland, forest and lakes. It services the local communities of Tallaght, Templeogue, Firhouse, and Walkinstown. The Park is included in the South Dublin County Council Tourism Strategy as a tourism initiative. It is a venue for local events and is a popular area for walkers, runners and joggers and for field sports. The Park is bisected by the M50 motorway. There is access between the two sections of the park in two pedestrian footbridges over the M50, one at Greenhills Road, the other at Templeogue Road. It has lakes, fed by the River Poddle, with a network of walking paths and a woodland with marked walking trails.

There are four main entrances which provide access by vehicles, and several entrances directly from residential areas for pedestrians. There are car parks at Tymon North Road, Greenhills Road, Limekiln Road and Willington Lane.

In July 2019, Tymon Park was awarded its first ever Green Flag, alongside being recognised as one of the country's top recreational outdoor spaces and the overall category winner for best Town Park nationwide. Over the last several years the Park has been

developed to include a fairy trail, forest walks, ponds and lakes, playing pitches, and a diverse woodland landscape and wildflower meadows to support and encourage biodiversity.

6.4 Potential Impacts

6.4.1 "Do Nothing" Scenario

If the proposed development were not to proceed, the existing river channel would remain as it is, resulting in many of the same potential impacts on human beings as have occurred previously (most recently in October 2011).

There would remain the risk of flooding of residential properties and commercial premises within the floodplain, with potential impacts on:

- public health;
- roads and transportation networks, including pedestrian access;
- wastewater and surface water collection networks;
- commerce;
- utility service networks (gas, electric and water).

If the proposed development were not to proceed, the opportunity to protect the local communities from future flooding events would be lost.

6.4.2 Health and Safety

Flooding poses a risk to human health and safety. It can cause physical injury, illness and loss of life. Deep, fast flowing or rapidly rising flood waters can be particularly dangerous, especially if the floodwater is carrying debris. The most significant danger in rapid rise of floods is drowning or physical injury due to being trapped or swept away by floods.

There is a long history of flooding of the River Poddle. The most recent severe event was in October 2011 which resulted in the death of a woman who became trapped in her basement flat in Harold's Cross.

Floodwater contaminated by sewage or other pollutants (*e.g.* chemicals stored in garages or commercial properties) can potentially cause illness, either directly as a result of contact with the polluted floodwater or indirectly as a result of sediments left behind. Floodwater may hide other hazards for wading pedestrians, such as manhole openings where the covers have been lifted by flood flows.

The impact on people and communities as a result of the stress and trauma of being flooded or even of being under the threat of flooding can be immense. Long-term impacts can arise from chronic illnesses and the stress associated with being flooded. Vulnerable people such as the elderly, disabled or those with a chronic illness are less able to cope with floods than others. Some may lack the financial means to recover and maintain acceptable living conditions after a flood.

6.4.3 Land Uses

The Scheme is based on detailed surveys and modelling that has determined with a high degree of precision where flood protection measures are required. Thus, all elements of the proposals are essential to the effective operation of the Scheme. While the proposals

will introduce significant and permanent changes to the local landscape, there are no new land uses proposed. The Scheme makes the best use of available green infrastructure and open spaces in this highly urbanised area of Dublin to provide flood protection to in excess of 1,000 homes and businesses currently at risk of flooding. It is anticipated that the parks and green spaces will retain their function as amenities for the local population, and for biodiversity, once the Scheme is completed and all mitigation and enhancements recommended in this EIAR are implemented.

6.4.4 Population

The surrounding area is densely populated. It comprises two elements, the resident population and workers in the offices, commercial and industrial premises nearby. In general, both groups occupy the area at different times. The proposal will impact both groups in different ways.

In relation to broader impacts on the receiving population, it is noted that the potential for effects on human health are dealt with in this EIAR under the more specific topics of the environmental subject areas by which they might be caused including **Chapter 12 Noise and Vibration** and **Chapter 13 Air Quality and Climate**, and Chapter 14 Traffic and Transport.

Once the proposed development is operational, there will be a positive impact for the immediate surrounding population and the catchment population through flood prevention.

6.4.5 Tourism, Recreation and Amenity

The proposals will have a short-term negative impact on access to and enjoyment of the river and waterbodies in Tymon Park and at Ravensdale Park. Elsewhere there are footpaths along the River at various sections. Access along these footpaths will be restricted during the construction stage.

The main impacts of the Scheme on the local population will be during the construction phase where there will inevitably be disruption to users of the parks and green spaces where works are proposed. All effort has been made to maintain access to the parks and green spaces and minimise community severance when planning the Scheme.

In some cases, as with Ravensdale Park, construction of the Scheme will require full closure of the Park, for the duration of the works, in the interests of health and safety. All entrances to the Park from Ravensdale Drive, Ravensdale Park, Kimmage Road, and via the footbridge at the green space from Kimmage Road West will be closed.

In Tymon Park the closure of footpaths is necessary in the interests of health and safety in the areas where the temporary compound, the embankments and the ICW are to be constructed. Access through the eastern and southern part of the Park will be maintained throughout to ensure that there is no severance for the local community to access the Park for leisure and recreation or travelling to and from school.

SDCC and DCC have engaged with local residents and Tymon Park user groups who will be affected by the Scheme, by disruption and disturbance, and have notified them by letter of the proposed works. Advance notice will be given to the receiving communities through regular updates on the project website <u>www.poddlefas.ie</u> and through the use of signage at entry points to parks and green spaces as the construction progresses.

The landscape changes and visual effects brought about by the Scheme are addressed in **Chapter 10 Landscape and Visual** of the EIAR. The landscape changes will be significant

during the construction phase of the Scheme with the loss of trees, woodlands and bankside vegetation in the main works areas. The greatest landscape change will be in Tymon Park, especially with the main flood storage embankment and ICW. The landscape mitigation and tree planting plans propose the replanting of trees and woodland, reinstatement of habitats, and enhancement of the public realm in the main works areas. Through time, these changes will become part of the local landscape, and barely perceived by the local community.

The introduction of flood walls through the centre of Ravensdale Park is also a significant change which, once completed, could have a positive impact on the local community by providing amenity in seating areas encouraging people to make greater use of the Park.

The impacts on the population and human health as outline above will mainly arise in the construction stage. Any impacts experienced by the local population by community severance, traffic disruption, noise and vibration, and dust will be temporary in duration over 24 months in total.

Overall the positive benefits of the flood alleviation scheme to provide protection in the case of a 1 in 100 year storm event to 921 properties in the Poddle catchment should outweigh any negative impacts, especially during the construction phase.

6.4.6 Health and Safety

The aim of the Flood Alleviation Scheme is to reduce the risk to properties and human beings along the River, as far as possible and to as many as possible so that the long-term health and safety of those who live along the River can be secured.

Construction sites, with movement of machinery and storage of materials, pose a potential health and safety hazard to workers and members of the public if site rules are not properly implemented.

Construction of the proposed development will require ground works at Tymon Park and the establishment of a contractor's compound. Measures will be put in place during the construction stage to divert pedestrian access, especially at local parks and footpaths along the River.

Other sites for the proposed works are multiple and at various points along the river. These will be accessed by small teams of workers who will park equipment and trailers on the public roads nearby. Some works will require entry on to private property.

6.5 Mitigation Measures

The mitigation measures proposed in the section below relate to the construction and operational period of the proposed development. Such measures relate only to the avoidance, reduction or remedy of impacts, which affect human beings in particular those which relate to the local population and human health in relation to Noise and Vibration, Air Quality, and Landscape character and Visual amenity, and traffic and transport.

Reference should also be made to **Chapter 17** for a summary of all mitigation measures and residual impacts.

6.5.1 Construction Phase

Impacts associated with construction – such as noise, dust, the passage of heavy works vehicles *etc.*, will be short-term effects that will end once the project is operational. The

appropriate management of construction activities and traffic will mitigate against significant impacts, as set out in various sections of this EIAR.

A scheme specific Construction Environmental Management Plan for the development will be prepared prior to construction by the successful Contractor and will identify a variety of measures that will be incorporated to mitigate against nuisance including provisions in relation to traffic, vermin, noise and dust on the site.

Techniques to minimise the generation of dust before during and after the works and to protect receptors from dust and noise during construction and construction traffic have been dealt with in **Chapter 12 Noise and Vibration** and **Chapter 13 Air Quality and Climate.**

6.5.2 Operational Phase

The plans for the scheme incorporate landscaping and public realm proposals at Tymon Park and Ravensdale Park to ensure public access and enjoyment of the river and parks is enhanced as a result of the proposed development. The proposals provide additional benefits, over and above flood protection, including public access and public realm, biodiversity and water quality. Thus, the operational phase will bring long-term positive impacts that will outweigh the short-term impacts during the construction phase, and the changes in the local environment necessitated by the flood protection works.

The operation of the Scheme will be in-line with the measures set out in this EIAR. A range of strategies will address operating conditions on the sites and deal with particular activities including maintaining landscaping to less visual impact, on-site environmental conditions such as noise, odour monitoring *etc.* Traffic accessing the site will be low intensity and will be managed by appropriate design measures. The current employment levels will remain the same once the development is operational.

There are no other anticipated significant impacts on human beings that require the incorporation of mitigation measures.

6.6 Residual Impacts

There will be indirect positive residual impacts on patterns of employment and economic development resulting from the construction phase of the development. In addition, there will be longer-term, strategic impacts arising from the operation and existence of the Scheme where once completed, the infrastructure that is in place will provide flood protection to vulnerable properties and the population in SDCC and DCC areas. It can be stated that these impacts to the local population will be positive due to the nature of the proposed development.

Whilst there will be some residual impacts from the pluvial flooding which will remain, affecting some 200 properties, overall the positive benefits of the flood alleviation scheme to provide protection in the case of a 1 in 100 year storm event to 921 properties in the Poddle catchment should outweigh any negative impacts, especially during the construction phase.

7 **BIODIVERSITY**

7.1 Introduction

7.1.1 Assessment Brief

The aim of this Ecological Impact Assessment (EcIA) is to identify, quantify and evaluate the impacts of the proposed development on ecosystems and their components, including designated sites, habitats, flora and fauna. It has been prepared in accordance with the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (2018), which is the primary resource used by members of the Chartered Institute of Ecology and Environmental Management (CIEEM).

The purpose of this document is to:

- Provide an objective and transparent assessment of the potential ecological impacts of the proposed development for all interested parties, including planning authorities and the general public
- Facilitate objective and transparent determination of the consequences of the development in terms of national, regional and local policies relevant to ecology
- Propose the steps will be taken to adhere to legal requirements relating to designated sites and legally protected species (CIEEM, 2018).

Although the above guidelines provide a scientifically rigorous framework for EcIA, some processes also rely on the professional judgment of an ecologist, including survey design, the valuation of ecological features, and the characterisation of impacts. An outline of the author's experience, training and accreditation is provided in the following section, which support his competency to make such judgements.

7.1.2 Statement of Authority

All surveying and reporting was carried out by Nick Marchant, the principal ecologist of NM Ecology Ltd. He has an MSc in Ecosystem Conservation and Landscape Management from NUI Galway and a BSc in Environmental Science from Queens University Belfast. He is a member of CIEEM and operates in accordance with their code of professional conduct.

Nick has twelve years of professional experience, including nine years as an ecological consultant, one year as a local authority biodiversity officer, and two years managing an NGO in Indonesia. He provides ecological assessments for developments throughout Ireland and Northern Ireland, including wind farms, infrastructural projects (water pipelines, greenways, *etc.*), and a range of residential and commercial developments.

7.1.3 Preliminary Scoping of Potential Impacts

The proposed development will comprise of raised earthen flood embankments, integrated constructed wetland, channel realignment and regrading, improvements to the surface water drainage system and ancillary and temporary works.

These proposed works could potentially affect a range of ecological features, as follows:

• Vegetation will need to be cleared from the development footprint and along access routes. This will directly affect habitats and flora in affected areas, either on a temporary or permanent basis;

- The removal of vegetation on river banks may have direct impacts on terrestrial fauna, or may damage / disturb their breeding or resting places, *e.g.* bird nests or bat roosts;
- The construction of embankments and retaining walls may affect fauna that live underground, *e.g.* badger setts or kingfisher nesting-burrows;
- In-stream works could cause direct impacts on fish and aquatic fauna; and
- Pollutants from the construction site (*e.g.* suspended sediments, cement products, hydrocarbons) could be washed into the river by surface water runoff and could cause pollution of the river and downstream protected areas.

This preliminary scoping exercise was used to determine an appropriate surveying strategy for the site. An updated scoping exercise is provided in **Section 7.4.4** *Identification of important ecological receptors*, which is based on the species present within the zone of influence, their ecological value, and their susceptibility to impacts.

7.1.4 Consultation and Engagement

Copies of all consultation responses in the EIA scoping are provided in **EIAR Volume 4**, **Appendix 3-2**. A summary of the responses received from the consultations and stakeholder engagement relevant to ecological issues is provided below.

7.1.4.1 SDCC Heritage Officer

An informal meeting was held between the South Dublin County Council Heritage Officer and a project engineer in February 2019 regarding the scoping of the project, and some notes were forwarded to the ecologist for review. Reference was made to the following ecological receptors:

- Brent Geese in Tymon Park;
- Flowering Rush on the stretch between the lakes and Wellington Rd;
- Nesting waterfowl at the Tymon Lakes;
- Otters, particularly near Limekiln Rd;
- Habitat surveys; and
- Bat surveys.

Potential impacts on these receptors have been addressed in this chapter.

Additional comments were received from the SDCC Heritage Officer and Parks department in July 2019 regarding the timing of habitat surveys, the protection of wildflower meadows, the retention of trees, and the suitability of trees for roosting bats. These comments have also been addressed in this chapter.

7.1.4.2 Inland Fisheries Ireland

Informal consultation by telephone was held with a Fisheries Environmental Officer of Inland Fisheries Ireland (IFI) in October 2018. The representative indicated that the River Poddle has limited fisheries value, with no recent records of salmonids or other fish listed on Annex II of the Habitats Directive. Common species such as three-spined stickleback may be present, but no larger fisheries are known to occur. The reason for its impoverished fish communities is likely to be the extensive culverting and re-alignment of the river through Dublin City, which has made the lower sections of the river impassable to migratory fish. No significant concerns were raised about the development, but it was indicated that best-practice pollution-prevention measures would be required.

A consultation meeting was held with the Fisheries Environmental Officer on 25th March 2019. It was confirmed that the Poddle is not a salmonid river, and subsequently that detailed aquatic surveys would not be required for the Environmental Impact Assessment.

7.1.5 Development Proposals

The proposed development consists of flood alleviation works along and adjacent to the River Poddle on sites totalling 12 ha with further works to rehabilitate or replace manholes, along with associated ancillary and temporary works.

7.1.5.1 Construction

The proposed works extend from the upper reaches of the River Poddle at Tymon North in Tallaght to Saint Teresa's Gardens in Merchant's Quay, Dublin. A detailed description of the proposed works is contained in **Chapter 5** and illustrated in **EIAR Volume 3**. A brief description is summarised as follows:

- a) Construction of flood defence embankments in Tymon North and Tymon Park, Tallaght;
- b) Demolition of the existing flow control structure and footbridge and construction of a flood storage defence spillway with passive flow control structure and replacement footbridge at Tymon Lake in Tymon Park, Tallaght;
- c) Construction of an integrated constructed wetland in Tymon Park, Tallaght;
- d) Channel re-alignment and embankments, and flood defence walls on both banks of the River adjacent to the Lakelands Overflow at an open space located at Whitehall Park, east of Templeville Road, Kimmage and Perrystown;
- e) Construction of a flood defence wall on the left bank of the River, at the rear of properties on Whitehall Road and Glendale Park, Terenure;
- f) Demolition of existing walls and construction of new flood defence walls on the right bank of the River at the rear of properties on Fortfield Road south of Kimmage Crossroads, Kimmage;
- g) Construction of flood defence walls and demolition and replacement of footbridge at Ravensdale Park, Kimmage;
- h) Construction of a flood defence wall on the right bank of the River at the end of St. Martin's Drive, Kimmage;
- i) Construction of a flood defence wall on the right bank of the River at Mount Argus Close, Harold's Cross; and
- j) Rehabilitating or replacing manholes in the public roads in Poddle Park, Crumlin and in the vicinity of Saint Teresa's Gardens and Donore Road, and at the rear of the National Stadium, South Circular Road, Merchant's Quay.
- k) Proposed ancillary works and associated development includes drainage channel clearance and removal of trees where required for the works; rehabilitating or installing culvert screens in locations as required; installing flap valves in all culverts draining to the River; biodiversity enhancements including installation of floating

nesting platforms in Tymon Lake, Tymon Park, Tallaght; and landscape mitigation and restoration at Tymon Park, Tallaght, Whitehall Park, Terenure, and Ravensdale Park and St. Martin's Drive, Kimmage which include public realm improvements, biodiversity enhancements and tree planting and landscaping.

I) Temporary works include establishing a main construction compound in Tymon Park with access off Limekiln Road, Tallaght which will be in operation for the entire duration of the works; and temporary works / set down areas at Wainsfort Manor Crescent, Terenure and Ravensdale Park and St. Martin's Drive, Kimmage which will be in use for the duration of the works to be carried out in these locations. Other temporary works include stockpiling of excavated earth in designated areas of Tymon Park, Tallaght; temporary channel crossings at Tymon North and Tymon Park, Tallaght; and channel diversions at Tymon Park, Tallaght and Whitehall Park, Terenure to enable the works along the River channel to be carried out.

7.1.5.2 Potential In-Combination Effects

The proposed working area is in an urban / suburban setting in the south-west of Dublin City. It passes through several zones of the South Dublin County Development Plan 2016 - 2022 and the Dublin City Development Plan 2016 - 2022, including areas zoned for industrial, residential and recreational uses. The catchment is fully urbanised, and given the demand for housing in Dublin, the main pressures are from intensification of urban development through infill or redevelopment of sites.

Live and recently approved planning applications in the vicinity of the River Poddle were reviewed on the online planning registers of South Dublin County Council (SDCC) and Dublin City Council (DCC). The following applications were considered to be relevant to the proposed development:

- A Part VIII Application was made in 2016 for the construction of a new library beside Castletymon Road (planning reference SD168/0003) adjacent to the River Poddle. An Appropriate Assessment screening report was included in the documentation, and it was concluded that there was no risk of likely significant impacts on any European sites. Construction of this project commenced in January 2019 and is expected to be completed in January 2020, prior to the commencement of the proposed development;
- Permission was granted in 2019 to Scoil Aonghusa Senior National School for a single storey temporary prefab classroom adjacent to the southeast boundary of the site and associated site works (SD19A/0289). These works will be relatively small in scale;
- A large residential development has been under construction for several years in the grounds of Mount Argus church on Kimmage Road Lower, and may continue in 2020. It is in close proximity to the River Poddle;
- There is a current planning application for demolition of an office building and development of a 12 no. units apartment building at a site located at Unit 1, KCR Estate in Ravensdale Park (3193/19);
- There is a site on the Vacant Sites Register of Dublin City Council in close proximity to the River Poddle located at the side of Riverpark House, in Poddle Park, Kimmage (VS-0751). Being on the Vacant Sites Register, this site is likely to be brought

forward for residential development. There are no sites in proximity to the River Poddle on the Vacant Site Register of South Dublin County Council; and

• An application for 7 no. houses was submitted at the Terenure Badminton Club on Whitehall Rd. in 2018 (planning reference SD18A/0360) but was 'deemed withdrawn' by SDCC following the expiration of a request for further information.

It is noted that all of these developments are outside the proposed working areas of the River Poddle Flood Alleviation Scheme, but if multiple sites were constructed concurrently, it is possible that they could lead to cumulative impacts on water quality in the River Poddle, and thus on downstream European sites. This is addressed in greater detail in the Natura Impact Statement that accompanies this application.

All other planning applications in the surrounding area were for small-scale works such as residential extensions. There is no risk that any of these minor developments would cause in-combination impacts with the proposed development.

7.2 Methodology

7.2.1 Overall Approach

The objective of this assessment was to identify any ecological features that would pose a constraint to the proposed development. It involved the following steps:

- Identification of designated sites within an appropriate zone of influence;
- Review of existing biological records on online databases (*e.g.* the National Biodiversity Data Centre);
- Walkover surveys incorporating the following elements:
 - Classification and mapping of habitats;
 - Surveys for rare or protected flora, and for any problematic non-native plant species (*e.g.* Japanese Knotweed);
 - Surveys for field signs of rare or protected fauna (*e.g.* badgers), and habitat suitability assessments for species that are shy, nocturnal or seasonal;
- Valuation of ecological features, review of legal considerations, and selection of important ecological features; and
- Assessment of impacts on important ecological features and development of appropriate mitigation strategies.

7.2.2 Data Collection and Walkover Survey

A desk-based scoping study was carried out using data from the following sources:

- Plans and specifications for the proposed development;
- Winter Habitat Study of Tymon and Bancroft Parks (a confidential report by Roughan & O'Donovan Consulting Engineers, 2018) (contained in EIAR Volume 4, Appendix 7-1);
- Mammal, Bird and Botanical surveys relating to the Poddle River Flood Alleviation Measures within the boundary of Dublin City Council (Malgorzata Goska Wilkowska and Brian Keeley, 2018) (contained in EIAR Volume 4, Appendix 7-2);

- Bedrock, soil, subsoil, ground water and surface water maps from the Geological Survey of Ireland web mapping service (<u>www.gsi.ie/mapping.htm</u>), and the Environmental Protection Agency web viewer (http://gis.epa.ie/EPAmaps/);
- Maps and details of designated sites from <u>www.npws.ie;</u>
- Biological records from the National Biodiversity Data Centre online mapping service, and from the National Parks and Wildlife Service internal database.

The following resources were used for the walkover surveys:

- Habitat surveys were carried out in accordance with the *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al 2011), and using the classification system of *A Guide to the Habitats of Ireland* (Fossitt 2000);
- Flora were identified using *An Irish Flora* (Parnell & Curtis, 2012) and *The Vegetation Key to the British Flora* (Poland & Clement 2009). Nomenclature follows the plant crib of the Botanical Society of the British Isles (BSBI 2007). The abundance and extent of species is described using the DAFOR scale (Dominant, Abundant, Frequent, Occasional, Rare);
- Fauna surveys and habitat suitability assessments followed the methods outlined in the *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA 2006), with reference to other guidelines where required.

The study area for this assessment consisted of all land within the footprint of the proposed development, with a buffer zone of up to 20m in relevant areas. All desktop and field data was collected between January 2018 and August 2019.

Type of survey	Surveyors	Dates	
Habitats, flora and invasive species	Roughan O'Donovan (Tymon and Bancroft Parks)	Jan - Apr 2018	
	Malgorzata Wilkowska (Dublin City Council lands)	August / September 2018	
	NM Ecology (full scheme)	September 2018, March, May and August 2019	
Winter birds	Roughan O'Donovan (Tymon and Bancroft Parks)	Weekly from Jan to mid-Apr 2018 (14 surveys)	
	NM Ecology (Tymon Park)	March 2019	
Badgers, otters, and other	Roughan O'Donovan (Tymon and Bancroft Parks)	Jan - Apr 2018	
terrestrial fauna	Brian Keeley (Dublin City Council lands)	September 2018	
	NM Ecology (full scheme)	September 2018, March, May and August 2019	
Bats	Brian Keeley (DCC lands)	September 2018	
	NM Ecology (Dublin City Council lands)	August 2019	

Table 7-1: Overview of fieldwork personnel and dates

7.2.3 Bat surveying techniques

Bat surveys for the Dublin City Council lands (i.e. works areas between Mount Argus Close and Ravensdale Park) were carried out by Brian Keeley in 2018. All methods and results for Brian Keeley's surveys are presented in **EIAR Volume 4, Appendix 7-2**. Separate surveys were carried out in South Dublin County Council lands (all areas between Fortfield Road and Tymon Park) by NM Ecology Ltd. in 2019. Preliminary ecological appraisals of potential roost features were also undertaken by NM Ecology Ltd throughout the scheme. Methods for NM Ecology's surveys are outlined below.

Survey methods were developed with reference to *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Bat Conservation Trust, 3rd edition, 2016). Preliminary ground-level roost assessments were carried out for all mature trees and built structures (buildings and bridges) to assess their suitability for roosting bats, using the methods in Section 6.2 of the BCT Guidelines. No potential bat roosts were found within the site boundary, so emergence / re-entry surveys were not considered necessary.

A transect survey of the SDCC lands was carried out in August 2019. It involved a continuous walk at a slow pace through the works area, recording bats using a handheld detector (an Anabat Walkabout detector, Titley Scientific Inc). August is during the peak season of bat activity, and coincides with the maternity period, i.e. the birth and raising of offspring. Weather conditions at the time of survey were ideal for bats, with warm temperatures and no wind or rain.

7.2.4 Valuation of Ecological Features

Based on the information collected during the desktop and walkover surveys, the ecologist assigns an ecological value to each feature based on its conservation status at different geographical scales (**Table 7-2**). For example, a site may be of national ecological value for a given species if it supports a significant proportion (*e.g.* 5%) of the total national population of that species.

Ecological value	Geographical scale of importance
International	International or European scale
National	The Republic of Ireland or the island of Ireland
Regional	Leinster, and/or the east coast of Ireland
County	County Dublin
Local	Suburban / rural areas between Tallaght and Harold's Cross
Negligible	None, the feature is common and widespread

It is accepted that any development will have an impact on the receiving environment, but the significance of the impact will depend on the value of the ecological features that would be affected. The following is outlined in the CIEEM guidelines: "one of the key challenges in an EcIA is to decide which ecological features (habitats, species, ecosystems and their functions/processes) are important and should be subject to detailed assessment. Such ecological features will be those that are considered to be important and potentially affected by the project. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to impacts from the development, and that will remain viable and sustainable."

For the purposes of this chapter we have only assessed impacts on ecological features that are of local value or higher (refer to **Table 7-2**) or those that receive legal protection. These features are termed 'important ecological features' and are listed in **Section 7.4.4**. Impacts on features of negligible ecological value (*e.g.* amenity grasslands) are not considered to be significant, so they are not included in the impact assessment.

7.2.5 Ecological Impact Assessment

Potential direct, indirect or cumulative impacts on ecological features can be described in relation to their magnitude, extent, duration, reversibility and timing/frequency, as outlined in the CIEEM (2019) guidelines. Depending on the type of impact and the sensitivities of the important ecological feature, the ecologist may determine that the impact would have a 'significant effect'. The following definitions are provided in the CIEEM guidelines: "A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project". "For the purpose of EcIA, a 'significant negative effect' is an effect that undermines biodiversity conservation objectives for 'important ecological features', or for biodiversity in general." Reference is also made to the Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) of the Environmental Protection Agency regarding the significance of impacts. Where significant impacts are identified, measures will be taken to avoid, minimise, reinstate or provide replacement habitat (where possible). Based on these measures, the impact assessment will be repeated, and any residual impacts of the proposed development will be discussed.

7.3 Existing Environment

7.3.1 Environmental Setting

The River Poddle is a highly-modified urban watercourse that arises in Cookstown/Tallaght and flows in a north-easterly direction through Dublin city to meet the River Liffey at Wellington Quay. The proposed working area covers a section of the watercourse between Tymon North in Tallaght and Saint Teresa's Gardens in Merchant's Quay, Dublin.

The underlying bedrock is dark limestone and shale of the Calp formation, which is a locally-important aquifer (moderately productive in local zones). Subsoils are limestone till and localised pockets of limestone gravels, while soils are gravels and alluvium along the original course, with made ground and brown earths along re-aligned sections.

7.3.1.1 Description of the River Poddle

The river was part of the original settlement of Dublin city in the 9th century, forming the Dubh Linn (dark lake) after which it is named. However, as the city expanded the river was modified extensively, including culverting under roads and residential areas, and realignment along property boundaries. The most significant change was the enclosure of the lower section of the river under Dublin city centre, comprising approximately 2 - 2.5km of continuous culvert between Harold's Cross and Wellington Quay. Five other sections of the river have been culverted under residential developments, each of between 100 and 500 m length. The most extensive re-alignments were at the source of the river in Tallaght,

where it was re-routed along property boundaries in an industrial estate, and in Tymon Park, where it was widened to form a series of ponds / lakes.

The extensive modification of the river has significantly reduced its ecological value. It is understood that the river has no populations of salmonids or any other fisheries interests (*pers. comm.* Inland Fisheries Ireland), and that the culvert in the lower section of the river is impassable to any migratory species (*e.g.* Atlantic salmon or sea trout).

7.3.1.2 Water Quality

The River Poddle is not monitored under the Water Framework Directive Status Assessments 2010-2015. However, considering the extensive hydro-morphological changes to the river, it is likely that it would have a classification of 'poor' or 'bad' status under the WFD monitoring scheme.

Some water quality data obtained from South Dublin County Council is presented in the Integrated Constructed Wetland report (Vesi Environmental Ltd, 2019) that accompanies this application. The levels of both nitrates and phosphorous exceeded the limits for "Good" water status as defined in the Surface Water Regulation (S.I. 272/2009). Some water quality monitoring was carried out by the EPA at the Priory Road in Kimmage on one occasion in 2007¹, and a Q-value of 3 was recorded, which is indicative of poor water quality. In summary, water quality in the River Poddle is currently considered to be poor, due to elevated levels of nutrients, and to extensive modification of the watercourse.

Further downstream, the transitional / estuarine waters of the River Liffey are of moderate status, and coastal waters in Dublin Bay are of good status (Water Framework Directive Status Assessments 2010-2015)².

7.3.2 Designated Sites

The proposed development site is not located within or adjacent to any European sites, so there is no risk of direct impacts (*e.g.* habitat loss or fragmentation) on any sites. Potential indirect impacts on distant sites were considered within a zone of influence of 5km, and along associated watercourses (the River Poddle and River Liffey). The locations of designated sites are shown in **Figure 7-1**, and details of each site are provided in **Table 7-3**.

¹ Water sampling carried out by the EPA as part of the National Rivers Monitoring Programme (now replaced by the Water Framework Directive (WFD) Monitoring Programme). Data obtained at gis.epa.ie [accessed August 2019].

² Environmental Protection Agency, Liffey Catchment Assessment (2010 – 2015), November 2018, version no. 3. <u>https://bit.ly/2EOnYJY</u> [accessed 31/05/19].

Site Name	Distance ³	Qualifying Interests
Grand Canal pNHA (2104)	Overlap	Freshwater canal and associated semi-natural vegetation, with high biodiversity, and value as an ecological corridor.
Dodder Valley pNHA (991)	0.8 km south	The last remaining stretch of natural river bank vegetation on the River Dodder before it enters Dublin city. The site is of importance for riparian woodland and its diversity of bird species, including kingfisher and sand martins
Glenasmole Valley SAC, pNHA (1209)	4.5 km south	Annex I habitats: semi-natural dry grasslands and scrubland facies on calcareous substrates, <i>Molinia</i> meadows, petrifying springs with tufa formation (Cratoneurion) Annex II species: none
Royal Canal pNHA (2103)	3.3 km north	Freshwater canal and associated semi-natural vegetation, with high biodiversity, and value as an ecological corridor.
South Dublin Bay and River Tolka Estuary SPA (site code 4024)	10km	Habitats: coastal wetlands Special conservation interests: light-bellied brent goose, oystercatcher, ringed plover, grey plover, knot, sanderling, dunlin, bar-tailed godwit, redshank, black-headed gull, arctic tern, roseate tern, and common tern
South Dublin Bay SAC (210)	10 km	Annex I habitats: inter-tidal mudflats / sandflats (including patches of <i>Salicornia</i> and other annuals), annual vegetation of drift lines, embryonic shifting dunes Annex II species: none
North Dublin Bay SAC (206)	10 km	Annex I habitats: inter-tidal mudflats / sandflats (including patches of <i>Salicornia</i> and other annuals), <i>Spartina</i> swards, salt marshes, annual vegetation of drift lines, embryonic shifting dunes, white dunes, grey dunes, dune slacks Annex II species: petalwort <i>Petalophyllum</i> <i>ralfsii</i>
North Bull Island SPA (4006)	10 km	Habitats: coastal wetlands Special conservation interests: wintering populations of light-bellied brent goose, shelduck, teal, pintail, shoveler, oystercatcher, golden plover, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, turnstone, black-headed gull

Table 7-3: Designated sites of relevance to the proposed development site

7.3.2.1 Identification of Potential Impact Pathways

Indirect impacts on designated sites can occur if there is a viable pathway between the source (the proposed development site) and the receptor (the habitats and species for which a site has been designated). The most common pathway for impacts is surface water, for example if a pollutant is washed into a river and carried downstream into a designated site in coastal areas. Other potential pathways are groundwater, air (*e.g.* sound

³ Some of the potential pathways for impacts on European sites are *via* intervening watercourses (River Poddle and River Liffey), so distances are measured along the length of connecting waterways rather than at the nearest point.

waves or airborne dust), or land (*e.g.* flow of liquids, vibration). The zone of effect for hydrological impacts can be several kilometres, but for air and land it is rarely more than one hundred metres. The magnitude of impacts (*e.g.* the concentration of pollutants) usually decreases as the distance between source and receptor increases. An appraisal of potential pathways between the proposed development and the designated sites listed in **Table 7-3** is provided below.

The Glenasmole Valley SAC and Dodder Valley pNHA are located in a separate river catchment (the River Dodder), so surface water is not a potential pathway for indirect impacts. Both are located more than 500 m from the indicative working area, and are at higher elevations, so groundwater would not provide a viable pathway. The distances involved are also too great for impacts *via* air or land pathways. Therefore, all potential pathways to these designated sites can be screened out.

In **Figure 7-1** it appears that the River Poddle intersects with the Grand Canal pNHA to the north of Harold's Cross. However, the river is culverted in this location, and passes underneath the bed of the canal. The canal is a self-contained hydrological feature that has no interaction with surrounding surface water or ground water. Therefore, there is no hydrological connection with the proposed development, and the enclosure of the culvert prevents any pathways *via* air or land, so all potential pathways to the pNHA can be screened out.

The Royal Canal pNHA is located several kilometres to the north of the site, and has no association with the River Poddle catchment, so all potential pathways can be screened out.

There is a distant hydrological connection to four Natura 2000 sites in Dublin Bay *via* the River Poddle and River Liffey. The connection is considered to be rather tenuous, because the nearest Natura 2000 site – the *South Dublin Bay and River Tolka Estuary* SPA – is more than 10 km downstream of the proposed development site. Nonetheless, it does provide a potential hydrological pathway for impacts, and will be discussed further in **Section 7.5** of this chapter. All other potential pathways can be screened out, because the distances involved are too great for impacts *via* groundwater, air or land pathways.

Potential impacts on the Natura 2000 sites in Dublin Bay are considered in the *Natura Impact Statement* (NIS) that accompanies this application (refer to **Part 4** of the planning documentation). The NIS concludes that the proposed development will not adversely affect the integrity of any European site, either alone or in-combination with other plans or projects, once the mitigation as detailed in the NIS are implemented in full.

7.3.3 Desktop Records of Flora and Fauna

Records of flora and fauna in the vicinity of the proposed development site were obtained from the Scientific Unit of the National Parks and Wildlife Service (NPWS) *via* a data request. Records on the National Biodiversity Data Centre website were also reviewed. The former are from the NPWS' internal databases of rare and protected species, and the latter are public records from a range of verified sources (*e.g.* BSBI tetrad data for Ireland). The NPWS records were filtered for protected and priority species, and an edited list is provided in **EIAR Volume 4, Appendix 7-3**.

It is important to note that these records do not provide a definitive confirmation of the presence or absence of these species in the study site or the surrounding area. Most records are from national distribution atlases that are based on representative sampling

at a few randomised sites, so the true distribution of these species (and also species not included on this list) may be much higher than recorded. Conversely, the distribution of some species may have decreased since the latest record, and some may have become locally extinct. The list should be interpreted in this context.

7.4 Field Survey Results

7.4.1 Habitats and Flora

Habitats within the proposed development site were classified using *A Guide to Habitats in Ireland* (Fossitt, 2000). Descriptions of each habitat type are provided in this section, and a list of habitats within the development footprint is provided in **Section 7.5.1**, **Table 7.6**. A map of habitats in Tymon Park is provided in **Figure 7-2**; all other locations have only one or two habitat types that are easily distinguishable, so habitat maps are not considered necessary.

These habitat descriptions are based on field surveys carried out by NM Ecology Ltd. in September 2018 and August 2019, with reference to the summer habitat surveys carried out by Malgorzata Goska Wilkowska within the Dublin City Council area in early August 2018 (**EIAR Volume 4, Appendix 7-1**), and the winter habitat survey carried out by Roughan & O'Donovan Consulting Engineers in Tymon and Bancroft Parks between January and April 2018 (**EIAR Volume 4, Appendix 7-1**).

7.4.1.1 Lowland Watercourse (FW2)

The River Poddle has a relatively slow flow in most of the study area, although there are some small waterfalls and/or riffles in places. The channel is typically about 1 - 2m wide and 0.1 - 0.3m deep, although it is slightly broader and deeper towards its north-eastern end as the water volume increases. The substrate is sand and gravel, with occasional cobbles, and some patches of fine silt in slow-flowing sections. There is litter / refuse in many locations, particularly near bridges and public footpaths.

Fast-flowing sections of river channel are typically unvegetated, but there are patches of dense aquatic vegetation in slow-flowing sections during summer months, including watercress *Rorippa nasturtium-aquaticum*, Nuttall's waterweed *Elodea nuttallii*, spiked watermilfoil *Myriophyllum spicatum*, pink water-speedwell *Veronica catenata* and some patches of pondweed *Potamogeton* sp. (not accessible for identification) In Tymon Park, some sections of river support reedbeds and tall-herb swamps, which are discussed separately below.

Some patches of flowering-rush *Butomus umbellatus* are found on the edge of the river in Tymon Park; this is discussed in the 'rare flora' section below.

With the exception of flowering-rush, all other plant species in this habitat are common and widespread in Ireland. However, there are only a small number of urban watercourses in south-west Dublin city, and the river has secondary value as an ecological corridor and a habitat for fauna, so it is considered to be of Local ecological value.

7.4.1.2 Artificial Lakes and Ponds (FL8)

There are a number of artificial waterbodies in Tymon Park, which can be referred to as either ponds or lakes. These waterbodies vary in size from approximately 0.2ha to 1.8ha in surface area and appear to be more than 1m deep in places. The three ponds in Tymon Park are linked, but the eastern pond (which will be used for flood storage) is approximately 1 - 1.5m lower in elevation than the two westerly ponds.

The water in all ponds was quite opaque, and rafts of algae were observed in some places, indicating that the waters are eutrophic. Litter / refuse was observed in some of the ponds. Some submerged aquatic vegetation was observed (*e.g.* spiked water-milfoil, waterweed), but floating vegetation was not abundant. All ponds are surrounded by reedbeds and tall-herb swamps, which are discussed separately below.

Large ponds are relatively rare in Dublin City, particularly ponds with mature reedbeds and tall-herb swamps. They also have secondary value as a habitat for fauna, particularly waterfowl and bats. Therefore, the complex of lakes and associated vegetation in Tymon Park is considered to be of County ecological value.

7.4.1.3 Reed Swamps (FS1) and Tall-herb Swamps (FS2)

Although these are discrete habitats, they are described here in combination, as they frequently co-exist in close proximity. Extensive and species-rich habitats occur around the edges of the ponds / lakes in Tymon Park and their associated streams, including along the associated streams. There are also some small, localised patches of these habitats elsewhere along the River Poddle, although they do not have the same value as those in Tymon Park.

Reedbeds occur in some places around the margins of the ponds, particularly the southeastern corner of the largest pond (Tymon Lake), and the majority of the most-northerly pond. Common reed *Phragmites australis* is the dominant species, with patches of bulrush *Typha latifolia*, lesser bulrush *Typha angustifolia*, common club-rush *Schoenoplectus lacustris*, and Reed Canary-grass *Phalaris arundinacea*. Galingale *Cyperus longus* (which we consider likely to be an introduced species at this location) is locally abundant in the northern pond and associated stream. Some herbaceous species are frequent to occasional in the reedbed habitat, including great willowherb *Epilobium hirsutum*, marsh-bedstraw *Galium palustre*, marsh marigold *Caltha palustris* and brooklime *Veronica beccabunga*.

Other parts of the lake (and associated streams) have localised patches of the reeds and cyperaceous species mentioned above, but also support a range of herbaceous plants. Great willowherb and yellow iris *Iris pseudacorus* are abundant, meadowsweet *Filipendula ulmaria* and nettle *Urtica dioica* are frequent, marsh marigold and wild angelica *Angelica sylvestris* are occasional, and purple-loosestrife *Lythrum salicaria* is rare. In some places bittersweet *Solanum dulcamara* and/or patches of brambles *Rubus fruticosus* agg. are abundant. The habitat grades into dry meadow (usually the species-poor variant) on the upper banks.

There are some occasional trees around the margins of the lakes, predominantly willows (*Salix alba, S. fragilis, S. viminalis*), with some alder *Alnus glutinosa* and ash *Fraxinus excelsior*. The island in Tymon Lake supports dense scrub / immature woodland of less than 5m height, including frequent pine *Pinus* cf *nigra*, alder and horse-chestnut *Aesculus hippocastanum*, occasional willow and downy birch *Betula pubescens*, and rare pedunculate oak *Quercus robur*. Some giant-rhubarb *Gunnera tinctoria* was found at the western end of Tymon Lake; this is discussed in the 'Invasive Plant Species' section below.

Reedbeds and tall-herb swamps of this size and diversity are relatively rare in Dublin City. The habitat is species rich, and also has secondary value as a habitat for fauna. Therefore, the complex of lakes and associated vegetation in Tymon Park are considered to be of County ecological value.

7.4.1.4 Dry meadow (GS2)

This habitat refers to areas of grassland that are infrequently (or never) mowed. It can be sub-divided into two categories: species-rich grasslands that are managed for wildlife by SDCC, and species-poor areas that are unmanaged.

The species-rich habitat occurs in many of the grassland areas to the north and east of Tymon Lake. Grasses and perennial species are left to grow during the summer, and the habitat is then mowed in late summer after plants have spread seed. Of the grasses, Yorkshire-fog Holcus lanatus, false oat-grass Arrhenatherum elatius and cock's-foot Dactylis glomerata are abundant, crested dog's-tail Cynosurus cristatus common bent Agrostis capillaris, red fescue Festuca rubra and perennial rye-grass Lolium perenne are frequent, Italian rye-grass Lolium multiflorum is occasional, and common couch Elytrigia repens is rare. Among the broadleaved species, the following are frequent: ribwort plantain Plantago lanceolata, creeping buttercup Ranunculus repens, meadow buttercup Ranunculus acris, red clover Trifolium pratense, common bird's-foot-trefoil Lotus corniculatus, creeping cinquefoil Potentilla reptans. The following are occasional: common knapweed Centaurea nigra, creeping thistle Cirsium arvense, hawkweeds Hieracium spp, common ragwort Senecio jacobaea, creeping bent Agrostis stolonifera, red bartsia Odontites vernus, yellow-rattle Rhinanthus minor, common mouse-ear Cerastium fontanum, great willowherb, field horsetail Equisetum arvense and heath groundsel Senecio sylvaticus. Rare species include: broad-leaved dock Rumex obtusifolius, an unidentified orchid (probably common spotted-orchid Dactylorhiza fuchsii), hairy sedge Carex hirta, selfheal Prunella vulgaris, bush vetch Vicia sepium, and greater stitchwort Stellaria holostea. Some of the grassland on lower-lying ground near Tymon Lake (which may be subject to occasional flooding) has some species typical of wet grassland habitats, including abundant silverweed *Potentilla anserina* and frequent hard rush *Juncus inflexus*. In total this habitat has at least 9 grass species and 25 broadleaf species, which is considered to be particularly rich for a habitat of this type.

Some of the species-rich meadow has scattered trees, notably to the east of Tymon Lake. Many of the trees are relatively small, and were planted approx. 5 – 10 years ago. The most abundant species is pedunculate oak, but there are also some elms *Ulmus* sp, sweet chestnut *Castanea sativa*, small-leaved lime *Tilia cordata* and turkey oak *Quercus cerris*.

The species-poor habitat occurs in areas that are never mown, notably those along the banks of rivers and ponds, and in the grassland area at Whitehall Park. These habitats are typically dominated by false oat-grass, with local abundance of bindweed and brambles. Yorkshire-fog, cock's-foot, cleavers *Galium aparine* and nettle are frequent, while greater willowherb, common hogweed *Heracleum sphondylium*, common ragwort, bush vetch, ribwort plantain and wild angelica are occasional, and there are some small localised patches of winter heliotrope *Petasites fragrans* and butterfly-bush *Buddleja davidii*.

The species-rich variant is rare in Dublin, and typically only occurs in public parks that are managed appropriately, so we consider it to be of Local value. The species-poor variant is common and widespread in Dublin, and the habitat has little or no value for fauna, so it is considered to be of Negligible ecological value.

7.4.1.5 Amenity grassland (GA2) / Scattered trees and parkland (WD5)

Patches of amenity grassland are found in a number of public parks along the river corridor, notably Wainsfort Manor Crescent, Ravensdale Park, St. Martin's Drive and Mount Argus Close. The key difference from the dry meadows described above is that amenity grassland is mowed regularly, which prevents the establishment of broadleaf herbaceous species.

The grassland is dominated by perennial rye-grass *Lolium perenne*, with frequent daisy *Bellis perennis*, dandelion *Taraxacum officinale* ag., creeping buttercup *Ranunculus repens*, common bent *Agrostis capillaris* and annual meadow-grass *Poa annua*. All vegetation is kept at a low height by regular mowing during summer months.

These habitats often have some occasional planted trees, so they can also be classified as 'scattered trees and parkland'. This is particularly notable in Ravensdale Park, but also occurs to a lesser extent in other locations. Tree species include ornamental cherries *Prunus* spp., maples (*Acer pseudoplatanus, A. platanoides, A. campestre*), small-leaved lime, silver birch *Betula pendula* and copper beech *Fagus sylvatica* '*purpurea*'.

All of these plant species are common and widespread in Ireland, and mowed grassland has little or no value for fauna, so the amenity grassland is considered to be of Negligible ecological value. Trees may be of Local value where they adjoin woodland or riparian habitats, but isolated trees are usually of Negligible value.

7.4.1.6 Mixed broadleaved woodland (WD1)

Patches of broadleaf woodland are found at a number of locations along the river corridor, particularly in parks and public areas. These woodlands all appear to have been planted, and to have been managed, so they are described here as 'modified' woodland rather than as semi-natural habitat. However, many areas have had little or no management for a sustained period of time, and now have a relatively natural character. The woodlands in Tymon Park are particularly diverse, although the trees are immature or semi-mature, and were planted approx. 10 – 20 years ago.

The most abundant species are sycamore *Acer pseudoplatanus* and ash *Fraxinus excelsior*. Other species include beech *Fagus sylvatica*, poplars (*Populus nigra*, *P. alba*, *P. tremula*) willows (*Salix alba*, *S. fragilis*, *S. cinerea*, *S. alba chrysocoma*), pedunculate oak, silver birch, downy birch *Betula pubescens*, alder, lime *Tilia* sp., horse-chestnut, European Larch *Larix decidua* and elm *Ulmus sp*. The shrub layer is often quite sparse, but some areas have occasional elder *Sambucus nigra*, hawthorn *Crataegus monogyna*, holly *Ilex aquifolium*, hazel *Corylus avellana*, cherry laurel *Prunus laurocerasus* and snowberry *Symphoricarpos albus*. The ground layer often supports abundant ivy *Hedera hibernica*, brambles *Rubus fruticosus* ag and nettles *Urtica dioica*. Woodland ground-flora is abundant in places, including alexanders *Smyrnium olusatrum*, lesser celandine *Ficaria verna*, pendulous sedge *Carex pendula*, and occasional hairy-brome *Bromopsis ramosa*, wood avens *Geum urbanum*, common hogweed, cleavers and cow parsley *Anthriscus sylvestris*. Common figwort *Scrophularia nodosa* and water figwort *Scrophularia auriculata* are found in isolated patches along the river bank.

All species within the habitat are common and widespread in Ireland. It is also noted that the habitat is somewhat fragmented along the banks of the River Poddle, often separated by large patches of grassland habitat. However, broadleaf woodlands are relatively uncommon in urban areas, particularly when associated with watercourses. They also have secondary value as an ecological corridor, and as habitat for a range of fauna. For these reasons, the woodland is considered to be of Local ecological value.

7.4.1.7 Wet willow-alder-ash woodland (WN6)

Some of the ponds in Tymon Park are surrounded by willows *Salix* spp and alder *Alnus glutinosa*, and thus are considered to be semi-natural 'wet willow-alder-ash woodland'. These areas grade into mixed broadleaved woodland away from the water's edge, and much of the ground flora is the same. This habitat is also considered to be of Local ecological value.

7.4.1.8 Treeline (WL2)

In some places the mixed broadleaved woodland is restricted to a linear strip of planted trees – particularly of beech, aspen *Populus tremula* and other poplars *Populus* spp – so it is more accurate to describe them as treelines. All other aspects of the habitat are as described above for mixed broadleaved woodland, and the habitat is also considered to be of Local ecological value.

The ESB compound in Tymon Park (refer to **Drawing No. 08133** of the planning drawings) is surrounded on all sides by lines of dense cypress trees *Cupressus leylandii*. These non-native conifers are considered to be of negligible value for habitats and flora, although it is noted that they may have secondary value for fauna such as nesting birds.

7.4.1.9 Hedgerow (WL1)

Some short sections of hedgerow are found in Tymon Park, including along the bank of the river to the south-west of Tymon Lake. The most abundant species are hawthorn, blackthorn *Prunus spinosa* and hazel, while dog-rose *Rosa canina* is frequent, and ash, wych elm, rowan *Sorbus aucuparia* and spindle *Euonymus europaeus* are occasional. One short section of hedgerow at the western end of Whitehall Park consists entirely of immature sycamore trees. Most hedgerows are square in profile and appear to be cut on an annual basis. These habitats consist of common and widespread species, but they have secondary value as ecological corridors and habitat for a range of fauna, so they are considered to be of at least Local ecological value.

Elsewhere, sections of hedgerow have been planted as screening along the boundaries of residential properties. They typically consist of a single species of non-native shrub such as cherry laurel or *Griselenia littoralis*, and the ground flora is very limited. All non-native hedgerows are considered to be of negligible value for habitats and flora, although they may have secondary value for fauna such as nesting birds.

7.4.1.10 Recolonising bare ground (ED3)

This habitat occurs at one location – Fortfield Road – at which ruderal vegetation has partially colonised a former track used for the maintenance of the river. It occurs underneath a treeline and adjacent to scrub and species-poor dry meadow, and shares many of the plant species described in other habitats above. However, a number of other ruderal species were recorded, including frequent wood avens, Herb-Robert *Geranium robertianum*, lesser trefoil *Trifolium dubium*, cow parsley and yarrow *Achillea millefolium*, and occasional greater plantain *Plantago major*, traveller's-joy *Clematis vitalba*, tutsan *Hypericum androsaemum*, creeping cinquefoil, dandelion, bittersweet, Canadian fleabane *Conyza canadensis*, nipplewort *Lapsana communis*. Rare species include broad-leaved

helleborine *Epipactis helleborine*, meadow vetchling *Lathyrus pratensis*, fern-grass *Catapodium rigidum*, wood millet *Milium effusum* and feverfew *Tanacetum parthenium*.

The habitat consists of a range of common ruderal species, and is considered to be of Negligible ecological value. However, one rare plant species – broad-leaved helleborine – is of Local value, and is discussed in greater detail under 'Rare or Protected Flora' below.

7.4.1.11 Scrub (WS1)

In many places the banks of the river are lined by dense linear strips of overgrown scrub, particularly in areas that are not accessible to the public. It is typically dominated by bramble, with other shrubs including snowberry, dog-rose, hawthorn, garden exotics, and tree saplings. There are some occasional emergent trees, notably ash and sycamore, and smaller numbers of willows and alder. The ground layer includes nettles, bindweed *Calystegia sepium*, winter heliotrope *Petasites fragrans*, horsetails *Equisetum* spp, great willowherb, false oat-grass *Arrhenatherum elatius*, cock's-foot *Dactylis glomerata*, hogweed *Heracleum sphondylium* and broad-leaved dock *Rumex obtusifolius*.

All of these plant species are common and widespread in Ireland. However, as part of the longer riparian corridor associated with the River Poddle, the habitat has secondary value for ecological connectivity, and for a range of fauna. For these reasons, all scrub is considered to be of local ecological value.

7.4.1.12 Rare or Protected Flora

No protected or red-listed plant species were encountered during field surveys, including any of the species listed in **EIAR Volume 4, Appendix 7-3**. However, three species were recorded that are relatively rare within Dublin city, and they are described below.

Flowering rush *Butomus umbellatus* is found within the river channel near Tymon Lake, particularly in the section downstream of Tymon Lake. This species does not receive any legal protection in Ireland and is not included on the red list of flowering plants (Wyse-Jackson *et al.* 2016). However, it is rare in Dublin city, as it is only found along the River Liffey valley, in Tymon Park, and in the campus of University College Dublin (based on online mapping from the BSBI and NBDC⁴).

Galingale *Cyperus longus* is also found around Tymon Lake, particularly in the northern pond and stream. This species is not listed in *An Irish Flora* (Parnell & Curtis, 2012) nor in the Irish Red List for Vascular Plants. In *Grasses, Sedges, Rushes and Ferns of the British Isles and North-western Europe* (Rose 1989), its distribution is described as "*Br Isles: England, Kent to Cornall, and S Wales only. Eur: W to SW France; very local and rare.*" On this basis, and following a review of records on the BSBI and NBDC databases, the ponds in Tymon Park appear to be the only record of this species on the island of Ireland. Considering that the ponds in Tymon Park were only created in the 1980s / 1990s, the presence of galingale at this location is likely to be a recent introduction, either planted as part of the landscaping of the park, or introduced accidentally in imported materials. Nonetheless, as a rare species, and the only national record, it is considered to be of botanical importance.

A small patch (four stems) of broad-leaved helleborine *Epipactis helleborine* was found in a patch of recolonising bare ground near Fortfield Road. Similarly, this species is not

⁴ Online records of the Botanical Society of the British Isles [available at <u>https://bsbi.org/maps</u>], and the National Biodiversity Data Centre [https://maps.biodiversityireland.ie/Map]
protected or red-listed, but it is rare in Dublin City, restricted primarily to the River Dodder valley, with some scattered records near Sandyford.

All of these species are considered to be of Local ecological value. In the interests of clarity, it is noted that none of these species is legally protected, nor are listed as endangered on the Irish Red List for Vascular Plants.

7.4.1.13 Invasive Plant Species

Three invasive plant species listed on the third schedule of the *European Communities* (*Birds and Natural Habitats*) *Regulations* 2011 (SI 477/2011, as amended) were recorded in the study area: giant-rhubarb *Gunnera tinctoria*, Japanese Knotweed *Fallopia japonica* and Nuttall's waterweed *Elodea nuttallii*.

Three patches of giant-rhubarb were found in the west of Tymon Lake (the largest of the three ponds) in September 2018, near the inflows from the other two ponds. When the site was revisited in August 2019, the plants had been removed, although some immature remnant growth was observed in the former locations, possibly from fragments of rhizome left after removal. Although giant-rhubarb is listed as a legally-restricted invasive plant, there is no sign that they have spread around Tymon Lake. This is expected, because giant-rhubarb is only invasive on the western coast of Ireland (particularly Mayo, Galway and Kerry), and it is rarely problematic in other parts of Ireland. Therefore, the plants are not considered to be invasive in Tymon Park, although the legal restrictions on this plant are still applicable.

A small patch of Japanese knotweed was found in the north-west of Tymon Park. It is located more than 250 m from the proposed working areas, so there is no risk that it would be affected during construction works. Therefore, it is not considered to be an 'important ecological feature' for the purposes of this impact assessment.

Nuttall's waterweed was recorded in the channel of the River Poddle, notably within Tymon Park. Patches of the plant were observed, but it was not considered to be particularly dense, or to obstruct the channel. Nonetheless, the legal restrictions on this plant still apply.

Some other plant species recorded during habitat surveys are non-native and can be invasive in places, notably cherry laurel, snowberry, winter heliotrope and pendulous sedge. However, these species do not have any legal restrictions, and none appeared to be highly invasive within the study area. Therefore, these plants are not considered to be 'important ecological features' for the purposes of this impact assessment.

7.4.2 Fauna

Descriptions of rare and protected fauna observed in the vicinity of the proposed development site are outlined below. For some nocturnal or secretive species, an appraisal of habitat suitability is provided.

7.4.2.1 Fish

The River Poddle does not currently support any salmonid species, nor any large coarse fish (pers. comm. Inland Fisheries Ireland). This is mainly due to the extensive culverting of the river, particularly the lower sections underneath Dublin city centre, which prevents fish from migrating from the River Liffey into the River Poddle. Other reasons include poor water quality throughout the river, and the relatively small size of the watercourse. The only species known to use the river are three-spined stickleback *Gasterosteus aculaeatus* and minnow *Phoxinus phoxinus* (pers. comm. Inland Fisheries Ireland). These species are common and widespread throughout Ireland and are present in almost all watercourses. Therefore, the River Poddle is considered to be of Negligible ecological value for fish.

7.4.2.2 Otters

Otters are regularly recorded on the River Dodder and Grand Canal, and there have been some occasional sightings on the River Poddle (NBDC online databases, and pers. comm. SDCC Heritage Officer), particularly in Tymon Park. A series of otter surveys were carried out within the zone of influence of the flood alleviation scheme in 2018 and 2019, as follows:

- Surveys of Bancroft and Tymon Parks were carried out by ecologists of Roughan & O'Donovan Consulting Engineers between January and April 2018;
- Surveys of river bank within the boundary of Dublin City Council were carried out by Brian Keeley (Principal Ecologist of Wildlife Surveys Ireland) in September 2018;
- All of the study area was resurveyed by NM Ecology Ltd in October 2018 and March 2019.

No otter holts, nor any other evidence of otter, was found during any of the field surveys. Therefore, although it is possible that the River Poddle is used occasionally by otters, it does not support a resident or regularly-occurring population. Due to the impoverishment of fish populations in the river, it is unlikely to have enough food stocks to sustain even a single individual. On this basis, the study area is considered to be of Negligible importance for otters.

7.4.2.3 Badgers

As noted above, badger surveys of the study area were undertaken on a number of occasions by ecologists of Roughan & O'Donovan Consulting Engineers, Wildlife Surveys Ireland, and NM Ecology Ltd. There are records of badgers in the surrounding 10km square (National Biodiversity Data Centre online data viewer), including a number of records around Tymon Park.

Two badger setts were recorded in Tymon North by ecologists of Roughan & O'Donovan Consulting Engineers in early 2018: an active, nine-entrance main sett, and an inactive, two-entrance outlier sett. The locations of the setts are not shown in this chapter in order to avoid the risk of persecution, but they are located approximately 500m and 150m (respectively) from any aspect of the proposed development. Therefore, they are considered to be outside the zone of influence of the proposed development. On this basis, the study area is considered to be of Negligible importance for badgers.

7.4.2.4 Other Terrestrial Mammals

No mammals were observed during field surveys. Records of the following protected mammals were obtained from the National Biodiversity Data Centre online database in the surrounding 10km square (refer to **EIAR Volume 4, Appendix 7-3**): sika deer, pine marten, red squirrel, stoat, hedgehog, brown hare, Irish hare, and pygmy shrew. Almost all of these records are from Tallaght and/or Ballyboden; none were from the River Poddle or its surroundings.

Sika deer *Cervus nippon*, pine marten *Martes martes* and red squirrel *Sciurus vulgaris* are primarily associated with woodland / forest habitats, and parts of the woodland and scrub habitat would be suitable for all three species. However, woodland along the River Poddle is highly fragmented, and any animals moving along the river corridor would need to cross a number of roads, because the culverts are largely impassable. No signs of any of these species were found during site surveys, and no breeding or resting places were observed in any trees. Therefore, the proposed development site is of Negligible importance for these species.

The Irish hare *Lepus timidus* subsp. *hibernicus* and brown hare *Lepus europaeus* are common and widespread in Ireland. Hares may use parts of the proposed development site on an occasional basis, but in practice it is highly unlikely that any would be present, due to the high levels of disturbance by humans and dogs. No hares were encountered during the surveys, so the site is of Negligible importance for them.

Hedgehog, pygmy shrew and stoat are also widespread in Ireland, and are occasionally found in hedgerow, woodland or scrub habitats in urban regions. It is possible that some or all of these species would use the proposed development site on an occasional basis, so on a precautionary basis the site is considered to be of Local value for these species.

7.4.2.5 Bats

Foraging and commuting habitats

A bat survey of the river corridor within the boundary of Dublin City Council (i.e. works areas between Mount Argus Close and Ravensdale Park) was carried out by Brian Keeley in September 2018 using handheld bat detectors. The results were noted as follows:

"Three species of bat were in evidence within this survey. Of these, the most common species was the common pipistrelle. This is the most common species in Ireland and it is found throughout Dublin city. This species is a regular house-dweller and it is probable that the bats noted [may roost] in houses and other buildings relatively close to the Poddle. Soprano pipistrelle activity was also noted at Mount Argus. This species is more strongly associated with water courses and water bodies than common pipistrelles. The third species - Leisler's bat - was seen and heard flying over the Park early in the survey period."

A separate survey within the boundary of South Dublin County Council (works areas between Fortfield Road and Tymon Park) was carried out by NM Ecology Ltd. in August 2019. A high level of bat activity was recorded around Tymon Lake, with constant activity by common pipistrelles, frequent activity by soprano pipistrelles, and single records of Leisler's bat and a *Myotis* species (cf *M. daubentonii*). The areas of highest feeding activity were around the reedbeds and tall-herb vegetation around the margins of the lakes / ponds, but bats were also active above the water. Bat activity was much lower in the remainder of the survey area, with only occasional passes by pipistrelles and Leisler's bats along the section of river to the east of Tymon Lake (the proposed location of the Integrated Constructed Wetland), as well as Tymon North, Whitehall Park, Wainsfort Manor Crescent and Fortfield Road. Maps of these bat records are provided in **Figure 7-3** to **7-7**.

The three main species – common pipistrelle, soprano pipistrelle and Leisler's bats – represent the typical bat assemblage in Dublin. They are common and widespread throughout Dublin City, particularly in areas with mature trees and water. The River Poddle

and its associated lake / pond, woodland and scrub habitats are likely to be a key foraging and commuting area for bats in the south-west of Dublin city, so the site is considered to be of Local importance for these three species. All other works areas are considered to be of Negligible importance for foraging / commuting bats.

Daubenton's bats are frequently recorded on some of the major watercourses in Dublin City, including the River Liffey, River Dodder and River Tolka, and some suburban sections of the Grand Canal and Royal Canal. Daubenton's bats were not recorded by Brian Keeley in September 2018, and only a single Myotis bat (likely to be a Daubenton's bat) was recorded by NM Ecology Ltd in August 2019. It is noted that Daubenton's bats typically favour relatively large watercourses with sections of flat water, so the River Poddle is considered to be of low suitability for this species. On this basis, the River Poddle is considered to be of Negligible value for Daubenton's bats.

No Nathusius' pipistrelle bats were recorded by Brian Keeley in September 2018, and there are no prior records of this species on the NBDC database within 1 km of the River Poddle. The other bat species known to occur in Dublin – brown long-eared bat, Natterer's bat and whiskered bat – are rarely recorded in urban areas, as they usually avoid brightly-lit areas. They have been recorded in Phoenix Park and Marlay Park, but not within 1km of the River Poddle. Therefore, the River Poddle is considered to be of Negligible value for these species.

Potential roost features

Bats typically roost in buildings, bridges and mature trees. There are a large number of buildings in the vicinity of the proposed development, but all are considered to have negligible or low suitability for roosting bats (as per the classification system in Collins, 2016). Some old buildings in the broader surroundings (*e.g.* Kimmage Manor, Mount Argus Church) are considered to have moderate or high suitability for roosting bats, but none of these structures are within 100 m of the study area.

All bridges within the zone of influence were inspected, but none had any crevices or cavities that would be suitable for roosting bats. The footbridge in Ravensdale Park (which is within the proposed working area) is constructed of a concrete arch with masonry sides and is considered to have negligible suitability for bats.

Tree removal will be required at a number of the proposed working areas. Preliminary ecological appraisals (i.e. ground-level visual inspections) were carried for all trees that would be removed as part of the proposed development, but none were considered to have any suitability for roosting bats. All were immature or semi-mature, with intact trunks and branches, and no cavities, crevices or major wounds. Some old trees with moderate or high suitability for bats were found in Mount Argus Park and the grounds of Kimmage Manor, but none of these trees are within 100m of the study area.

In summary, all buildings, bridges and trees in the vicinity of the proposed development are considered to be of negligible suitability for bats.

7.4.2.6 Birds

Brent geese and other over-wintering waterfowl

Tymon Park has previously been used by light-bellied brent geese *Branta bernicla hrota* as a feeding area. This species spends the winter in Ireland (typically between September / October and March / April), and then migrates to the high Arctic during summer months

to breed. Dublin Bay and the surrounding area supports several thousand brent geese in winter months. They feed in coastal areas at low tide, but at high tide they often fly inland to feed on grasslands. There are a number of urban parks and sports fields in Dublin city that are used by geese, but Tymon Park has previously been used in significant numbers. There are anecdotal records of 1,200 brent geese in the park in 2008⁵, and 700 geese in 2009⁶.

Weekly surveys of over-wintering birds were carried out in Tymon Park between January and mid-April 2018 by ecologists of Roughan & O'Donovan Consulting Engineers, comprising 14 surveys in total. Brent geese were a particular focus of the survey, and the traditional feeding areas for this species in the north-west of the park were included in the survey area. Brent geese were observed flying over the park (but not landing) during one of the surveys in January and are believed to have landed in Greenhills Park to the north of the site. However, brent geese were not observed during any of the other 13 surveys. The ecologists made some notes about sources of disturbance in the park, as follows: "Brent Geese have not used Tymon Park in recent years as a result of constant disturbance by dogs. In addition, a dog park was built next to the area that was used by Brent Geese in the fields at the north end of Tymon Park East." Therefore, it was concluded that Tymon Park was not used as a feeding area for Brent Geese between January and mid-April 2019.

A flock of brent geese was observed by the SDCC Heritage Officer on the 4th of February 2019 (*pers. comm.*) on playing fields in the north-west of the park. The playing fields were subsequently surveyed by NM Ecology Ltd. in early March 2019 to search for goose droppings or other signs of activity, but no evidence was found.

In summary, Tymon Park was an important feeding area for brent geese approximately ten years ago, but it now appears to be used very infrequently. This is almost certainly due to disturbance from dogs (*e.g.* in the dog enclosure in the north-west of the park), which typically causes geese to take flight, even at distances of several hundred metres. Therefore, Tymon Park is no longer considered to be an important feeding area for brent geese.

All other areas of grassland along the River Poddle (*e.g.* Ravensdale Park) are considered to be of negligible value for brent geese, because they are small in size, surrounded by dense vegetation, have trees overhead (thus obstructing flight paths for geese), and are frequented by dog walkers.

Other over-wintering waterfowl

A total of 19 bird species were recorded during the winter bird surveys by ecologists of Roughan & O'Donovan Consulting Engineers between January and April 2018. Mallard, wigeon, teal, northern shoveller, tufted duck, little grebe, coot, moorhen, mute swan, grey heron and little egret were all recorded at the ponds. Large numbers of gulls (notably black-headed gulls and common gulls) were recorded in other parks, including the playing fields, Castletymon car park, and the ponds. Peak counts for all species are provided in **Table 7-4**, which is reproduced from the report by Roughan & O'Donovan Engineers in 2018.

⁵ 'Eye on Nature' column in the Irish Times, 08 March 2008. Available online at www.irishtimes.com/news/eye-onnature-1.901390

⁶ 'Dublinbirding' Archive, 21st December 2009. Available online at www.dublinbirding.ie/pages/ archive/December2009.htm

Common Name	Scientific Name	Peak Count	
Mute Swan	Cygnus olor	17	
Brent Goose (w)	Branta bernicula	10	
Wigeon (w)	Anas Penelope	23	
Teal (w)	Anas crecca	5	
Mallard	Anas platyrhynchos	126	
Tufted Duck	Aythya marila	15	
Northern Shoveler (w)	Anas clypeata	9	
Little Grebe	Tachybaptus ruficollis	9	
Grey Heron	Ardea cinerea	8	
Little Egret	Egretta garzetta	1	
Coot	Fulica atra	60	
Moorhen	Gallinula chloropus	39	
Black-headed Gull	Chroicocephalus ridibundus	356	
Common Gull	Larus canus	234	
Feral goose	Anser sp.	3	
Feral duck	Anas sp.	6	
Herring Gull	Larus argentatus	79	
Lesser Black-backed Gull	Larus fuscus	3	
Snipe (w)	Gallinago gallinago	1	

 Table 7-4: Peak counts of birds recorded in Tymon Park in Jan – Apr 2018

In summary, the ponds in Tymon Park are used by a number of waterbirds, including several winter migrants. There are relatively few ponds of comparable size in the southwest of Dublin city, so the site is considered to be of local importance for breeding waterfowl.

Other sections of the River Poddle are considered to be of little importance for overwintering birds, because the river corridor is relatively narrow and subject to frequent disturbance. Therefore, all other areas are considered to be of negligible importance for wintering birds.

Breeding waterfowl

A number of birds nest around the ponds of Tymon Park in summer months, including mute swan, mallard, coot and moorhen. Birds are often territorial during their nesting season, so most of the ponds only support a small number of pairs (1 - 2) of birds. For example, each of the three ponds in the north of Tymon Park supports a single pair of nesting mute swans. The number of nesting birds, and the locations of nests, typically varies slightly between years. However, it is assumed for the sake of this assessment that several species of waterfowl will breed at the lake / ponds in Tymon Park each year.

Coot and mute swan are currently considered to be 'amber list' species of conservation concern in Ireland (Culhoun & Cummins 2013). For coot, this is because their overwintering population is highly localised, and because there are moderate declines in their over-wintering populations, and a moderate decline in their breeding range. For mute swan, it is because Ireland supports a significant percentage (defined as more than 20%) of both the over-wintering and breeding populations of this species in Europe. Mallard and moorhen are not considered to be of conservation concern in Ireland.

In summary, the ponds in Tymon Park are used on an annual basis as nesting sites by mute swan, mallard, coot and moorhen. Considering the lack of other nesting sites for many of these species in the surrounding area, these ponds are considered to be of Local importance for breeding waterfowl.

It is highly unlikely that these species nest elsewhere on the River Poddle, because the river channel is quite narrow (e.g. 1 - 2m), few species nest on moving water, and because of the high levels of disturbance by humans and dogs along most sections of the river. Therefore, all other sections of the river are considered to be of Negligible value.

Other bird species

Grey wagtail *Motacilla cinerea* were observed feeding along the river channel on a number of occasions. Dipper *Cinclus cinclus* were not observed, but are common on watercourses in the Dublin area, and are likely also to use the River Poddle on occasion. Both species nest adjacent to rivers, often in bridges or other man-made structures. The grey wagtail is currently of conservation concern in Ireland, due to rapid declines in their breeding population, but dipper are not of conservation concern. As there are only a small number of watercourses in Dublin, the River Poddle is considered to be of Local value for these species.

Grey heron *Ardea cinerea* and little egret *Egretta garzetta* were observed feeding in the river on occasion. However, the relatively small size of the watercourse and the high levels of disturbance in some areas (e.g. by domestic dogs) reduces the suitability of the watercourse for these species. No nesting colonies (heronries) were observed in the study area, although it is possible that individual birds may nest in trees in the study area. Both species are common and widespread in Ireland, and they are not of conservation concern. However, as there are only a small number of watercourses in Dublin, the River Poddle is considered to be of Local value for these species.

No kingfishers *Alcedo atthis* were observed during the survey, nor any vertical earth banks suitable for their nesting burrows. There are no desktop records of kingfishers on the River Poddle. Therefore, the river is of Negligible value for this species.

A number of other common urban / garden birds were recorded in woodland / scrub vegetation alongside the river, including robin, wren, chaffinch, blackbird, song thrush, blue tit, great tit, rook, jackdaw and hooded crow. It is highly likely that some of these species will nest in riverside vegetation. No rare bird species were recorded in the area, and there is extensive nesting habitat in the surrounding area, so the vegetation along the banks of the River Poddle is considered to be of Negligible ecological value for these species. Nonetheless, all birds (including nests, eggs and chicks) receive protection under the Wildlife Act 1976 (as amended).

7.4.2.7 Reptiles and Amphibians

No reptiles or amphibians were observed during the site survey. The ponds in Tymon Park and Mount Argus may be suitable breeding sites for smooth newts *Triturus vulgaris* and common frogs *Rana temporaria*. On a precautionary basis the site is considered to be of Local value for both species. Common lizards *Zootoca vivipara* occur at a very low density in Ireland and are usually only recorded in upland heath / bog habitats and sand dunes, so the River Poddle and associated habitats are considered to be of Negligible value for this species.

7.4.2.8 Terrestrial Invertebrates

Some of the dry meadow habitat in Tymon Park is managed for pollinators and other invertebrates, and a broad diversity of species was observed during habitat surveys. The reedbeds and tall-herb communities around the lakes / ponds in Tymon Park also supported a diverse range of invertebrates. Detailed invertebrate surveys were not undertaken as part of this assessment, but due to the diversity of species observed, the dry meadow, reedbed and tall-herb habitats are considered to be of Local importance for invertebrates. All other habitats in the survey area are common and widespread in urban areas, and are considered to be of Negligible importance for invertebrates.

7.4.3 Potential Limitations and Information Gaps in this Study

Habitat surveys were carried out in summer months (August 2018, May and August 2019), which are ideal periods for botanical surveying. Bat surveys were carried out in September 2018 and August 2019, which is within the ideal survey period. Surveys for mammal breeding resting places (*e.g.* badger setts and otter holts) were carried out in winter and spring, which is the ideal survey period. Bird surveys were undertaken throughout the year. Therefore, the data presented in this chapter is not considered to have any significant limitations or information gaps.

7.4.4 Identification of Important Ecological Features

Summaries of the ecological valuation and legal / conservation status of habitats and fauna are provided in **Tables 7-5** and **7-6**. For the purposes of this impact assessment, any features that are valued at Local importance or higher, and/or that receive legal protection, are considered to be 'important ecological features', and will be included in the impact assessment. Features of Negligible value and without legal protection (e.g. three-spined stickleback and minnow) are not included in the impact assessment.

Ecological feature	Ecological Valuation	Important Ecological Feature?
Natura 2000 sites	International	Yes
Natural Heritage Areas	National	No
Lowland watercourse (FW2)	Local	Yes
Artificial lakes and ponds (FL8)	County	Yes
Reed swamps (FS1) and Tall-herb Swamps	County	Yes
Mixed broadleaved woodland (WD1)	Local	Yes
Wet willow-alder-ash woodland (WN6)	Local	Yes
Treeline (WL2) / Native hedgerows (WL1)	Local	Yes
Scrub (WS1)	Local	Yes

Table 7-5: Identification of important ecological features: designated sites, habitats and flora

Ecological feature	Ecological Valuation	Important Ecological Feature?
Recolonising bare ground (ED3)	Local	Yes
Species-rich dry meadow (GS2)	Local	Yes
Species-poor dry meadow (GS2)	Negligible	No
Artificial surfaces (<i>i.e.</i> footpaths, walls, BL3)	Negligible	No
Amenity grassland (GA2) / Scattered trees and parkland (WD5)	Negligible	No
Rare plants (flowering rush, galingale and broad- leaved helleborine)	Local	Yes
Invasive plant (Giant rhubarb, Nuttall's waterweed)	-	Yes

Table 7-6: Identification of important ecological features: fauna

Ecological feature	Ecological valuation	Legal protection*	Important Ecological Feature?
Fish	Negligible	-	No
Common pipistrelle, soprano pipistrelle and Leisler's bats	Local	HR	Yes
Hedgehog, pygmy shrew and stoat	Local	WA	Yes
Badgers	Negligible	WA	No
Otters	Negligible	WA	No
Other terrestrial mammals	Negligible	WA	No
Winter birds in Tymon Park	Local	HR	Yes
Brent geese	Negligible	HR	No
Breeding birds in Tymon Park	Local	HR	Yes
Grey wagtail, dipper, grey heron, little egret	Local	HR	Yes
All other nesting birds	Negligible	WA	Yes
Kingfisher	Negligible	HR	No
Smooth newt and common frog	Local	WA	Yes
Common lizard	Negligible	WA	No
Invertebrates (Tymon Park)	Local	Various	Yes

* WA: Wildlife Act 1976 (as amended), HR: European Communities (Birds and Natural Habitats) Regulations 2011 (as amended)

In summary, the important ecological features for this assessment are:

• Natura 2000 sites in Dublin Bay

- Habitats: rivers, ponds / lakes, reedbeds and tall-herb swamps, woodland, treelines / hedgerows, scrub, species-rich dry meadow and recolonising bare ground
- Rare flora: flowering rush, galingale, broad-leaved helleborine
- Invasive species: giant rhubarb, Nuttall's waterweed
- Mammals: three bat species (common pipistrelle, soprano pipistrelle and Leisler's bats) and three other terrestrial mammals (hedgehog, pygmy shrew and stoat)
- Wintering and breeding birds in Tymon Park
- Aquatic birds (grey wagtail, dipper, grey heron, little egret) and other nesting species throughout the study area
- Smooth newt and common frog
- Invertebrates: pollinators and other species in selected habitats in Tymon Park

7.5 Potential Impacts

7.5.1 Construction Phase

7.5.1.1 Designated Sites

The River Poddle is a tributary of the River Liffey, which provides a hydrological pathway to four Natura 2000 sites in Dublin Bay. There is a considerable distance between the proposed development site and the nearest downstream Natura 2000 site, with approximately 10km of intervening watercourse from the nearest point of the proposed development (at Merchant's Quay), and approximately 15km from the farthest point (Tymon North). Considering the dilution effect of the intervening rivers and coastal waters, it is considered highly unlikely that any pollutants generated by the proposed development could reach the Natura 2000 sites in high-enough concentrations to affect the qualifying interests of any site.

However, adopting a precautionary approach (implicit in the EU Habitats Directive and confirmed by European Court judgments), it is possible in a worst-case scenario that a large-scale pollution event could cause adverse effects on the conservation status of the qualifying interests of European sites. Therefore, in accordance with best practice, it is recommended that appropriate mitigation measures are employed during construction in order to avoid or reduce the potential impacts of pollution incidents. Further details are provided in the Natura Impact Statement that accompanies this application.

7.5.1.2 Habitats

A summary of permanent and temporary impacts on habitats within the footprint of the development is provided in **Table 7-7**. Column 1 refers to the planning drawing number (refer to **Part 2, Planning Drawings** of the Planning Documentation), column 2 to the proposed works that will be carried out, column 3 to the nature of impacts, and column 4 to the ecological value of each habitat.

Planning Drawing No. and Location	Proposed works	Impacts on Habitats	Valuation
Drawing No. 08132 Tymon North)	Construction of an embankment	Permanent removal of mixed broadleaved woodland (mainly poplar and sycamore)	Local
		Temporary river crossing and scrub removal	Local
		Temporary access track <i>via</i> existing footpaths and amenity grassland	Negligible
Drawing No. 88133 (Tymon North, ESB substation)	Construction of an embankment	Permanent removal of a non- native treeline (Leyland cypress)	Negligible
		Temporary access track via existing roads and footpaths	Negligible
Drawing No. 08140 (Tymon Park)	Temporary site compound	Temporary disturbance of species-rich dry meadow	Local
Drawing No. 08140 (Tymon Park)	Temporary storage areas	Temporary disturbance of amenity grassland and species- poor dry meadow. Permanent removal of a short section (<i>e.g.</i> up to 5m) of hedgerow	Negligible
Drawing No. 08141 (Tymon Park, west of woodland)	Construction of an embankment	Permanent removal of an existing footpath and adjacent amenity grassland, but also two small patches of immature broadleaved woodland (ash, pedunculate oak, <i>etc.</i>) Temporary access track <i>via</i> existing roads and footpaths	Negligible (footpath and grassland), Local (woodland) Negligible
Drawing No. 08142 (Tymon Park, east of woodland)	Construction of an embankment	Permanent removal of some mixed broadleaved woodland (mostly ash) and species-rich dry meadow Temporary access track <i>via</i> existing roads and footpaths	Local (woodland and meadow)
Drawing No. 08143 (Tymon Park, east of lake)	Construction of an embankment and flow control structure	Permanent removal of species- rich dry meadow, a small patch of immature broadleaved woodland, and some scattered immature trees Temporary access track <i>via</i> existing roads and footpaths	Local (meadow, woodland and trees) Negligible
Drawing No. 08146 (Tymon Park)	Integrated constructed wetland	Permanent removal of species- rich dry meadow Temporary access track <i>via</i> existing footpaths and some species-rich dry meadow	Local Negligible (paths),
Drawing No. 08151 (Whitehall Park)	River re-alignment	Permanent removal of a section of existing river channel	(meadow) Local

Table 7-7: Habitats within the development for	footprint
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Planning Drawing No. and Location	Proposed works	Impacts on Habitats	Valuation
		Permanent removal of species- poor dry meadow, and construction of a new river	Negligible
		Temporary access <i>via</i> species- poor dry meadow	Negligible
Drawing No. 08152 (Wainsfort Manor Crescent)	Replacement / reinforcement of an existing retaining wall	Permanent removal of a semi- mature treeline (willow, sycamore, lime, <i>etc</i> .) Temporary site compound on amenity grassland, and temporary access <i>via</i> existing roads and footpaths	Local Negligible
Drawing No. 08155 (Fortfield Road)	Replacement / reinforcement of an existing retaining wall	Replacement / reinforcement of an existing wall Temporary access may disturb an existing treeline and recolonising bare ground	Negligible Local (treeline and recolonisin g bare ground)
Drawing No. 08160 (Ravensdale Park)	Construction of a concrete retaining wall and pedestrian bridge	Permanent removal of amenity grassland and some treelines (Norway maple and lime trees) Temporary set down area and access on existing footpaths and amenity grassland	Local (treeline) Negligible
Drawing No. 08165 (St Martins Drive)	Construction of a concrete retaining wall	Permanent removal of a treeline (ash, sycamore, field maple) and some amenity grassland Temporary set down area and access <i>via</i> existing roads and amenity grassland	Local (treeline) Negligible (amenity grassland) Negligible
Drawing No. 08170 (Mount Argus Close)	Construction of a concrete retaining wall	Permanent removal of amenity grassland, and some temporary disturbance	Negligible
Drawing Nos. 08250 & 08251 (Various locations)	Sealing manholes	Temporary disturbance of existing roads and some species-poor dry meadow	Negligible

In summary, the proposed development will have permanent impacts on areas of speciesrich dry meadow, broadleaved woodland and treeline habitats, all of which are of Local value. There will also be temporary impacts on species-rich dry meadow, treeline, recolonising bare ground and the River Poddle, which are also of Local value. In all cases, the extent of impacts will affect only a small proportion of habitats within the study area. However, due to the extent and duration of impacts, they are considered to be Significant impacts in the context of EIA (as per EPA Guidelines). All other habitats in the footprint of the proposed development are of Negligible value. There will be no loss of the Countyvalue habitats around Tymon Lake. The permanent impacts are considered to be unavoidable, because the locations for proposed works are spatially constrained, *e.g.* in topographical depressions. Trees are widespread along the river corridor, and are often growing in close proximity to existing retaining walls that require reinforcing / replacement, so it would not be possible to implement the proposed development without removing some trees. However, the project has been designed with the aim of removing trees only where necessary. In addition, the ecologist liaised with engineers regarding the areas for temporary works (*e.g.* access routes and spoil storage areas), in order to highlight habitats that should be protected. Therefore, some temporary impacts on habitats of Local value have been avoided.

Where habitat loss was unavoidable, measures have been taken to reinstate or provide replacement habitat. A range of landscape enhancement measures are outlined in the accompanying report, which are considered to be a component of the design of the proposed development. Where embankments will be constructed on species-rich dry meadows in Tymon Park, the existing topsoil will be stripped and re-laid on the surface of the embankment, allowing species-rich meadow to re-establish in these areas. New areas of species-rich meadow will also be created toreplace similar habitat which is lost in the footprint of the integrated constructed wetland; suitable locations are in Tymon Park or Whitehall Park, but the final location will be determined at the detailed design stage.

Replacement tree and woodland planting in Tymon Park, Ravensdale Park and St Martins Drive will be provided for the loss of broadleaved woodland and treeline habitats with two trees planted for every tree that will be removed. All temporarily-disturbed habitats will be re-instated to match the baseline habitats. Further details of these proposals are provided in the landscape mitigation plan for the proposed development (Refer to **EIAR Volume 3** - *Landscape Mitigation*). Overall, the total extent of dry meadow, broadleaved woodland and treeline habitats following the implementation of the landscape mitigation plan will be equal to, or slightly higher than, the baseline scenario. It will take 1 - 2 years for the meadows to re-establish, and 10 - 20 years for the trees to re-establish, but after this lag period there will be a neutral impact on these habitats.

It is also important to note that the integrated constructed wetland will enhance the ecology of the area, complementing the species-rich reedbeds and tall-herb swamps around Tymon Lake. Some additional patches of marginal wetland vegetation will also be planted around Tymon Lake. It will take up to 5 years for the vegetation to fully establish, but after this lag period it will have a positive ecological impact of Local significance.

The re-alignment of river at Whitehall Park will result in the loss of an existing section of river habitat, and the construction of a section of new channel. The new channel will be constructed in accordance with best practice, and will incorporate a graded profile with a basal width of 3 m. This is approximately equal to the existing channel width, so there will not be a significant change in the flow rate or dynamics of the watercourse at this location. It will take up to five years for the vegetation to fully establish in the new channel, but after this lag period there will be a neutral impact on this habitat.

Subject to the habitat mitigation measures outlined above, all temporary and permanent impacts on habitats would be reduced to Not Significant or Imperceptible.

7.5.1.3 Rare flora

Flowering rush is present in the channel of the River Poddle immediately downstream of Tymon Lake (the largest of the ponds in Tymon Park). The integrated constructed wetland will be developed along this section of the river, and will involve some modification of the

river banks and channel. Most of the flowering rush plants in the channel will be retained in their current positions, but it is possible that some plants adjacent to the river bank will be disturbed. If this is the case, there could be Slight to Moderate impacts on these plants, which are of Local value.

A small patch of broad-leaved helleborine was found in a patch of recolonising bare ground near Fortfield Road. The plants are growing on the edge of an access track beside the river, in an area that is likely to be used by construction vehicles during the construction of an adjacent retaining wall. The permanent loss of these plants would have a Slight to Moderate impacts, on features that are of Local value

Galingale is present around some of the ponds adjacent to Tymon Lake. None of these locations are within the footprint of construction works, and there will be no direct or indirect impacts on this species.

7.5.1.4 Invasive species

Some patches of giant rhubarb were found in the west of Tymon Lake. Mature plants were recorded in 2018, but in 2019 it appears that they were removed, leaving only some immature remnant growth, possibly from fragments of rhizome left after removal. This species is listed on the third schedule of the *European Communities (Birds and Natural Habitats) Regulations 2011)*, under which it is an offence to intentionally cause it to spread. There will be no construction work in the vicinity of the giant rhubarb plants, so there will be no fragmentation or movement of any part of the plants. This species is not invasive in the east of Ireland, and there is no evidence that it is spreading in its current location, either around the pond or further downstream. Overall, there is no risk that any invasive plant material will be spread during construction works, nor does there appear to be any risk of spread if the plant is left in its current location.

Nuttall's waterweed occurs in the channel of the River Poddle, notably within Tymon Park. Some patches are in the vicinity of the proposed integrated constructed wetland, and it is possible that they may be disturbed during construction works. If any plants were spread, it would constitute an offence under the *EC (Birds and Natural Habitats) Regulations 2011*.

7.5.1.5 Bats

Foraging and commuting bats

Bat activity was relatively low in most of the areas that were surveyed, and almost all records were of species that are common and widespread in Dublin city: soprano pipistrelle, common pipistrelle and Leisler's bats. Overall, the River Poddle is considered to have relatively low value for bats, due to fragmentation effects caused by artificial lighting, and gaps in tree cover. The only location in which bats were recorded in significant numbers was at Tymon Lake, where soprano pipistrelles were abundant, with moderate numbers of common pipistrelles, and single records of Leisler's and Daubenton's bats. Small numbers of pipistrelles were recorded in Mount Argus Park, Ravensdale Park, Fortfield Road and Wainsfort Manor Crescent.

There will be no change to the habitats used by bats at Tymon Lake, so there will be no direct or indirect impacts at this location. The integrated constructed wetland is likely to increase the foraging resource for bats at this location, and thus could have a Slight positive impact. Some trees will be removed at Ravensdale Park, Wainsfort Manor Crescent and St Martin's Drive, which may partially sever some commuting routes or feeding areas

for bats. However, it has been shown that pipistrelle and Leisler's bats will readily cross gaps of several metres, so small-scale tree removal would have an Imperceptible effect on foraging or commuting bats.

Potential roost features

No potential roost features were identified within any of the working areas. All of the trees in the footprint of works were inspects by the ecologist, and none had any crevices or cavities that would be suitable for roosting bats. Therefore, there will be no direct impacts on bats or bat roosts, and no offence under the *European Communities (Birds and Natural Habitats) Regulations 2011* (as amended) and the *Wildlife Act 1976* (as amended).

7.5.1.6 Terrestrial mammals (hedgehogs, stoats, pygmy shrew)

These species may occur at low densities in the scrub and woodland alongside the river. They are all highly mobile and would be able to move away from the area during construction works. However, when rearing young (typically during spring and summer months), it is possible that these species may have reduced mobility, and that they could be killed or injured during site clearance works. Depending on the species and numbers involved, it could have a Significant negative impact on their local populations.

7.5.1.7 Winter Birds

The ponds in Tymon Park are used by a number of migratory birds during winter months, including wigeon, teal and shoveller. The largest pond – Tymon Lake – will be used as a floodwater storage area, so it is likely that water levels will fluctuate, particularly during periods of heavy rainfall. However, this would have no impact on winter birds, as the birds would easily adapt to changes in water level. Therefore, there is not considered to be any risk of impacts on winter birds.

7.5.1.8 Breeding Birds

If trees and shrubs are cleared during the bird nesting season (usually between March and August, inclusive), it is possible that active nests could be destroyed. This also applies to the removal or replacement of riverside walls and bridges, which can be used as nesting sites by grey wagtail and dipper. No nests of grey wagtails, dippers, grey herons or little egrets were observed during baseline surveys, but it is possible that these species may nest in the area in the future. The killing of any birds or the disturbance of their breeding / resting places would constitute an offence under the *Wildlife Act* 1976 (as amended).

It is noted that construction works at the ponds within Tymon Lake will almost entirely be located on dry land, with no significant works in any areas likely to be used by nesting birds. Therefore, it is highly unlikely that there will be any direct impacts on breeding waterfowl (notably mute swans, mallard, moorhens and coot) around these ponds.

7.5.1.9 Non-breeding Birds

Birds are not considered to be vulnerable to impacts when they are not nesting. Some birds may be temporarily displaced during construction works, but there is alternative habitat in the surrounding area. It is noted that the proposed works will only affect a small proportion of the watercourse, so there will be alternative areas of undeveloped habitat for aquatic birds (notably grey wagtail, dipper, grey heron, little egret) throughout the construction period. Therefore, there will be an Imperceptible impact on birds during their non-breeding periods.

7.5.1.10 Smooth newts and common frogs

As noted above, the construction works at the ponds within Tymon Lake will almost entirely be located on dry land, with no significant works within the pond. The dry meadow in the footprint of works is unlikely to be used by hibernating newts or frogs during winter months. Therefore, it is highly unlikely that there will be any direct impacts on either species.

7.5.1.11 Invertebrates

The species-rich dry meadow, reedbed and tall-herb habitats in Tymon Park are considered to be of Local importance for invertebrates. The proposed development will involve no change to these wetland habitats, and the loss of dry meadow habitat will comprise only a small proportion of the available habitat, so there will be an Imperceptible effect on invertebrate populations.

7.5.2 Operational Phase

The proposed development will require little or no human intervention during the operational period, other than some occasional maintenance work, including periodic clearing of debris from the channel and culvert screens and cutting trees and vegetation. Therefore, there is not expected to be any impact on designated sites, rare flora, invasive species, bats, terrestrial mammals or wintering / non-breeding birds. However, it is possible that fluctuating water levels could have impacts on aquatic habitats and species, as outlined below.

7.5.2.1 Habitats

No further removal of habitats will take place during the operation of the proposed development. Habitats will be managed for ecological and amenity purposes, as outlined in the landscape mitigation plan. The flood storage area in Tymon Lake may experience fluctuating water levels during periods of very high rainfall, potentially causing temporary inundation of habitats around the margins of the lake. However, the reedbed and tall-herb swamp habitats are adapted to fluctuations in water levels, and can easily survive periods of temporary inundation. Therefore, there is not considered to be any risk of direct or indirect impacts on these habitats during the operational phase.

7.5.2.2 Breeding waterfowl in Tymon Park

A number of species nest around the ponds in Tymon Park each year, including mute swan, mallard, moorhen and coot. The largest pond – Tymon Lake – will be used as a floodwater storage area, so it is likely that water levels will fluctuate, particularly during periods of heavy rainfall in winter months. However, it is possible that there could be periods of unseasonably high rainfall in spring / summer months (during the nesting season for many birds), and thus that water levels may rise significantly, which may cause the inundation of nests. If eggs or chicks are inundated, it is highly likely that they would die.

It is important to note that the proposed floodwater storage pond is approximately 1 - 1.5m lower in elevation than the two ponds immediately to its north and west. Therefore, fluctuations in water level would only affect Tymon Lake, and there would be little or no

fluctuations at either of the two adjacent ponds, or at any ponds in Tymon Park West. Tymon Lake usually supports a single mute swan nest, and small number of mallard, coot and moorhen nests.

In most years it is unlikely that there would be significant rainfall events during the nesting season, so impacts from inundation would probably only occur infrequently, *e.g.* once every five years. Chicks and eggs would be affected, but adult birds would easily be able to escape the rising water levels. The chicks of most waterbirds emerge from the nest soon after hatching (*e.g.* 1 - 2 days for mute swans), so the main risk of impacts would occur during the egg development phase, which lasts for up to 40 days in all relevant species. If one clutch of eggs failed, it is possible that birds would attempt to lay another clutch of eggs soon afterwards. Mute swans typically only have one brood in each year, but moorhen and coot have 2 - 3 broods per year.

Overall, it is considered unlikely that flood waters would fluctuate to such an extent that they would inundate nests, but it may occur in some years. If this was the case, it is possible that single broods of mute swan, mallard, coot and moorhen may be lost. This would only occur in the largest pond (Tymon Lake), and there would be no fluctuation of water levels in any of the other ponds. In a worst-case scenario, the loss of some broods could have slight impacts on local populations of breeding waterfowl, but would not have a significant effect on local populations.

7.5.2.3 Water quality, and aquatic ecology

The integrated constructed wetland has been designed to remove nutrients and other pollutants. The following is stated in the report that accompanies this application "It is expected that given the current receiving water quality and flows the proposed ICW will reduce pollutant concentrations to align more with Surface Water Regulations 'Good status' (Ammonia $x \le 0.065$ mg/l, BOD $x \le 1.5$ mg/l, and Molybdate Reactive Phosphorus $x \le 0.035$ mg/l)." The improvement of water quality will have a significant positive effect on the aquatic ecology downstream in the waterbody, including fish, aquatic invertebrates and vegetation.

After flood events the river water will be naturally turbid and will contain suspend solids and silt from the surrounding land in the catchment (refer to **Chapter 8 Hydrology and Hydromorphology**). This would have a moderate short-term negative impact on the water quality in the river. However, this is a natural, stochastic event that occurs in the baseline scenario, and the development will not significantly the likelihood or magnitude of its occurrence. Smooth newts and common frogs

The ponds in Tymon Park are likely to be used as breeding sites by smooth newts and common frogs. As noted above, it is expected that there will be fluctuations in water levels in Tymon Lake at some times of the year, potentially including the spring months in which amphibians lay their eggs. However, as the eggs of both species are laid underwater, they would not be affected by temporary changes in water level. Therefore, there will be no direct or indirect impacts on newts or frogs during construction works.

7.5.3 Cumulative Ecological Impacts

Some other developments in the vicinity of the River Poddle are discussed in **Section 7.1.5**. However, considering the relatively small scale of these developments, and their distance from the River Poddle, they would not increase the magnitude of the potential impacts on described above.

7.5.4 'Do Nothing Scenario'

If the proposed development does not take place, the habitats, flora and fauna of the site would remain in a similar condition to the baseline environment. The river would continue to flood in some years.

7.6 Mitigation Measures

7.6.1 Engagement of an Ecological Clerk of Works

A number of sensitive habitats and species were recorded in the vicinity of the proposed development site, and some of these mitigation measures require specialist skills. Therefore, the contractor will employ an Ecological Clerk of Works (ECoW) to oversee the implementation of the mitigation measures outlined below. The ECoW will be required to provide reports and written correspondence to the Employers' Representative as requested, in order to demonstrate compliance with the measures outlined in this report.

7.6.2 Pollution Prevention Measures (Construction phase)

A range of pollution-prevention measures for the construction phase of the proposed development are described in the Outline Construction and Environmental Management Plan (Outline CEMP) contained in **EIAR Volume 4, Part II, Appendix 5-1**. All are established measures that are widely used in construction projects, and there is a high degree of confidence in their success. The contractor will be required to employ an Environmental Manager and ECoW to assist with preparing a detailed CEMP and its implementation, and to advise on all works in close proximity to the river.

The pollution prevention measures included in the Outline CEMP are summarised as follows:

- All work within 50m of the river corridor will be planned in accordance with the contractor's ECoW and recorded in a method statement. The ECoW will give a toolbox talk in advance of works, and all working areas will be marked out clearly in advance of work;
- Silt-management measures will be implemented for all groundworks in order to prevent the release of suspended solids into the watercourse;
- The main site compound at Tymon Park will include a bunded area for the storage of pollutants, with additional areas for the stockpiling of materials, and drainage control for the washing area;
- Hazardous materials (*e.g.* fuel, cement, *etc.*) will be stored at least 50m from the river;
- Vehicles will be refuelled over drip trays;
- Spill kits will be kept in the site compound and all mobile vehicles; and
- Any concrete required for construction work will be ordered ready-mixed. Vehicles will be cleaned off site.

The re-alignment of the river at Whitehall Park will involve in-stream works, including the creation of a new section of channel, diversion of the river to the new channel, and the infilling of the existing channel. Temporary crossings of the River Poddle will be required to facilitate works in some locations, notably Tymon North and Tymon Park. In these cases, all in-stream works will comply with current best practice, notable the Inland Fisheries

Ireland *Guidelines on protection of fisheries during construction works in and adjacent to waters* (IFI, 2016) and Transport Infrastructure Ireland's *Guidelines for the crossing of watercourses during the construction of national road schemes* (TII 2008), as outlined in the CEMP. It is noted that the River Poddle is of relatively low sensitivity for aquatic ecology, as it does not support salmonids, or protected species.

Reference should also be made to the measures as outlined **Section 6.8** of **Chapter 6** of the EIAR.

7.6.3 Habitat enhancement measures (Construction phase)

Impacts on habitat will be mitigated by re-instating disturbed areas with an equivalent habitat type, *e.g.* species-rich dry meadow or a treeline. The majority of new tree and shrub planting will be of native species, complemented by some common ornamental species, *e.g.* beech, chestnut, walnut, cherries and limes.

Species-rich dry meadow will be re-instated on the surface of new embankments in Tymon Park, and in the footprint of the temporary construction compound. At the outset of construction works, all topsoil will be stripped in these areas to a depth of 200 mm, stockpiled during construction works (stored separately from other materials), and then spread in a thin layer across surface of the final areas. The stripped topsoil will provide a seed source for the re-establishment of meadows in these areas. No grass-seed should be spread in these areas, and they should not be fertilised. They will be managed in the same manner as the wildflower meadow to the north of Tymon Lake. Scattered trees may be planted in some areas, but no trees or shrubs will be planted on the embankment adjacent to Tymon Lake, because wildfowl typically prefer areas with a broad field of view.

In woodland areas some of the felled trees will be left in-situ to provide dead-wood habitat for invertebrates. New specimen trees will be planted in Tymon Park, Ravensdale Park and St Martins Drive, accounting for twice the number of trees that will be removed. Methods for the planting and maintenance of these trees are outlined in the landscaping plans that accompany this application.

7.6.4 Protection of rare flora (Construction phase)

Two species of rare plant were recorded in, or adjacent to, the footprint of proposed works: flowering rush in the channel of the River Poddle adjacent to the location of the integrated constructed wetland, and broad-leaved helleborine in a patch of recolonising bare ground adjacent to the river channel at Fortfield Road. It is noted that neither species receives legal protection, nor are they included in the red list of terrestrial plants, but both are relatively rare in Dublin city, so they are considered to be of local importance.

To ensure the protection of these species, the contractor's ECoW will review all construction works in the vicinity of these plants and will implement appropriate measures to protect them. In all instances, the priority will be to leave the plants in-situ in order to avoid or minimise disturbance, but where this is not feasible, the plants may be translocated. The approach should be as follows:

 At the outset of construction works, the contractor's ECoW will survey the affected areas in order to map all individual plants of flowering rush and broad-leaved helleborine. The survey should be carried out during the growing season for these species (May to September, inclusive)

- The ECoW will review the proposed working areas with the contractor, in order to determine whether the rare plants will be disturbed
- Where possible, plants will be left in-situ and protected during construction works. Robust measures will be taken to protect the plants, including the use of temporary fences or other similar measures
- Where such impacts are unavoidable, the plants will be translocated to a similar habitat nearby (*e.g.* shallow flowing water for flowering rush, or broadleaf woodland for broad-leaved helleborine). The ECoW should liaise with a landscape contractor regarding suitable techniques for translocation, in order to maximise chances of survival. The ECoW will also consider options for the collection and dispersal of seed if any plants are in flower

7.6.5 Control of Nuttall's waterweed (Construction phase)

Some patches of Nuttall's waterweed were observed in the channel of the River Poddle adjacent to the proposed site of the integrated constructed wetland. It is possible that some waterweed plants could be spread during construction works, which would constitute an offence under the *EC* (*Birds and Natural Habitats*) *Regulations 2011*.

Prior to the commencement of construction, the contractor's ECoW will survey the affected section of channel to map the distribution of Nuttall's waterweed. If any waterweed is observed in the footprint of works, the ECoW will prepare an Invasive Species Management Plan, which will set out the contractor's strategy to ensure compliance with the law during construction works. The plan should include measures to avoid the accidental spread of waterweed plants during construction works, and to manually remove (and dispose of) any plants within or adjacent to the proposed working area. A derogation licence will be required from the Department of Culture, Heritage and the Gaeltacht.

7.6.6 Protection of nesting birds and terrestrial mammals (Construction phase)

Under Sections 22 and 23 of the *Wildlife Act* 1976 (as amended), it is an offence to kill or injure a protected bird or mammal, or to disturb their breeding / resting places. Most birds nest between March and August (inclusive), and the peak breeding period of most small mammals is similar. It is strongly recommended that any tree or shrub removal is carried out between September and February (inclusive). If this is not possible, an ecologist will survey relevant vegetation in advance in order to determine whether any protected fauna are present. If any are encountered, the vegetation clearance will be delayed until the protected fauna have moved away from the area, *e.g.* when chicks have fledged and a nest has been abandoned.

Tree protection zones will be marked out for all retained trees and hedgerows in the vicinity of working areas.

7.6.7 Installation of nesting platforms in Tymon Lake (Operation phase)

In recognition of the risk to nesting birds in Tymon Lake (which will be used for flood storage), two floating nest platforms will be installed on the Lake. These platforms will rise and fall as water levels fluctuate, and therefore will provide a safer nesting site for species like mute swan. Research in the UK has shown that a range of waterfowl will readily use nesting rafts, particularly when rafts are surfaced with vegetation (Burgess & Hirons

1992). Refer to **EIAR Volume 4, Appendix 7-4** for more information on the construction and benefits of nesting platforms, and an example of its successful application in Co. Clare.

It is intended that the nesting platforms will be approximately 1m x 1m in size and surfaced with sods of grass or reeds. They will be constructed on stable, floating platforms, but anchored to the ground to prevent them from drifting. Advice will be sought from specialists in the design of the rafts in order to maximise the likelihood of their success.

7.6.8 Provision of nesting sites for sand martins and kingfisher

An optional measure for ecological enhancement would be the construction of artificial nesting tunnels for sand martins and/or kingfisher. These species typically nest in shallow burrows in vertical sand / mud banks on river banks. No suitable habitat for either species was observed along the River Poddle during the baseline surveys for this assessment.

The details of these features could be agreed at the design stage, but some principles are outlined below. Artificial nesting banks can be created from concrete and clay / polyethylene pipes⁷, or purchased as pre-fabricated wooden boxes. Nesting sites should be located on or beside the river bank, with a minimum height of 1.5m above water level, and a length of at least 5m. The following sites would be suitable:

- The western edge of Tymon Lake, on the steep section of bank between the two streams
- The southern bank of the river downstream of Tymon Lake, immediately opposite the ICW
- The north bank of the realigned section of watercourse at Whitehall Park.

7.7 Residual Impacts

The mitigation measures outlined in **Section 7.6** will avoid or minimise impacts from the proposed development. Habitat reinstatement or replacement, including trees and woodlands, are proposed to mitigate unavoidable impacts. The implementation of these measures will be overseen by an ECoW.

The proposed pollution prevention measures will prevent fine sediments, concrete/cement, hydrocarbons and other pollutants from reaching the river and downstream designated sites. Subject to the successful implementation of these measures, the proposed development, either alone or in combination with other developments, will not adversely affect the integrity of any European sites, either directly or indirectly. A Natura Impact Statement accompanies this application.

The clearance of proposed working areas will have a slight negative impact on woodland, treeline and meadow habitats. This impact is an inevitable consequence of the development and cannot be avoided or mitigated. However, working areas will be reinstated to resemble the original habitat as closely as possible, including replacement planting of trees and meadows. In woodland areas some of the felled trees will be left insitu to provide dead-wood habitat for invertebrates. It will take at least ten years for woodland and treeline habitats to re-establish to their baseline condition, so this will

⁷ Guidelines on sand martin nesting habitat are available online: <u>https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/advice/conservation-land-management-advice/sand-martin-nest-sites/</u> or <u>http://downloads.gigl.org.uk/website/artificial_bank_creation.pdf</u>

remain as a Slight residual impact on the local status of these habitats in the short term, but in the medium term the impacts will be neutral.

It is noted that replacement tree planting will not be implemented at Ravensdale Park or Wainsfort Manor Crescent. However, these areas are small in extent and the habitats are urban parkland of Negligible ecological value, so the removal of small numbers of trees will have an Imperceptible effect. Considerations of the aesthetic or amenity value of these trees are made in the Tree Survey and Arboricultural Assessment that accompanies this application (see **EIAR Volume 4, Appendix 5-2** and **EIAR Volume 3**). Replacement tree planting elsewhere in the study area will more than offset the loss of at these locations.

The integrated constructed wetland will improve water quality in downstream sections of the river, and will provide additional habitat for fauna, notably aquatic habitats, breeding birds and foraging bats. This will have a positive ecological effect of Local importance.

Rare plants will be protected during construction works, either in-situ or by translocating them to a suitable receptor site. Subject to these measures, there should be an Imperceptible impact on these species.

Some Nuttall's waterweed is present in the river channel adjacent to the proposed integrated constructed wetland. The contractor will ensure that they avoid spreading the plant during construction works, and if required, will acquire a derogation licence from the Department of Culture, Heritage and the Gaeltacht. This will ensure that waterweed is not spread, and that the contractor complies with the *EC (Birds and Natural Habitats) Regulations 2011*.

The retained trees and shrubs will be protected during construction work using treeprotection zones. Trees will be felled and cleared outside the season of peak breeding seasons of birds and terrestrial mammals, or the area will be surveyed by an ecologist to confirm that no protected fauna were present. As a result, there would be no significant impact on nesting birds or terrestrial fauna in these habitats, and no legal offence under the Wildlife Act 1976.

Two floating nesting platforms will be installed in Tymon Lake to increase the diversity of nesting options for waterfowl, and to provide locations that are protected from fluctuations in water levels. On this basis, the residual impact on nesting waterfowl in Tymon Lake will be imperceptible. Artificial nesting banks for sand martins and/or kingfisher could also be provided, although this is an optional measure.

Subject to the successful implementation of these measures, it is concluded that the proposed development will not cause any significant negative impacts on designated sites, habitats, protected species, or any other features of ecological importance.

Table 7-8 provides a summary of potential impacts to biodiversity as a result of the proposed development, along with the mitigation measures that are proposed, and any residual impacts.

Feature	Potential impacts	Proposed mitigation	Residual impact
Designated sites	Significant effect: Pollution of watercourses could affect fauna within designated sites	Implementation of pollution-prevention measures	No impact
Habitats	Significant effect: Permanent loss and/or temporary disturbance of small patches of woodland, treeline and meadow. This will be mitigated by a range of habitat reinstatement, replacement and enhancement measures	Details of habitat enhancement and re- instatement measures are outlined in the landscape plan	Unavoidable Slight negative impact on local status of woodland, treeline and meadow habitats in the short term, but neutral impact in the medium term
Water quality and aquatic ecology	Positive effect: Addition of an integrated constructed wetland, which will improve downstream water quality	N.A.	Significant positive effect on water quality and aquatic ecology
Rare flora	Slight / Moderate effect: Loss or disturbance of flowering rush and broad- leaved helleborine during construction works	Translocation of any plants that are at risk	Imperceptible effect
Invasive species	Legal offence: Nuttall's waterweed may be spread during the construction of the integrated constructed wetland	The contractor will prepare an Invasive Species Management Plan	No legal offence
Bats	Imperceptible effect: Disruption of foraging / commuting bats due to tree removal	N.A.	Imperceptible effect
Birds and terrestrial mammals	Significant effect: Clearance of vegetation during the breeding season	Restriction on timing of works, or pre-clearance survey	No impact
	Significant effect: Inundation of waterfowl nests in Tymon Lake	Provision of nesting platforms	Imperceptible impact
Winter / non- breeding birds	No impact	N.A.	No impact
Smooth newts and common frogs	No impact	N.A.	No impact
Invertebrates	No impact	N.A.	No impact

Table 7-8:	Summary	of residual	impacts
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7.8 Monitoring

All working areas will be surveyed in the year following construction in order to assess the re-establishment of vegetation. If any areas are found not to be revegetating or are found to be susceptible to localised bank erosion, additional landscaping work will be carried out. If any replanted trees or shrubs fail to establish, they will be replaced with a suitable alternative. If Nuttall's waterweed or any other invasive species is found to have spread during construction works, the contractor will be required to eradicate any new growth.

Populations of rare flora will be monitored for the first three years after construction. If any populations are observed to be declining or in poor health, an ecologist will liaise with a landscape contractor regarding suitable methods to assist the plants.

The status of nesting birds in Tymon Lake will be assessed for three years following construction, including during any periods of high rainfall in the nesting season. If nests are being affected by inundation on an annual basis, then additional measures will be implemented, such as the provision of additional nesting rafts or modifications to the rafts.



Figure 7-1: Designated Sites



Figure 7-2: Habitat Map (Tymon Park)



Figure 7-3: Tymon Survey - Tymon North



Figure 7-4: Tymon Park (west)



Figure 7-5: Bat survey – Tymon Park (east)



Figure 7-6: Bat Survey – Whitehall / Wainsfort Manor



Figure 7-7: Bat Survey – Fortfield Road / Ravensdale

8 HYDROLOGY AND HYDROMORPHOLOGY

8.1 Introduction

This chapter of the EIAR presents the hydrological and hydromorphological assessment of the proposed River Poddle Flood Alleviation Scheme. The existing hydrological environment within the study area is described and the impacts of the proposed scheme on the water environment are addressed in this chapter. Impacts relating to the construction and operational phases of the proposed scheme are assessed and mitigation measures proposed to reduce significant environmental impacts on the receiving environment. Finally, residual impacts are identified. The waterbodies within the study area are shown in **Figure 8-1.** Readers are also referred to **Chapter 7 Biodiversity** in relation to interactions with the water environment.

8.2 Statement of Authority

This chapter has been prepared by Barry Dunphy from Nicholas O'Dwyer Ltd. Barry holds a Bachelor's Degree in Civil Engineering and a Master's Degree in Engineering Water, Wastewater and Hydrology with over 20 years' experience in the flood relief and water supply industry in Ireland and internationally. Barry is the consultant Project Manager for the Poddle Flood Alleviation Scheme.

8.3 The Proposed Development

A detailed description of the proposed works is contained in **EIAR Chapter 5**. **The Proposed Development** In summary, the proposed River Poddle Flood Alleviation Scheme will consist of:

- **Raised earthen flood embankments** along the upper reach of the River in Tymon North and Tymon Park to provide flood protection. The embankment at Tymon Lake in Tymon Park will be constructed to provide the main flood storage in the Scheme, and a replacement **flow control structure** at Tymon Lake will control flows downstream in a flood event.
- An **integrated constructed wetland (ICW)** in Tymon Park to improve water quality.
- New, replacement or reinforced **flood walls** to provide flood protection in residential areas in the middle reach of the River at Whitehall, Kimmage; at Wainsfort Manor Crescent, Terenure; to the rear of properties on Fortfield Road south of Kimmage Crossroads, Kimmage; at the end of St. Martin's Drive in Kimmage; and at Mount Argus Close in Harold's Cross.
- **Channel realignment and regrading** in Whitehall Park to provide clearance between the river and adjacent properties for flood protection.
- Ancillary works and associated development includes drainage channel clearance and removal of trees where required for the works; rehabilitating or installing culvert screens in locations as required; installing flap valves in all culverts draining to the River; rehabilitating or replacing manholes; biodiversity enhancements including installation of floating nesting platforms in Tymon Lake,

Tymon Park, Tallaght; and landscape mitigation and restoration at Tymon Park, Tallaght, Whitehall Park, Terenure, and Ravensdale Park and St. Martin's Drive, Kimmage including public realm improvements, replacement footbridges, biodiversity enhancements and tree planting and landscaping.

• **Temporary works** include establishing a main construction compound in Tymon Park with access off Limekiln Road, Tallaght which will be in operation for the entire duration of the works; and temporary works / set down areas at Wainsfort Manor Crescent, Terenure and Ravensdale Park and St. Martin's Drive, Kimmage which will be in use for the duration of the works to be carried out in these locations. Other temporary works include stockpiling of excavated earth in designated areas of Tymon Park, Tallaght; temporary channel crossings at Tymon North and Tymon Park, Tallaght; and channel diversions at Tymon Park, Tallaght and Whitehall Park, Terenure to enable the works along the River channel to be carried out.

The proposed works which have the potential to impact on the hydrology and hydro morphology of the River Poddle consist of:

- Site preparation works including contractor's compound the construction of temporary roads, and the ICW in Tymon Park;
- Temporary river crossings at Tymon North and Tymon Park;
- The construction of earthen flood storage embankments in Tymon Park;
- The construction of a flow control structure on the River Poddle at the outlet of the Tymon Lake;
- Channel re-alignment and reprofiling at Whitehall Park; and
- The construction of flood defence walls along the banks of the River Poddle at Ravensdale Park and at St. Martin's Drive.

8.4 The Existing Environment

The extensive modification of the River Poddle in the past has significantly reduced its ecological value. It is understood that the River has no populations of salmonids and the culvert in the lower section of the River is likely to be impassable to any migratory species (*e.g.* Atlantic salmon or sea trout).

The study area where works are to be carried out within the Poddle catchment area and particular in proximity to the River itself are:

- Tymon North embankment works adjacent to the River channel;
- Tymon Park embankment, flow control structure and footpath grading works adjacent to existing Tymon Lakes;
- Tymon Park ICW works in and adjacent to the River channel;
- Whitehall Park river channel re-alignment works;

- Wainsfort Crescent defence wall works along River channel;
- Fortfield Road defence wall at rear of gardens along River channel;
- Ravensdale Park defence wall and pedestrian bridge along River channel;
- St. Martin's drive defence wall along River channel;
- Mount Argus defence wall along River channel.

8.4.1 Catchment Extent

The River Poddle is a highly urbanised catchment. The majority of the flows into the River Poddle originate from the surface water network.

The River extends from the Cookstown area north of Tallaght to the north east where it joins with the River Liffey between Grattan Bridge and the Millennium Bridge and has a catchment area of 16.4km². The Poddle is an ungauged catchment so no historic flow data or rating curves are available. Following the flood events of October 2011, level alarms and CCTV were installed at the Lakelands overflow weir, at the Wainsfort Manor culvert, and at Gandon Close. These are used to notify SDCC/DCC drainage maintenance when water levels rise to a certain point which might indicate a blockage of obstruction at the culvert inlet screen. The recorded level data for these culverts provide verification of flows in the River for a given rainfall event which was used in the modelling of the River.

The extent of the catchment is shown in **Figure 8-2** along with details on Hydrological Estimation Points (HEP) which are provided in **Table 8-1**. The River Poddle lies within the Liffey and Dublin Bay WFD Catchment (Catchment ID: 09), Hydrometric Area (HA: 09).

A thorough review of the latest available drainage network maps confirmed that there has not been a significant change to the drainage network since the 2014 CFRAM study. The catchment area does not necessarily follow the topographic catchment due to cross connections *via* the drainage network.

HEP Point	Location	Catchment Area (Ha)	Channel Gradient
09_1029_U	Institute of Technology Tallaght	74.7	1:100
09_1874_2	Tymon Park	247.46	1:100
09_1874_5	Lakelands Overflow	378.54	1:250
09_1874_10	Mount Argus Park	481.09	1:167
09_1874_17	Confluence with the River Liffey	644.79	1:250

Table 8-1: Sub-catchments in the Study Area

8.4.2 Surface Water Quality River Poddle

In December 2000 one of the most significant pieces of water-related EU legislation was introduced, the EU Water Framework Directive 2000/60/EC (WFD) which fully embraces certain key environmental management principles. Firstly, it adopts a holistic approach covering all waters - rivers, lakes, transitional waters/estuaries, coastal waters and groundwater as well as their dependant wetlands. Secondly, it recognises that water systems do not stop at administrative boundaries, such as county boundaries, requiring waters to be managed at a catchment or River Basin District (RBD) level. The WFD is an umbrella directive that incorporates the requirements of some other earlier pieces of European legislation. The targets set in the WFD are ambitious, which envisaged that the majority of water bodies would achieve good status by 2015 (unless classified as heavily modified in which case they should have achieved 'good ecological potential' by 2015) and deterioration in existing water quality status is not acceptable ('good ecological status' in respect of macro-invertebrates is considered to be equivalent to a Q4 or above rating under the Irish water quality monitoring system. Other biological, physio-chemical and hydro-morphological elements also need to be taken into account in fully classifying river water bodies).

Ireland completed the first step in implementing the WFD in December 2003 by formulating the European Commission (Water Policy) Regulations (S.I. No. 722 of 2003) and transposing the WFD into Irish Law.

The EPA monitors the water quality of the River Poddle. River water quality is graded by the EPA from Q1 (seriously polluted) through to Q5 (unpolluted) based on the presence or absence of macro invertebrate communities. The Greater Dublin Strategic Drainage Study (GDSDS) outlined that, although the reference conditions had yet to be established for each water body within the GDSDS area at the time of its publication in 2005, the WFD is likely to require the achievement of both the molybdate-reactive phosphate levels (MRP) and biological Q value targets set out in the Phosphorus Regulations. However, derogations may be given for example where the waterbody has been heavily modified or for reasons such as technical unfeasibility, or disproportionate expense. Within the GDSDS area the River Poddle is likely to fall into this category as it has been heavily culverted and modified.

The EPA compiled a *National Implementation Report* in 2005 to provide information on the implementation of the Water Quality (Dangerous Substances) Regulations, 2001 (S.I. No. 12 of 2001). The report ("Dangerous Substances Regulations National Implementation Report, 2005") found the River Poddle to be Non-Compliant due to the presence of Atrazine. South Dublin County Council reported that the elevated level of Atrazine recorded in the Poddle River was due to a one-off sample and that this may have resulted from its use in domestic gardens or in parks in the area. Dublin City Council also reported slight Atrazine exceedances in the Poddle, as well as the Camac and Dodder Rivers.

The EPA "Interim Report on the Biological Survey of River Quality: Results of the 2007 Investigations"¹ found the River Poddle to be moderately polluted at Kimmage (Station No. 0400) and assigned it a rating of Q3. The lack of sensitive macroinvertebrate species and the abundance of tolerant species indicated severe ecological disruption. Excessive siltation and the presence of *Cladophora sp.*, a filamentous algae indicative of enrichment, were noted. Recent excavation works on the bank were also noted.

The report included the channel length surveyed (km) and the estimated channel length for the rivers in hydrometric area no. 9 in four biological quality classes: A - Unpolluted, B - Slightly polluted/eutrophic, C - Moderately polluted and D - Seriously polluted. Two kilometres of the River Poddle was surveyed and designated as Class C (moderately polluted) with a WFD Quality Class of "Poor" (**Figure 8-3**).

8.4.3 Estuarial/Transitional Waters within the study area

As can be seen in **Figure 8-1**, the River Poddle discharges to the Liffey Estuary Lower transitional waters. The Liffey Estuary Lower and the Tolka Estuary transitional waters are classified as "At Risk" of deteriorating or being at less than Good status in the future (**Figure 8-4**). The Transitional Waterbody WFD Status 2010-2015 mapping designated the Liffey Estuary Lower and Tolka Estuary as having "Moderate" quality status.

8.4.4 Catchment Description

The majority of the Poddle catchment is classified as low and very low near surface nitrate susceptibility, with a limited area of moderate and high susceptibility between Ravensdale Park and Mount Argus Park. The majority of the catchment is classified as high near surface phosphate susceptibility. Tymon Park and the reach of the River upstream of the M50 has a low near surface phosphate susceptibility, with a limited area in the vicinity of Wainsfort being classified as moderately susceptible.

The Poddle catchment is highly urbanised and heavily modified channel with no natural tributaries. This is noted in the changes in the River's course over time including the canalisation and culverting of the River as well as the introduction of in line lakes at Tymon North and in Tymon Park. Notable modifications to the River include:

- Lakes at Tymon North
- Lakes at Tymon Park
- Diversion of flows from Balrothery weir (Dodder) to Poddle just upstream of Lakelands weir – now removed

¹ (<u>https://www.epa.ie/pubs/reports/water/rivers/Interim%20Report_2007_web.pdf</u>)
- Penstock (broken) and overflow weir at Lakelands to divert flows to Terenure College Lakes
- Culvert and screen from exit of Wainsfort Manor to rear of Fortfield Avenue where River used to run *via* Kimmage Lodge and St Anne's flour mills
- Canalisation of River through Ravensdale Park existing course ran to east of Park *via* Ravensdale Mills with a weir and canal running to a Mill pond before re-joining the main River at Poddle Park (current course)
- Culverted channel at Larkfield Mills now SuperValu Sundrive to Stone Boat weir
- Culverting of River from Gandon Close, Harold's Cross to run under ground as far as the Grand Canal
- Grand Canal siphon and overflow into Grand Canal Sewer
- Poddle course continues underground from the Canal (except at White Swan Business Park) to outfall at Wellington Quay

8.4.5 Hydromorphology of the River Poddle

This section provides an overview of the existing hydromorphological condition of the River Poddle along with the impacts associated with the construction of the proposed Flood Alleviation Scheme.

Hydromorphology can be described as the hydraulic interaction between channel form and channel flows to define physical habitat. This also demonstrates the important link between hydromorphological forms and processes, and ecological condition and habitat. A hydromorphological response to a physical modification within a watercourse needs to be understood to determine not only the impacts on hydromorphological condition but also the impacts to habitats at a local scale. Please refer to **EIAR Chapter 7 Biodiversity** for information regarding the impacts of the proposal on habitats and species and proposed mitigation.

The WFD defines the flow, shape and physical characteristics of a watercourse as its hydromorphology. Any in-channel works can impact upon the shape of a watercourse and the natural processes that occur within it, including:

- flow patterns
- width and depth of a channel
- features such as pools, riffles, bars and bank slopes
- sediment availability/transport
- interaction between a channel and its floodplain
- ecology and biology (*i.e.* habitats which support plants and animals)

The River was part of the original settlement of Dublin city in the 9th century, forming the Dubh Linn (dark lake) after which it is named. However, as the City expanded the River

was extensively modified, including culverting under roads and residential areas, and realignment along property boundaries. The most significant change was the enclosure of the lower section of the River under Dublin City centre, comprising approximately 2 to 2.5km of culvert between Harold's Cross and Wellington Quay. Five other sections of the River have been culverted under residential developments, each between 100 and 500m length. The most extensive re-alignments are at the source of the River in Tallaght, where it has been aligned along boundaries in an industrial estate, and in Tymon Park, where it has been widened to form a series of ponds. The Poddle is significantly modified compared to natural conditions associated with a river of this type as a result of urbanisation leading to disconnection of the floodplain, channel realignment, and in-channel structures impacting sediment transport and channel widening/narrowing.

8.5 Methodology

This chapter presents the findings of a desktop study of available hydrological and water quality data from published sources from the EPA and OPW. It discusses the surveys, modelling and analysis carried out by NOD and specialist subconsultants Black & Veatch to design the Flood Alleviation Scheme. The analysis carried out incorporates river flow and level data, water quality sampling results, flood study reports, topographical site and riverbed survey information, along with geological and Ordnance Survey mapping.

8.5.1 Modelling the catchment

During the Eastern CFRAM Study in 2011 a Hydrology Report and Hydraulic Modelling Report were prepared. The hydraulic model for the River Poddle catchment was developed using InfoWorks ICM software which modelled the existing river channel (river cross sections, hydraulic structures and culverted sections) from Cookstown to the outfall to the River Liffey and included the contributing surface water network drainage.

The Hydrology Report for the River Poddle Scheme was compiled by Black & Veatch in 2019. This report contains a review of the previous hydrology assessment undertaken as part of the CFRAM study and provides recommendations for the proposed hydrology methodology to be used for the current River Poddle Flood Alleviation Scheme. This information was used to update and develop the hydraulic model to assess the extent of flood risk for the existing catchment and to determine the proposed flood alleviation measures to be adopted as part of the Scheme.

The hydrological study includes the analysis of existing hydrometric and meteorological data available throughout the catchment. This analysis determined the recent extreme events which could influence hydrological parameters used in previous studies.

Following the completion of the Hydrology Report a detailed assessment and update of the hydraulic model for the River Poddle was carried out by Black & Veatch using the updated hydrological information together with:

- a review of the River Poddle Catchment extents
- a review of GIS surface water networks for south Dublin and Dublin city areas within the Poddle Catchment to include for any changes to surface water network draining into the Poddle

- review of planning permissions in the catchment pertaining to changes in permeability and drainage into the Poddle as well as any modifications to the channel itself in terms of river crossing, weirs, bridges, culverts *etc*.
- a review of the CFRAM hydraulic model completed in 2014 to determine model stability.
- assessment of level monitors at Lakelands, Wainsfort Manor and Gandon Close and rain gauges within the catchment to verify flows.
- CCTV (closed circuit) survey of Lakelands overflow culvert to Terenure College Lakes, 24" drainage culvert on Priory Road, Kimmage and National Stadium culvert and siphon clean out.
- assessment of flow and rainfall survey data carried out at point locations along the River channel to verify the model.
- inclusion of topographic survey along the extents of the channel to provide updated levels.
- reservoir analysis to determine the storage requirement at Tymon lake, level of embankment works required and the most appropriate method to allow safe spill of the embankment should an event greater than the 1% Annual Exceedance Probability (AEP) or 100 year event occur.

The results of the hydraulic analysis were mapped to show the flood extents and depths for the 2yr, 5yr, 10yr, 20yr, 50yr, 75yr, 100yr, 1000yr flood events for the as well as the 100yr with 20% and 30% increase in peak flows attributable to climate change. **EIAR Volume 3**, contains the flood map outputs for the 100yr or 1% AEP event.

Inclusion of threshold survey levels for properties within the catchment to determine the level of damage for flood events ranging from 50%, 20%,10%, 5%, 2%, and 1% AEP flows as determined in the Hydrology Report. This determined the level of economic damage that would occur within the catchment from fluvial and pluvial flooding for the range of flooding events. These damage levels in monetary terms were then compared to the levels of damage that remained following the completion of the fluvial and pluvial proposed works to demonstrate the economic cost benefit to the flood alleviation scheme.

The design flood event for which the Flood Alleviation Scheme is proposed to protect was agreed by the Project Steering Committee to be the 1% AEP with the additional allowance of 60% blockage at the 12 significant culverts along the River.

8.5.2 Catchment Hydrology

The Poddle catchment is highly urbanised and heavily modified channel with no natural tributaries. This is noted in the changes in the River's course over time including the canalisation and culverting of the River as well as the introduction of in line lakes at Tymon North and in Tymon Park.

The modified urban nature of the watercourse means that standard methods for calculating the design flows such as Flood Studies Update (FSU) or Institute of Hydrology Report No. 124 (IH124) are not appropriate. From the FSU Web Portal, the catchment of the River

Poddle has an Urban Extent (URBEXT) factor of 0.8942, which accounts for high levels of urbanisation with very little rural contribution to the flow in the River.

As with other heavily urbanised watercourses, inflows to the River Poddle originate mainly from the surface water drainage network, although the base flow would be from groundwater. Therefore, the most suitable method for calculating flows in the system is an integrated modelling approach. This approach applies a rainfall hydrograph profile to a catchment with user defined permeability characteristics (*e.g.* percentage grassed, paved, roofed, *etc.*) to generate a flow in the surface water network which feeds the main watercourse.

Rainfall hydrograph profile

The initial step for generating the rainfall hydrograph profile was to use the FSU Work Package 1.2 '*Estimation of Point Rainfall Frequencies'*. This package estimates design rainfall events and their associated Depth, Duration, and Frequency (DDF). The output of the package is 2km x 2km gridded rainfall data for a range of return periods (or AEPs) and storm durations. The gridded rainfall is then converted to a rainfall hydrograph profile using storm profiles developed through the Flood Studies Report (FSR) and subsequent Flood Studies Supplementary Report No. 16.

The profiles selected for consideration were the 50% summer and the 75% winter profiles. During the model runs undertaken in this study it was found that the 50% summer profile provided the more extreme flood flow conditions within the River Poddle. As such the 50% summer profile was used for all design rainfall AEP events and rainfall depths were calculated for a range of durations from 15 minutes to 25 days and for AEPs from 50% to 0.1%.

Storm durations

In addition, a range of durations was analysed to determine the critical storm duration at various reaches along the catchment. For the upstream area around Tymon Park the critical duration was between 1 and 2 hours, while downstream of Tymon the critical duration was found to be 9 hours. This is unusually long for an urban catchment but can be explained due to the upstream attenuation at Tymon Park. Moving further downstream to the area around Mount Argus Park, the critical duration reduces again to approximately 2 hours. The worst-case critical duration was investigated to ensure that the worst-case storms are used in assessing flood risk at various locations along the watercourse with critical durations varying from 2 to 9 hours.

Historic flood events

Prior to the CFRAM study there were a number of historic events which caused flooding on the River Poddle. These are discussed in more detail in the following sections. The return period for these events was derived using the FSU web portal data.

Since the CFRAM was published there has been no reported flooding from the River Poddle. The 2011 flood event has been simulated using the hydraulic model to confirm that this recent event has been represented accurately.

24-25/10/2011 event

Up to 90mm of rain (as recorded by the Casement rain gauge) was reported to have fallen within a 6 hour period on the evening of 24th October, 2011. This resulted in major flooding

along the River Poddle. It was reported that the rainfall depth exceeded the 2% AEP (1 in 50 year event) at a number of rain gauging locations throughout Dublin and in some locations the 1% AEP (1 in 100 year event) was exceeded.

Post flood surveys were carried out to record flood extents and flood levels wherever possible. The resulting level information, photographs and anecdotal evidence were used to calibrate the hydraulic model.

05/09/2008 event

There was 47.88mm of rainfall recorded at Casement rain gauge and 57.9mm recorded in the Kimmage area over an 11 hour period which is approximately a 20% AEP (1 in 5 year event).

06/11/2000 event

The Poddle overflowed its banks in the Kimmage area when 103mm of rain fell over a 48hour period in the Dublin area with estimated return periods of 4% to 3% AEP (1 in 25-33-year event).

11/06/1993 event

The Poddle River was reported to have overtopped its banks. Rainfall depth reported to be in the order of 1% to 0.4% AEP (1 in 100 - 250 year event). This was a long duration event in excess of 24 hours and the flooding was relatively minor.

25/08/1986 event

Hurricane Charlie caused significant flooding throughout Dublin. Along the River Poddle, a total of 80 households and 5 commercial properties were seriously affected by the flooding. Affected area stretched from Kimmage Cross Roads to the Grand Canal. No specific data on flood extents or locations was available for model verification.

Hydrological Estimation Points

Five Hydrological Estimation Points (HEP), similar to those used for the CFRAM Report were chosen to calculate intermediate flow value along the River Poddle as part of the hydrological study for the Poddle FAS. These locations are shown on **Figure 8-2** indicated by the red, yellow and green dots.

There are no tributaries along the River Poddle. Itwas decided during the preparation of Hydrology Report for this Scheme to match the four HEP used in the CFRAM study so that they can also be used to compare output with previous studies. The locations are as follows:

- 1. at the upstream end of the open watercourse close to the Institute of Technology Tallaght
- 2. at Lakelands Overflow Sluice
- 3. at the upstream end of Mount Argus Park
- 4. at the confluence with the River Liffey

A fifth point was selected for this project at Tymon Park as it is critical for the proposed online storage option.

8.5.3 Estimation and Validation of Design Flood Parameters

Design flood flows were calculated as part of the previous CFRAM study by using the FSU methodology and were compared to the flows generated by the CFRAM ICM model. Design flood flows for the Hydraulics Report for this study were then generated by the hydraulic simulations from the updated ICM model for the purposes of the development of the Flood Alleviation Scheme.

The FSU web portal (specifically 'Work Package 1.2, Flood Studies Update, Estimation of Point Rainfall Frequencies') was utilised to estimate the return periods for the storm events listed in **Section 8.5.2** using the rainfall data record available at these gauges. The Poddle catchment according to the FSU web portal can be seen in **Figure 8-5**.

The design flows were compared for the 10%, 1% and 0.1% AEP. **Table 8-2** below shows the comparison of the flows calculated with FSU, in the original CFRAM study and using the updated flood alleviation scheme (FAS) ICM model.

НЕР	10% AEP			1%AEP			0.1% AEP		
	FSU	CFRAM	FAS	FSU	CFRAM	FAS	FSU	CFRAM	FAS
09_1029_U Inst. of Techn. Tallaght	0.68	2.0	1.12	1.25	3.0	2.09	2.23	3.8	2.98
09_1874_5 Lakelands Overflow	3.36	4.1	2.16	6.21	6.3	6.57	11.06	8.4	10.49
09_1874_10 Mount Argus Park	5.47	2.3	1.49	10.10	2.8	5.00	18.01	5.2	5.93
09_1874_17 Confluence with the River Liffey	8.10	4.2	1.19	14.98	5.0	2.05	26.71	6.2	3.55

Table 8-2: Comparison of FSU flows to ICM model flows (CFRAM and FAS current study)

8.5.4 Assessment of Potential Future Scenarios

Review / Validation of Design Storms

The hydrological analysis was applied in the hydraulic model to determine the critical storm durations for each area of the catchment, allowing the worst-case scenario to be designed for. Data provided in the model included rainfall depths for a range of events from the 50% AEP to the 0.1% AEP inclusive for the 9-hour duration event only.

As the catchment is highly urbanised the critical storm duration would be expected to be short. However, from the results from the modelling that was carried out for the Flood Alleviation Scheme this did not appear to be the case. The likely reason for this is the existing attenuation which occurs at Tymon Park and other storage areas which are close to the upstream end of the watercourse.

From the analysis undertaken the critical duration for the upstream catchment as far as Castletymon Road Bridge is 2 hours, this then increases to 3 hours across Tymon Park and then becomes 9 hours from Tymon Park to the downstream boundary. The reason for this increase in the critical duration is due to the attenuation at Tymon Park which slows the flows down within the model and means that the peak response from the impermeable areas is similar to the response from permeable areas. The respective critical durations along the particular reaches of the River Poddle are illustrated in **Figure 8-6**.

Summer storms were more critical and gave the highest peak water levels along the entire length of the watercourse. This is to be expected given the urban nature of the catchment which is at greater risk of flooding from a flashier higher peaked rainfall in the summer than flatter longer duration winter rainfalls.

All design storms were simulated for the three critical durations (2, 3 and 9 hours) and with the summer profile. Generated flood extents map the worst-case scenario with the outputs of three rainfall durations combined together.

Climate Change Scenarios

When determining design flood levels for the defences, due consideration must be given to the long term affects attributable to climate change. The effects of future climate change have been assessed based on guidelines issued by the OPW. These guidelines recommended that two future scenarios should be assessed as follows:

Mid-range future scenario (MRFS) whereby;

- Rainfall depths +20%
- Flood flow +20%
- Sea level +0.5m
- Decrease in time to peak by 1/3 (Tp) due to afforestation [sic] future scenario allowances for the effects of forestation are not applicable due to the urban nature of the catchment

High end future scenario (HEFS) whereby:

- Rainfall depths +30%
- Flood flow +30%
- Sea level +1.0m
- Decrease in time to peak (Tp) by 1/3 and add 10% to Standard Percentage Runoff (SPR) rate due to afforestation [sic] future scenario allowances for the effects of forestation are not applicable due to the urban nature of the catchment

8.6 Potential Impacts During Construction

The impacts of the proposed scheme in the absence of mitigation measures on the water environment within the Study Area as described in **Section 8.2** are described in the following sections.

8.6.1 Site Preparation Works for the Access Tracks and Contractor's Compound at Tymon Park

Site preparation works for the access tracks and contractor's compound at Tymon Park will include the stripping of topsoil and the placement of mobile offices and toilets. The contractor's compound at Ravensdale will be a setting down area and will not require excavation of topsoil to establish it. The contractor will agree the location of the compounds with South Dublin County Council and Dublin City Council prior to the commencement of works in the respective areas.

The stripping of topsoil to create the base for the access tracks and the contractor's compound has the potential for silt laden runoff to enter the River during heavy rainfall events, with the potential for moderate short term for negative impacts on water quality and species that inhabit the River.

The spillage of diesel, hydraulic oil or lubricants from the contractor's compound to the watercourse may have a significant medium-term negative impact on the water quality and species that inhabit the River. Any spillage of diesel/hydraulic oil may also have a significant medium-term impact on groundwater in the area. The Outline CEMP details the construction methodology for the elements of the Scheme including prevention and control of spillages and pollution of water courses.

8.6.2 Site Preparation Works for the Tymon North Embankments, Tymon Park Flood Storage Embankment, Flow Control Structure and ICW

The construction of the flood storage embankments in Tymon Park will require the removal of the topsoil and excavating to subsoil in the footprint of the embankments on both sides of the River and at the Lake. Excavation to bed level of the River is required for the development of the ICW which is estimated at approximately 5,000 m³.

Excavated material will be held on-site temporarily at designated locations and screened for use in the construction of the embankments. It is estimated that 50% of this material will be required for the embankments and landscaping and the remainder will be taken off site for disposal at a licensed facility. Any material that is imported for construction of the embankments will need to be screened to test its suitability before being brought to the site. All earth material for the embankments will be brought on to the site will be for immediate use.

The excavation of the soil and the removal of the subsoil to create the embankments and ICW has the potential to increase the vulnerability of groundwater to pollutants. In the event of any spillages of diesel or rupturing of the hydraulic pipes on the excavators this may cause a significant medium-term negative impact on groundwater because of the immiscible nature of the material.

Silt laden runoff from the temporary stockpiles may have the potential to discharge to the River resulting in a moderate negative short-term impact on water quality and species. The presence of suspended soils in the runoff has the potential to settle out in the riverbed depending on their size and the velocity of flow in the River.

There is potential for pollutants to enter the stream during construction of the wing walls and the flow control structure. The temporary crossing at Tymon North and the temporary crossing and channel diversion of the River around the site of the wing walls in Tymon Park may potentially have a moderate short-term negative impact on water quality in the River. The release of the sediments into the water column will have a potential significant negative impact on water quality. Re-suspension of nutrients and trace heavy metals may cause an additional impact. In addition, the diversion of the River may have a significant negative impact on fish that live in the River but if correctly designed should not affect the movement of fish. The reduction in the overburden over the bedrock will leave the groundwater more susceptible to pollutants.

The excavation of the foundations for the wing walls is another potential source of pollutants to the water and groundwater in the area. Diesel/hydraulic oil from the bucket of the excavator are significant sources of pollutants to the River and groundwater. Any spillage of diesel or hydraulic oil to the River would cause a significant medium-term negative impact on water quality with the possibility of fish kills particularly during the summer months when river levels are low. Any spillage of diesel or hydraulic oil to the River would cause a significant medium.

The pumping of concrete into the formwork is a potential pollutant. The spillage of uncured concrete into a water body will cause a rise in the pH of the water (an increase in hydroxyl ions). This would cause a moderate short-term negative impact on water quality. A concrete spill would also increase the suspended solids levels in the River which would have a significant negative impact on fish and macroinvertebrates.

8.6.3 Construction of Channel Re-alignment at Whitehall Park

Construction of the channel re-alignment at Whitehall Park will entail topsoil stripping and excavation to create a new channel course for the River, excavation of new riverbank and side slopes on the right bank side and build-up of riverbank for flood protection on the left bank side. The existing river channel at this location will be filled in. Excavated material will be screened for use in the construction of the embankments and grading of the slopes and infilling the existing river channel course but remainder will be taken off site for disposal at an agreed licensed area.

The excavation of the soil and the removal of the subsoil to create the new channel and embankments has the potential to increase the vulnerability of groundwater to pollutants. In the event of any spillages of diesel or rupturing of the hydraulic pipes on the excavators this may cause a significant medium-term negative impact on groundwater because of the immiscible nature of the material.

There is potential for pollutants to enter the stream during construction of the defence walls at the approach to Lakelands overflow.

The excavation of the foundations for the walls is another potential source of pollutants to the water and groundwater in the area. Diesel/hydraulic oil from the bucket of the excavator are significant potential sources of pollutants to the river and groundwater. Any spillage of diesel or hydraulic oil to the river would cause a significant medium-term negative impact on water quality with the possibility of fish kills particularly during the summer months when river levels are low. Any spillage of diesel or hydraulic oil to the river would cause a significant medium-term negative impact on groundwater quality.

The pumping of concrete into the formwork is a potential pollutant. The spillage of uncured concrete into a water body will cause a rise in the pH of the water (an increase in hydroxyl ions). This would cause a moderate short-term negative impact on water quality. A concrete spill would also increase the suspended solids levels in the river which would have a significant negative impact on fish and macroinvertebrates.

8.6.4 Construction of Fluvial Defence Walls Along the Banks of the River Poddle

Construction of new or replacement flood walls has the potential to cause significant impacts on water quality. The flood wall construction will include the excavation for foundations. It will involve placing a cofferdam around the area for excavation, removing the material to the required depth, and, unless precast units are used, formwork and pumping of concrete/grouting into the footings. The formwork will be put in place, and reinforced steel and concrete/grouting will be pumped into the formwork. The construction of these walls has the potential to have a moderate short-term negative impact on water quality in the River Poddle.

A number of operations in this process have the potential to pollute the surrounding water. The pollutants range from oil on the excavator, to diesel and lubricants on the formwork. These pollutants would have a significant short-term negative impact on the water quality in the River. The release of suspended solids and silt into the River would have a moderate short-term negative impact on aquatic species in the River. This impact would be exacerbated in summer when river flows are expected to be lower.

8.6.5 Impact of Scheme on Hydromorphology of the River Poddle

A baseline geomorphological survey was carried out as part of the design process. The information gathered was used to assess the impact of the proposed scheme on the geomorphological processes within the catchment. The key aspects considered in the assessment are the likely impact of the Scheme on the erosion and deposition of sediment in the catchment and how the functioning of the Scheme may be adversely impacted by it. It is noted that as the works are being constructed in urban areas, it is considered that the impact of the Scheme on the overall catchment geomorphology, or any high-quality physical river habitat, will be limited.

The key consideration of the Scheme is that it should not alter the morphological typology (*i.e.* the 'type of river morphology') of the River Poddle.

8.7 **Potential Impacts of the Proposed Scheme during Operation**

8.7.1 Impacts of the Operation of the Tymon Park Embankments and Flow Control on Water Quality

The short-term storage of the flood water in the reservoir will cause it to accumulate nutrients (nitrogen and phosphorus) from the soil. The flood water will also accumulate suspended solids and silt from the land. This will have the effect of increasing the loading of these chemicals and pollutants to the River. After a flood event the River water will be naturally turbid and will contain suspend solids and silt from the surrounding land in the catchment. However, the discharge from the storage reservoir will extend that loading and will add additional suspended solids and silts to the River. This will have a moderate short-term negative impact on the water quality in the River.

The maximum discharge rate through the flow control structure will be 748 l/s during events greater than the 50% AEP up to the 1% AEP. The outflow from the lake through the flow control structure has the potential to impact locally on bed and bank erosion. The potential scouring could result in the re-suspension of sediments and silts into the water that will be carried downstream. The rate of deposition of this material will be dependent upon its size and the velocity in the River, but it is expected that the majority of the material will settle out within the riverine system. It will have a localised moderate

negative impact on the water quality in the River. However, the design of the flow control structure will be such as to minimise any hydraulic transience and bed and bank stabilisation will be utilised if appropriate to prevent scouring. The ICW is located downstream of the flow control structure and will provide an improvement in water quality in the river as it exits Tymon Park.

8.7.2 Impacts of the Operation of the ICW on Water Quality

The ICW concept is tailored towards the treatment of a wide range of common parameters, particularly nutrients (Ammonia-N, Phosphorus, Nitrate, *etc.*) as well as additional parameters such as Suspended Solids, Biochemical Oxygen Demand and a variety of metals. The removal mechanisms for these are primarily absorption, adsorption, precipitation, sedimentation and sequestration. The inclusion of the ICW in the proposed Scheme demonstrates a commitment on behalf of SDCC to improve water quality within the River Poddle to work towards achieving 'Good' water quality status under the WFD.

8.7.3 Impacts of the Operation of the Fluvial Defence Walls and Embankments Along the Riverbanks on Water Quality

When construction is complete it is anticipated that the impact of the fluvial defence walls on water quality will be minimal. There may be some localised changes in the flow patterns around or close by to them, but it is anticipated to only be noticeable when the flows are high and the walls are holding water levels. This will be a localised minimal impact. In most cases the walls constructed are replacing existing in-channel walls and embankments are located adjacent to the riverbank so there are minimal effects. As flows increase and when the defences are "*acting"* (*i.e.* containing significant flood events) then the flow patterns will change from the existing scenario as they will be largely contained within the channel rather than flowing out into urban areas. This act of containment would not adversely affect quality as compared with flowing onto paths and roads and returning to the channel.

8.8 Mitigation Measures

The following measures are recommended to mitigate against the potential impacts during the construction and operation phase as outlined in **Section 8.6** and **8.7** above.

In general, all works on the riverbank will be subject to a specific method statement agreed in advance with the statutory authorities. The method statement will incorporate the following points:

- To avoid excessive silt runoff, site clearance is not to be undertaken during wet conditions, when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours.
- To avoid contamination of the River water during an extreme flood event, no works likely to generate soiled water are to be carried out when rainfall of more than 3mm/hour is forecast within the next five days in the River Poddle catchment.
- At the riverbank works locations, eroded sediments are to be retained with silt fences.
- Soil cleared from the site and all materials associated with the building process are to be stored outside the flood zone in designated storage areas.

- Works adjacent to the riverbank will have catch-nets and silt traps to prevent debris from falling into the River.
- Raw or uncured waste concrete is not to be disposed of within 30m of the River.
- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils *etc.* are to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment.
- Fuelling and lubrication of equipment is not to be carried out close to the riverbank or lake shore.
- Any spillage of fuels, lubricants of hydraulic oils is to be immediately contained and the contaminated soil removed from the site and properly disposed of.
- Waste oils and hydraulic fluids is to be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Hydrocarbon/grit interceptors of suitable size are to be placed on the runoff discharge from the car park at the abstraction point and must be maintained by a person or persons designated to carry out this maintenance.

8.8.1 Mitigation Measures during Construction - An Overview

Mitigation measures relate to the protection of the aquatic environment from significant impacts that have been identified during the construction works. In addition to mitigating significant impacts for water quality these mitigation measures will also protect the aquatic species in the river.

Best practice mitigation measures will be employed for this Scheme as contained in the following guidance documents and best practice UK CIRIA guidance which includes but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites guide to good practice
- NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005);
- the Eastern Regional Fisheries Board guidance document 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Murphy, 2004); and
- the Southern Regional Fisheries Board guidance document 'Maintenance and protection of the inland fisheries resource during road construction and improvement works' (Kilfeather, 2007).

At the start of the project it is recommended that the main contractor holds a series of toolbox talks with the sub-contractors and supervisors to make them aware of the various environmental commitments made in relation to the scheme. It is recommended that responsible personnel and communication lines are agreed in advance of the work starting. These named responsible people should be documented in an Environmental Operating Plan for the scheme.

It is recommended that measures contained in the scheme specific Construction and Environmental Management Plan (CEMP) are instituted prior to the work commencing. The Plan shall follow the guidelines and headings of the ISO 14001:2006 Environmental Management Systems Standard. The Plan should also incorporate waste management, separation, disposal and documentation for wastes generated on-site, and in the contractor's compound. All contractors working on site should be made aware of the CEMP, its requirements and reporting procedures. A nominated person shall be tasked with maintaining the CEMP, ensuring that training is given to all workers and that all records regarding waste handling and disposal, environmental incidents and emergency procedures are kept in the main site office. It is recommended that an independent audit of the CEMP is carried out before the work commences. Similarly, a review of the CEMP shall be carried out during the construction programme.

For in-river works the following mitigation measures are recommended:

- Measures to minimise the suspension and mobilisation of sediment downstream of the working area should consider silt barriers and cofferdamming to create dry working areas.
- Works should allow the river to recover for at least 14 hours on a daily basis meaning that the period of in river work should be about 10 hours maximum.
- A dry working area should be created for pouring of concrete.
- In areas of the river where there are alien species, all plant and machinery should be thoroughly washed before moving to another section of the River.
- All vehicles should be regularly checked for oil leaks, and ruptured hose pipes.

Control of Suspended Solids

The potential for the release of suspended solids to the River during the construction of the storage embankments will be significantly increased during wet weather. It is recommended that temporary fencing is erected around working areas adjacent to the river to prevent earth-moving equipment from encroaching too close to the River or Lake at Tymon when constructing the walls and embankments.

The risk of erosion will be minimised where possible by planning the construction and construction routes. It is recommended that the topsoil under the footprint of the embankment is removed on a phased basis to help reduce the likelihood of soil erosion at the site. Where the topsoil is stripped and the subsoil removed, a drainage system should be installed to collect water from the excavated/denuded areas. The water should drain to a temporary settlement pond. The overflows for the settlement ponds should be to land rather than the River or the Lake. Sandbags should be used in denuded areas to attenuate runoff and reduce soil erosion. Stockpiles of soil should be situated a distance away for the edge of the river. Sandbags should be placed around the stockpiles to prevent sediment laden runoff to the river.

Only certified soil should be used for the construction of the embankments.

Wash down areas for vehicles and site equipment should be located away from the riparian zone. The wash water should be directed to the settlement pond.

The pouring of the concrete for the wing walls of the flow control structure should be undertaken in dry weather and the concrete should be allowed to cure for 48 hours minimum. Wash water from the concrete pumps or surplus concrete left in the truck must not be discharged to the river.

Control of Other Pollutants

Best practice methods should be employed at all stages during the construction. Fuel, lubricants, hydraulic oil, repair equipment used on the construction site should be carefully handled to avoid spillage. All tanks, barrels or containers containing hazardous materials (oils, lubricants, sealants *etc.*) must be stored in a sufficiently sized bunded area. Spill kits will be made available in site compound and in site machinery. In the event that a spillage does occur, adsorbent material should be placed on the material to adsorb it. The contaminated adsorbent should be correctly disposed of as a hazardous waste and brought to a licenced waste handing site by a licenced waste contractor. The Site Manager must retain a copy of any waste transport and disposal documentation. In the event of a larger spillage of oil/hydraulic oil then South Dublin County Council and/or Dublin City Council Environment Sections should be contacted immediately. The Emergency Procedures for the site should have a procedure for dealing with large spillages.

All empty diesel/oil/hydraulic oil containers should be drained to a single labelled container. The empty oil containers should be stored in a dedicated labelled totally sealed skip. Waste skips should be collected by a licenced waste carrier and brought to a licenced facility for disposal. All disposal records must be retained at the site offices.

The waste from the chemical toilets should be collected by a licenced waste carrier and brought to a licenced treatment facility.

A supply of oil booms and soak pads must be maintained within the contractor's area.

8.8.2 Timing of In-River Works

As this is a non-salmonid river, there is no seasonal restriction on timing of in-river works, and no requirement for prior approval of in-river works by IFI or NPWS, except that, as described above, it may be preferable to carry out certain works in low flow periods. Best practice measures will be adhered to and any diversions of the river during construction should follow the NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005).

8.9 Monitoring

A robust programme of maintenance will ensure that culvert screens and channels are kept clear of debris to ensure the Flood Alleviation Scheme functions correctly during a storm event. This includes carrying out repair works on existing walls and instituting a robust maintenance programme to ensure that debris that has accumulated in the channel is removed and vegetation cleared in order to prevent blockages in the future. These measures will be undertaken by each Council (South Dublin County Council and Dublin City Council) as part of a regular maintenance programme. The existing culverts and screens at Wainsfort Manor, Lakelands and Gandon Close have CCTV cameras and level alarms and are currently checked and cleared by the responsible local authority in advance of forecast rainfalls.

In addition to the above maintenance an asset register of the flood defences for the River Poddle will be prepared for SDCC/DCC to be incorporated into the development plans for both authorities to ensure that defences that are erected will not be removed as part of any future development either by a local resident or as part of a planning submission. The embankment structures will be kept clear of tree planting to maintain structural integrity and the flow control structure and embankment at Tymon Lake will undergo periodic checks by an All Panel Reservoir Engineer to ensure that the structural condition of the embankment is in order and there is no change or obstruction to the operation of the emergency overflow spillway that would inhibit the secure overflow of the embankment for events greater than 1% AEP.

8.9.1 Residual Impacts

The construction of the scheme will require in river works along the length of the River Poddle as well as works adjacent to and within the drainage area of the River. There is a potential for increased silt and suspended solids in the River during the construction work but with strict adherence to the Standard Operating Procedures for working in the River these impacts should be mitigated. In summary, in respect of the water environment, the impacts of the construction and operation of the Scheme will be localised and short term.

There will remain some areas within the catchment that will not directly benefit from the flood defence works and where there will still remain residual flooding. Residual flooding will occur in these areas as a result of localised pluvial flooding where the existing surface water network does not have the capacity to cope with a 1% AEP storm event. The residual flooding does not relate to fluvial flood flows directly from the River Poddle but rather the inability of the local surface water system to effectively drain high intensity rainfall events. This pluvial flooding has been identified particularly at Whitehall (SDCC), Mount Argus Road (DCC) and The Coombe (DCC). The surface water drainage issues identified during the hydraulic modelling in these locations have been discussed with both local authorities and SDCC and DCC have made commitments to develop solutions for these areas. These works are outside the scope of the proposed Scheme.



Figure 8-1: River Poddle surrounding waters quality



Source: Black & Veatch, Final Hydrology Report, 22 January 2019

Figure 8-2: Hydrological Estimation Points



Figure 8-3: Q-Values of the River Poddle and other surrounding rivers 2007-2017.

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Figure 8-4: Transitional water risk in relation to the River Poddle.



Figure 8-5: River Poddle catchment as per the FSU web tool.



Source: Black & Veatch, Final Hydrology Report, 22 January 2019

Figure 8-6: *Critical Storm duration by reach of the River Poddle.*

9 SOILS, GEOLOGY AND HYDROGEOLOGY

9.1 Introduction

This chapter of the EIAR describes the soils, geology and hydrogeology in the existing environment along the River Poddle and its catchment. The catchment of the River Poddle is urbanised, interspersed by open space and parkland, particularly close to the river. This chapter presents an assessment of the potential impacts on the soils, geology, and hydrogeology of the area arising from the proposed development and to propose measures to mitigate against these impacts.

9.2 Statement of Authority

This chapter has been prepared by Richard Church formerly of Nicholas O'Dwyer Ltd. Richard holds a Bachelor's degree in Geophysical Sciences and a Master's degree in Hydrogeology with over 25 years' experience in engineering and environmental consultancy in the water services industry in Ireland, UK and internationally.

9.3 Methodology

This chapter presents the findings of a desktop study of available soil, geology and hydrogeology data from published sources from the GSI, EPA and OPW. The analysis incorporates aquifer characteristics and vulnerability, soils, subsoils and quaternary sediments, the geological setting, groundwater well locations, along with geological and Ordnance Survey mapping.

This assessment has been prepared in accordance with the following guidelines:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2017)
- Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (Institute of Geologists of Ireland, 2013).

In keeping with these guidelines, this assessment has been undertaken in consultation with the requirements and guidelines of the Geological Survey of Ireland (GSI) concerning the soils, geology and groundwater environment.

9.4 Existing Environmental Conditions

This section describes the existing environment in terms of the current geology underlying the site on a regional and local scale as well as its interaction with the groundwater regime at the site. On this basis, the potential impacts of the development were identified, as were the measures required to mitigate against any negative impacts on the soils, geology and groundwater environment.

9.4.1 Development Proposals

The proposed development consists of flood alleviation works along and adjacent to the River Poddle on sites totalling 12ha, along with associated ancillary and temporary works.

9.4.2 Characteristics of the Proposed Development

The proposed works extend from the upper reaches of the River Poddle at Tymon North in Tallaght to Saint Teresa's Gardens in Merchant's Quay, Dublin. A detailed description of

the proposed works is contained in **Chapter 5** and illustrated in **Volume 3** of the EIAR. A brief description is summarised as follows:

There are three areas where more substantial works are proposed in green spaces and parks including Tymon North and Tymon Park in Tallaght where the main flood storage embankment is to be constructed and an Integrated Constructed Wetland (ICW) is also planned; at Whitehall/Wainsfort Manor Crescent in Terenure where a channel re-alignment is proposed; and at Ravensdale Park in Kimmage where flood walls are to be constructed to provide flood protection and storage.

Proposed ancillary works and associated development includes drainage channel clearance and removal of trees where required for the works; rehabilitating or installing culvert screens in locations as required; installing flap valves in all culverts draining to the River; rehabilitating or replacing manholes; biodiversity enhancements including installation of floating nesting platforms in Tymon Lake, Tymon Park, Tallaght; and landscape mitigation and restoration at Tymon Park, Tallaght, Whitehall Park, Terenure, and Ravensdale Park and St. Martin's Drive, Kimmage including public realm improvements, replacement footbridges, biodiversity enhancements and tree planting and landscaping.

Temporary works include establishing a main construction compound in Tymon Park with access off Limekiln Road, which will be in operation for the entire duration of the works; and temporary works / set down areas at Wainsfort Manor Crescent, Ravensdale Park and St. Martin's Drive, which will be in use for the duration of the works to be carried out in these locations. Other temporary works include temporary stockpiling of excavated earth in Tymon Park; temporary channel crossings at Tymon North and Tymon Park, and channel diversions at Tymon Park and Whitehall Park to enable the works along the River channel to be carried out.

9.4.3 The Existing Environment

9.4.3.1 Soils, Subsoils and Quaternary Sediments

Natural soils and subsoils are limited in the northern half of the catchment due to the urbanisation of the catchment. Much of the soil cover is classified by Teagasc as Made Ground. The till derived soils are classified as mineral and poorly drained. Mapping of soils within the catchment is presented in **Figure 9-1**.

The Quaternary sediments overlying the bedrock through the catchment are principally till derived from limestone, this is generally thin <5m. Some river derived sediments and gravels have been identified in Tymon Park to the west of the M50. Local areas of bedrock at surface are present in the catchment from Kimmage to Harold's Cross. Mapping of Quaternary sediments is presented in **Figure 9-2**.

9.4.3.2 Geological Setting

Reference to GSI web mapping¹ indicates that the catchment is underlain by the Lucan Formation of Lower Dinantian Limestones (known as 'Calp'). The formation comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones,

¹ Geological Survey of Ireland, web mapping, <u>http://spatial.dcenr.gov.ie/GeologicalSurvey/Groundwater/index.html</u> [accessed 31/05/19].

sometimes graded, and interbedded dark-grey calcareous limestone. There are no regional faults mapped within the catchment.

9.4.3.3 Aquifer Characteristics

The bedrock is classified by GSI as a Locally Important (LI) Aquifer where the bedrock aquifer is moderately productive but only in local zones. A map of the bedrock aquifers is presented in **Figure 9-3**.

9.4.3.4 Groundwater Wells

The GSI groundwater database reports two wells which were drilled in 1992 close to Kimmage Cross Roads for industrial purposes. These were drilled to 150m depth and report moderate to excellent well yields (45-818 m³/d). The bedrock in the area was intercepted at a depth of 2m. Two wells drilled in Crumlin and Drimnagh into the same bedrock report similar yields.

9.4.3.5 Groundwater Vulnerability and Recharge

As a result of the low permeability nature of the bedrock aquifer the potential recharge within the catchment is limited and a recharge coefficient of 20% is given to the area. The bedrock aquifer has a classification of High to Extreme vulnerability due to the thin subsoils and the limited soil depth. A map of the groundwater vulnerability is presented in **Figure 9-4**.

9.4.3.6 Geological Heritage

The Irish Geological Heritage (IGH) Programme identifies and selects a complete range of sites that represent Ireland's geological heritage under sixteen themes ranging from Karst features to Hydrogeology. The IGH Programme is a partnership between the GSI and the National Parks and Wildlife Service (NPWS) and sites identified as important for conservation are conserved as Natural Heritage Areas (NHA). Datasets are now available online detailing sites of geological heritage. There are no sites of geological heritage within the catchment.

9.4.3.7 Water Framework Directive Status

Under the Water Framework Directive (WFD), the key water quality objective is that all water bodies achieve or retain '*Good*' status by 2015. The Groundwater Body has been classified as having '*Good*' status and has a risk score of '*Not at Risk*'. There are no Drinking Water Protected Areas defined within the catchment.

9.4.3.8 Historic Map Review

A review of the historic 6" mapping for the area identifies a number of potential impacts from historic use of groundwater and bedrock within the catchment. A number of historic mills were located in the Kimmage area and a mill pond is located close to Kimmage Crossroads. This pond could be in hydraulic continuity with the underlying groundwater indicating shallow groundwater depths in the area. A number of old quarries are located to the north of Kimmage Crossroads which must have been backfilled with material at some point. An old quarry also exists in the park to the east of Mount Argus View.

9.4.3.9 Groundwater Flood Risk Assessment

The bedrock aquifer within the catchment has a low storage capacity for groundwater. Boreholes and surface water ponds indicate that groundwater levels are shallow (typically <5m depth). The soils mapping indicates that there are areas of poorly drained soils within the catchment and significant areas of 'made ground' which are also likely to be poorly draining. Therefore, additional groundwater recharge to the catchment could result in localised groundwater flooding, particularly in basements or excavated areas. This is likely to be during periods of high groundwater levels, typically during later winter months and early spring.

There are no recorded incidents directly and solely attributable to groundwater flooding within the catchment, and due to the size and particularly width of the catchment it may be difficult to distinguish a groundwater flood event from a river flood event.

It is considered that the principal risk of flooding by groundwater relates to poorly draining soils and subsoils preventing infiltration to groundwater from high rainfall events. The risk from direct groundwater flooding is considered to be low.

9.5 Potential Impacts

9.5.1 Construction Impacts

The following potential impacts have been identified during the construction phase.

9.5.1.1 Bedrock Exposure and Removal

In localised areas the upper weathered bedrock may be partially and permanently removed during the construction for wall foundations. The competent bedrock will be exposed for a short period during the construction phase prior to foundation pouring. The impact associated with the removal of weathered bedrock is considered to be a neutral permanent minor impact.

9.5.1.2 Hydrocarbon Leakage/Spillage

Possible contamination of soil and subsoil, by leakage or spillage from machinery and associated equipment, may occur during the construction phase. An accidental hydrocarbon spillage would have a negative short-medium term moderate impact on surface water quality at, and down-gradient of the development sites.

9.5.1.3 Foundation Pouring

The spillage of cement material poses a potential risk to surface and groundwater. During the construction phase this risk may be realised during the construction of buildings and the washing of equipment if due caution is not taken in pouring the concrete. The entry of cement washwater into the surface water drainage network would have a negative shortterm moderate impact on surface water quality.

9.5.1.4 Groundwater Flow Paths

The removal of soils and subsoils and the replacement by embankment and walls could result in localised diversion of groundwater flow. However, due to the low permeability nature of the underlying aquifer it is expected that this change would be very local and limited and have an imperceptible impact. Some limited dewatering of excavations may be required, which may involve pumping groundwater. This water could potentially become contaminated and will be tested prior to discharge.

9.5.2 Operational Impacts

There is not expected to be any further impacts on the bedrock or aquifer environment during the operational phase.

9.6 Mitigation Measures

9.6.1 Overview

Construction activities have the potential to cause minor adverse impacts to the geology and hydrogeology of the site. A number of planned mitigation measures, detailed below, will reduce these impacts. Many of the mitigation measures below are based on Construction Industry Research and Information Association, UK (CIRIA) technical guidance on water pollution control and on current accepted best practice.

9.6.2 Construction Phase

9.6.2.1 Soils

Any soil imported to site will be subject to assessment by a suitably qualified Ecologist to identify invasive alien species present. Any soils stored on site will be seeded and periodically topped. Such stores will be subject to on-going monitoring.

If invasive plant species are present at any of the sites, machinery and equipment including footwear and tools will be cleaned appropriately (as per species requirements) between infested sites.

An estimated 5,000m³ of material is to be excavated for the works in Tymon Park. The excess material from the excavation works will be used as bulk fill, embankments or landscaping where possible. It is estimated that 50% of the material will be required for the embankments and landscaping and the remainder will be taken off site for disposal at an agreed licensed area. All material removed from site will be disposed of in accordance with relevant waste management legislation.

The top layer of soil (approximately 200m depth) contains valuable ecological material that will be saved separately from subsoils and will be used to reinstate the parks and green areas and allow for natural restoration and establishment of plants. Stockpiles of this material are to be stored in banks no more than 1m high.

All materials excavated from the works areas will be stockpiled as close to the area where they are to be re used in landscape restoration in order to minimise on-site haulage and double handling. Areas for material storage have been assigned in consideration of sensitive habitats and ecological features and use of the parks and green spaces in the Scheme. Stockpiles of other material will be formed no more than 2m in height and will be sealed using the back of an excavator bucket or tracked upon by a tracked excavator to ensure the stockpile does not become saturated and therefore difficult to handle when being reinstated into the works. All stockpiles will be clearly defined, fenced and signed to ensure no cross contamination with other materials to be stockpiled.

9.6.2.2 Bedrock and Groundwater

The contractor shall be obliged to ensure no deleterious discharges are released from the sites to the River Poddle during excavation de-watering, testing or washing activities. Throughout the period of works the contractor shall also take account of relevant legislation and best practice guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites guide to good practice.

The contractor's construction method statements shall also indicate how management, monitoring, interception, removal and/or treatment of silt run-off will prevent contamination of ground or surface waters by mobilisation of soil particles.

The contractor's methodology statement should be reviewed and approved by a suitably qualified geotechnical engineer prior to site operations.

Excavations will be backfilled as soon as possible to prevent any infiltration of potentially polluting compounds to the subsurface and the aquifer.

Prior to the storage of any potentially polluting material on site, the site manager will be responsible for ensuring that a material safety data sheet for each product is available for inspection. A copy of all relevant material safety data sheets will be available at storage locations as well as the site office.

The majority of new material brought to site will be used immediately or will be stored within the site boundary. Other materials such as asphalt or concrete will be brought directly to the construction site when required and immediately placed.

All potentially polluting materials will be stored in bunded areas, the capacity of which will be 110% of the total volume of liquid to be stored. Any machinery refuelling that takes place on site will be carried out by competent personnel, preferably at a single designated location within the temporary site compound, otherwise a bowser will be used to refuel machinery working onsite. Spill kits will be stored at the machinery refuelling areas. The spill kits will comprise suitable absorbent material, refuse bags, *etc.* to allow for the appropriate clean-up and storage of contaminated material in the event of a spillage or leak occurring.

The washing of any plant equipment will be carried out in designated areas to prevent potentially polluting material from contaminating aquifers and soils/subsoils.

There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.

Any potentially contaminated groundwater that may be pumped from excavations will be tested and discharged appropriately.

All machinery will be inspected at the start of each work shift for signs of leaking hydrocarbons. Parking areas will be inspected on a daily basis for evidence of hydrocarbons leaking from machinery. Spills will be cleaned up and corrective action will be taken to prevent future spills.

9.6.3 Operational Phase

During the operational phase of the development, all materials required for the maintenance of the sites will be stored according to good practice and in areas either offsite or in bunded areas with impermeable floors. A programme of inspection and maintenance of the site drainage will ensure that any damage, blockages, *etc.* are identified and remedied.

9.7 Residual Impacts

If the mitigation measures detailed above are implemented it is expected that there will be no residual impacts on soils, groundwater and the underlying geology as a result of the construction or operation of the proposed development.





Figure 9-1. Soils in the surrounding areas of the River Poddle.



Figure 9-2. River Poddle Quarternary Sediments.



Figure 9-3. River Poddle Flood Alleviation Scheme Characteristics



Figure 9-4. River Poddle Groundwater Vulnerability.

10 LANDSCAPE AND VISUAL

10.1 Introduction

This Landscape and Visual assessment has been carried out by Cunnane Stratton Reynolds Ltd. landscape architects and town planners. The assessment is in accordance with the methodology prescribed in the *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, *2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment*.

The report identifies and discusses the landscape and visual effects in relation to the proposed works along the River Poddle, from the vicinity of Tymon Park to Mount Argus Close.

10.2 Statement of Authority

This assessment has been carried out by Evelyn Sikora BA, MA, a qualified Landscape Architect with a degree (Edinburgh College of Art 2006). She also holds a Master's in Planning and Sustainable Development (UCC, 2010) and is a member of the Irish Landscape Institute. Evelyn has over five years' experience in Landscape and Visual Assessment (LVIA) and has experience in a range of projects throughout Ireland. These include a number of infrastructural projects including road schemes, flood relief projects, telecommunications, quarry developments, wind farms, solar farms, water abstraction projects and residential and commercial development, in both rural and urban contexts.

10.3 Methodology

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

10.3.1 Forces for Landscape Change

The GLVIA notes that landscape is not unchanging, and that many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement. It also notes that many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

The GLVIA also notes that climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

10.3.2 Guidance

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is informed by the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft August 2017)

References are also made to the 'Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities' document, published in 2000 by the Department of Environment, Heritage and Local Government.

10.3.2.1 Use of the Term 'Effect' vs 'Impact'

The GLVIA advises that the terms 'impact' and effect' should be clearly distinguished and consistently used in the preparation of an LVIA.

'Impact' is defined as the action being taken. In the case of the proposed works, the impact would include the construction of the proposed development.

'Effect' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

10.3.2.2 Assessment of Both 'Landscape' and 'Visual' Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and 'visual amenity' refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

The assessment of landscape and visual effects included a desktop study, review of the proposed development drawings and visualisations, and a number of site visits which were carried out in February and March 2019.

10.3.3 Methodology for Landscape Assessment

The landscape effects of the development are assessed in this chapter. Landscape impact assessment considers the likely nature and scale of changes to the main landscape elements and characteristics, and the consequential effect on landscape character and value. Existing trends of change in the landscape are taken into account. The potential effect is assessed based on measurement of the landscape sensitivity against the magnitude of change which would result from the development.

10.3.3.1 Sensitivity of the Landscape Resource

Landscape Sensitivity: Landscape sensitivity is a function of its land use, landscape patterns and scale, visual enclosure and distribution of visual receptors, scope for mitigation, and the value placed on the landscape. It also relates to the nature and scale of development proposed. It includes consideration of landscape values as well as the susceptibility of the landscape to the proposed change.

Landscape values can be identified by the presence of landscape designations or policies which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape. These are described further in the sections that follow.

Landscape susceptibility is defined in the GLVIA as the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies.

Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

Sensitivity is therefore a combination of Landscape Value and Susceptibility.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment as listed in **Table 10-1**.

Table 10-1:	Categories	of Landscape	Sensitivity
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Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principle management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.
10.3.3.2 Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories listed in **Table 10-2** are used to classify magnitude of landscape change.

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape (i.e. landscape receptors), and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape with loss of landscape quality and perceived value.
High	Change that is moderate to large in extent, resulting in major alteration or compromise of important landscape receptors, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape with loss of landscape quality and perceived value.
Medium	Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.
Low	Change that is moderate or limited in scale, resulting in minor alteration of landscape receptors, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape and no reduction in landscape quality and perceived value.
Negligible	Change that is limited in scale, resulting in no alteration to landscape receptors, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character, quality or perceived value.

Table 10-2: Magnitude of Landscape Change

10.3.3.3 Significance of Effects

In order to classify the significance of effects, the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide, from the EPA Draft Guidance (2017).

There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Sensitivity of the Landscape Resource						
		Very High	High	Medium	Low	Negligible
Magnitude of Change	Very High	Profound	Profound- Very Significant	Very Significant- Significant	Moderate	Slight
	High	Profound- Very Significant	Very Significant	Significant	Moderate- Slight	Slight-Not Significant
	Medium	Very Significant- Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate- Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight-Not Significant	Not significant	Imperceptible	Imperceptible

Table 10-3: Significance of Effects

The matrix in **Table 10-3** is used as a guide only. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

Landscape effects are also classified as positive, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

10.3.4 Methodology for Visual Assessment

The visual effects of the development are assessed in this chapter. Visual assessment considers the changes to the composition character of views, the of the views, and the visual amenity experienced by visual receptors (groups of people). The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the visual receptor sensitivity against the magnitude of change to the view resulting from the development.

10.3.4.1 Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity is a function of two main considerations:

• Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.

Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.

Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

• Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

Visual receptor susceptibility and value of the viewpoints which are assessed, are discussed further in this chapter. For the purpose of assessment, five categories are used to classify a viewpoint's sensitivity as listed in **Table 10-4**.

Table 10-4: Categories of Visual Receptor Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for accommodating change in the form of development is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features focussed on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating compositional change in the form of development may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Viewpoints representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape which is regarded as moderately scenic. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view
Low	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, or on heavily trafficked routes etc. The view may present an attractive backdrop to these activities but is not regarded as particularly scenic or an important element of these activities.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality.

10.3.4.2 Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also takes into account the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view (see **Table 10-5**).

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Table 10-5: Categories of Visual Change

10.3.4.3 Significance of Visual Effects

As for landscape effects, in order to classify the importance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint.

Visual effects are also classified as positive, neutral or negative. This is an inherently subjective exercise. Visual receptors' attitudes to development of various types varies and this affects their perception of the visual effects of development.

10.3.4.4 Quality and Timescale

The predicted impacts are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality;
- Beneficial improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Impacts/effects are also categorised according to their longevity or timescale:

- Temporary Lasting for one year or less;
- Short Term Lasting one to seven years;
- Medium Term Lasting seven to fifteen years;
- Long Term Lasting fifteen years to sixty years;
- Permanent Lasting over sixty years.

A statement is made as to the appropriateness of the proposed development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the proposed development based on objective assessment of its likely landscape and visual impacts.

10.3.5 Study Area

The study area for both landscape and visual effects was determined through desktop study and site visits. Site visits were carried out in February and March 2019. The River Poddle rises in Tallaght and flows into the Liffey in Dublin City at Wellington Quay. However the areas of proposed flood alleviation works are limited to certain areas, as shown in the planning drawings. There are several areas where more substantial works relevant to landscape and visual effects are proposed including Tymon North and Tymon Park in Tallaght, Whitehall/Wainsfort Manor Crescent in Terenure, and Ravensdale Park and St. Martin's Drive in Kimmage.

The proposed flood relief measures which are most relevant to the landscape and visual assessment include these locations and works which are located in several areas along the River Poddle corridor, between Tymon Park and Mount Argus Close.

Minor works which will not result in landscape or visual effects include rehabilitation/replacement of manholes. These are proposed at a variety of locations but are not considered to have landscape or visual effects and any areas where these works are proposed are not included in the study area.

While the majority of the visual effects will be apparent in close proximity to the River Poddle, and the main landscape effects also occurring around the site, therefore the study area focuses on the river corridor and its immediate surroundings only. The study area falls within South Dublin County, from Tymon Park South to Kimmage Road West, just south of Ravensdale Park. The area north of this, including Ravensdale Park, to the River Liffey, lies within Dublin City Council's boundary.

10.4 Existing Environmental Conditions – Planning Policy

10.4.1 Policy Context - South Dublin County Council Development Plan 2016-2022

The South Dublin County Development Plan (hereafter referred to as the SDCC Plan) relates to the southwestern part of the study area, covering the River Poddle from Tallaght to Kimmage Road West, just south of Ravensdale Park.

The Poddle runs through a variety of spaces primarily with residential, open space and District Centre zoning, as indicated in Maps 5, 6 and 9 of the SDCC Plan. Some policies relate specifically to the River Poddle, and there are a number of relevant policies relating to flood alleviation, landscape and watercourses in the city.

Section 7.2 of the plan contains policies relating to surface waters and flood alleviation:

- **IE2 Objective 9:** To protect water bodies and watercourses, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains, within the County from inappropriate development. This will include protection buffers in riverine and wetland areas as appropriate (see also Objective G3 Objective 2 Biodiversity Protection Zone).
- **IE3 Objective 1:** To support and co-operate with the Office of Public Works in delivering the Catchment-Based Flood Risk Assessment and Management Programme and in particular the Eastern District CFRAMS and associated Flood Risk Management Plan (FRMP), the River Dodder CFRAMS and associated Flood Risk Management Plan (FRMP). The recommendations and outputs arising from the CFRAM study for the Eastern District shall be considered in preparing plans and assessing development proposals.
- **IE3 Objective 4:** To support and facilitate the delivery of flood alleviation schemes in South Dublin County, including the following schemes:
 - Poddle Flood Alleviation Scheme.
 - Ballycullen Flood Alleviation Scheme.
 - Whitechurch River Flood Alleviation Scheme (at Rathfarnham); part of the Dodder CFRAMS.

Chapter 8 includes objectives relating to Green Infrastructure, which includes rivers and streams. The relevant policy and objectives are as follows:

• **Green Infrastructure (G) Policy Overarching:** is the policy of the Council to protect, enhance and further develop a multifunctional Green Infrastructure network by building an interconnected network of parks, open spaces, hedgerows, grasslands, protected areas, and rivers and streams that provide a shared space for amenity and recreation, biodiversity protection, flood management and adaptation to climate change.

- **G1 Objective 1**: To establish a coherent, integrated and evolving Green Infrastructure network across South Dublin County with parks, open spaces, hedgerows, grasslands, protected areas, and rivers and streams forming the strategic links and to integrate the objectives of the Green Infrastructure Strategy throughout all relevant Council plans, such as Local Area Plans and other approved plans.
- **G1 Objective 2:** To prepare and implement a South Dublin County Green Infrastructure Strategy during the lifetime of this plan that will form the basis for the identification, protection, enhancement and management of the Green Infrastructure network within the County.
- **Policy 2 Green Infrastructure Network:** It is the policy of the Council to promote and develop a coherent, integrated and evolving Green Infrastructure network in South Dublin County that can connect to the regional network, secure and enhance biodiversity, provide readily accessible parks, open spaces and recreational facilities.
- **G2 Objective 1:** To reduce fragmentation of the Green Infrastructure network and strengthen ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, parks and open spaces and the wider regional Green Infrastructure network.
- **G2 Objective 2:** To protect and enhance the biodiversity value and ecological function of the Green Infrastructure network.
- **G2 Objective 3:** To restrict development that would fragment or prejudice the Green Infrastructure network.
- **G2 Objective 5:** To integrate Green Infrastructure as an essential component of all new developments.
- **G2 Objective 6:** To protect and enhance the County's hedgerow network, in particular hedgerows that form townland, parish and barony boundaries, and increase hedgerow coverage using locally native species.
- **G2 Objective 9:** To preserve, protect and augment trees, groups of trees, woodlands and hedgerows within the County by increasing tree canopy coverage using locally native species and by incorporating them within design proposals and supporting their integration into the Green Infrastructure network.
- **G2 Objective 11:** To incorporate appropriate elements of Green Infrastructure e.g. new tree planting, grass verges, planters etc. into existing areas of hard infrastructure wherever possible, thereby integrating these areas of existing urban environment into the overall Green Infrastructure network.
- **G2 Objective 13:** To seek to prevent the loss of woodlands, hedgerows, aquatic habitats and wetlands wherever possible including requiring a programme to monitor and restrict the spread of invasive species such as those located along the River Dodder.

Several polices relate specially to Green Infrastructure and Watercourses:

• Green Infrastructure Policy 3 Watercourses Network: It is the policy of the Council to promote the natural, historical and amenity value of the County's

watercourses; to address the long-term management and protection of these corridors and to strengthen links at a regional level.

- **G3 Objective 1:** To promote the natural, historical and amenity value of the County's watercourses and address the long-term management and protection of these corridors in the South Dublin Green Infrastructure Strategy
- **G3 Objective 2:** To maintain a biodiversity protection zone of not less than 10 metres from the top of the bank of all watercourses in the County, with the full extent of the protection zone to be determined on a case by case basis by the Planning Authority, based on site specific characteristics and sensitivities. Strategic Green Routes and Trails identified in the South Dublin Tourism Strategy, 2015; the Greater Dublin Area Strategic Cycle Network; and other government plans or programmes will be open for consideration within the biodiversity protection zone, subject to appropriate safeguards and assessments, as these routes increase the accessibility of the Green Infrastructure network.
- **G3 Objective 3:** To ensure the protection, improvement or restoration of riverine floodplains and to promote strategic measures to accommodate flooding at appropriate locations, to protect ground and surface water quality and build resilience to climate change.
- **G3 Objective 4**: To uncover existing culverts and restore the watercourse to acceptable ecological standards and for the passage of fish, where possible.
- **G3 Objective 5:** To restrict the encroachment of development on watercourses, and provide for protection measures to watercourses and their banks, including but not limited to: the prevention of pollution of the watercourse, the protection of the river bank from erosion, the retention and/or provision of wildlife corridors and the protection from light spill in sensitive locations, including during construction of permitted development.
- **G3 SLO 1:** To ensure the appropriate development of the former Burmah Garage site on Wellington Lane and surrounding area adjoining the River Poddle. Such development will ensure that the river remains over-ground and will provide an attractive vista towards Tymon Park.

(It should be noted in relation to Objective G3 SLO 1 that this development appears to have taken place as dwellings are constructed on this site.)

A number of other objectives relate to the Tymon Park vicinity, as follows -

- **H17 SLO1:** Facilitate high quality residential development, designed to complement and address Tymon Park, and including retention of theatre uses on site and providing for facility improvements in the park area.
- **C9 SLO 2:** To only permit development of educational, community facilities or older peoples' housing at the site of St Peter's BNS area.

Tymon Park is a regional park and has been identified as a Green Route as part of the Strategic Cycle Network.

10.4.1.1 Protected Structures and Recorded Monuments

The castle in Tymon Park is listed in the Record of Monuments and Places, as is the River Poddle itself. The associated mill weir and mill race at Wainsfort Manor Crescent is on the Record of Protected Structures.

- 002-007 Castle (site of), Tymon Park
- 022-203: Poddle River (between Templeville Road and Kimmage Road West).
- 186: City watercourse, mill, weir, mill race (at Wainsfort Manor Crescent) is on the Record of Protected Structures.

Land Use and Zoning Map 5 also indicates geological sites for protection in the park in the vicinity of Tymon Castle, including the site of Tymon Castle itself.

10.4.1.2 Landscape Character Assessment

South Dublin City Council has carried out a Landscape Character Assessment of South Dublin County (hereafter known as the Assessment). There are five Landscape Character Areas (LCAs) identified, and the proposed development and the part of the study area which falls within South Dublin County Council is included in the 'Suburban South Dublin LCA. This area extends from Tallaght/Oldbawn to Rathfarnham and along the county boundary to Clondalkin. Within the Study area, it includes the areas from Tallaght to Kimmage Road lower, just south of Ravensdale Park.

Further detail is provided in the Assessment document itself. The area categorised as Urban is a considerably large area and the Assessment notes that this LCA was not assessed in detail and a finer scale assessment would be required. The Assessment does however mention the key characteristics include:

- Built up urban areas with housing estates, and industrial commercial parks.
- Areas with important historical legacy of Templeogue village
- The M50 traverses the areas north-south, and other major traffic corridors are present, as well as the LUAS line
- Corridors of natural and semi-natural vegetation, notably along the Dodder and Camac as well as areas of open spaces.
- Grassed open spaces in gardens, industrial parks and golf courses and in housing areas, as well as street tree planting as well as larger scape recreational facilities area features of the area.

The LCA also notes the radical alteration of the primary settlements in the LCA during the 20th century. The landscape values noted in the Assessment are as follows:

- Public Parks with recreational and ecological resources
- Dodder River Valley
- 19th century industrial heritage
- Views out to Dublin Mountains and agricultural hinterland

Forces for Change are identified as follows:

- West boundary is set against agricultural and mountain hinterlands. Untidy urban developments can adversely impact on the character of the hinterlands.
- Urban developments can impact on open views to the hinterlands.
- On- going urban infrastructure developments notably road improvements generate increasing volumes of traffic and detract from opportunities to create or maintain tranquil settings
- New infill or other built developments can be insensitive to remnant historical or vernacular features

The Assessment proposes some mitigation measures for the Suburban South Dublin LCA, noting that detailed sensitivity and capacity assessment are recommended.

- Grassland and other amenity area open spaces should be managed for the dual benefits of public access and biodiversity
- Tree and shrub planting should be an integral component of amenity grasslands (schools' recreational grounds, golf courses and playing fields)
- The development of green infrastructure to connect different habitats within the urban context.
- Tree planting on streets and open spaces particularly on 'miscellaneous 'open space in housing areas- to improve their character
- Enhance connectivity between open spaces as a means of enhancing biodiversity while providing off road connections for pedestrian and cyclists.
- Proposed developments should be audited for their impact on views particularly those to the rural hinterland of the county

10.4.1.3 Views and Prospects

The South Dublin County Development Plan, as well as the Landscape Character Assessment, includes views and prospects.

The Plan notes that there are many scenic views and prospects. The Plan distinguishes between views, which are more localised views, and prospects, which relate to prominent landscapes or areas of special amenity or special interest that are widely visible from surrounding areas It notes that views from prominent public places will be protected.

Views are indicated on the Development Plan Maps. No views are indicated within the river corridor study area.

A total of 18 prospects are listed in the Development Plan and 16 are listed in the Landscape Character Assessment. The Development Plan includes a list of 18 Prospects, which are prominent hills or mountains which are widely visible from surrounding areas. While a number of these hills are located to the south of the proposed development, there is no visibility from the majority of the river Poddle corridor itself. However, some views

to the hills to the south are glimpsed from areas of Tymon Park. The prospects visible from this part of the to the study area include range of hills ranges from Verscholye's Hill and Saggart Hills in the southwest to Montpellier and Cruagh hills to the south east. However, from Tymon Park, which is one of the few areas where the hills are visible, they appear as an undulating ridgeline. These prospects listed include:

- Saggart Hill
- Verschoyle's Hill
- Knockannavea
- Sliabh na mBanóg
- Montpelier's Hill
- Ballymorefinn Hill
- Seahan Mountain
- Corrig Mountain
- Piperstown Hill
- Cruagh Mountain
- Killalee Mountain

(The Landscape Character Assessment also includes some views for consideration; however, it should be noted they do not appear in the Development Plan.) These include the following relevant views, which are relevant to Tymon Park and the wider area emphasise that the views of the hills from Tymon park, in this case, and the nearby Knocklyon interchange, are considered important:

- Views to the Dublin Mountains from major parks
- View from M50 interchange at Knocklyon, towards the Dublin mountains and Orlagh Retreat Centre;
- Ridge line of the Dublin Mts, Montpelier to Tallaght Hills, e.g. from Dodder Valley Park, Old Bawn and others

10.4.2 Dublin City Development Plan 2016-2022

The study area from Kimmage Road West (Ravensdale Park) to Gandon's Close in Harold's Cross lies within the Dublin City Council boundary.

10.4.2.1 Land Use Zoning

Land Use zoning along adjacent to the River Poddle from Ravensdale Park to Mount Argus includes mainly zoning for residential amenity (Objectives Z1 and Z2), Recreational amenity, open space and green networks) Open Space (Z9). Certain areas along the river include small areas zoned for the improvement of mixed neighbourhood facilities) along Kimmage Road Lower.

Zoning objectives for the River Poddle also include a Zone of Archaeological Potential which includes the river course from and including part of the river from Ravensdale Park to Gandon Close. Two locations along the river, at Mount Argus Close and in the green space at St Martin's Drive, are also listed as Sites of Archaeological Potential.

Chapter 9 contains policies and objectives relating to watercourses in the city

• **SI8:** To mitigate the effects of floods and droughts subject to environmental assessments.

Section 9.5.3 of the plan refers to flood risk management and outlines the primary sources of flooding and notes the CFRAM studies which include the River Poddle. Relevant policies include:

- **SI11:** To put in place adequate measures to protect the integrity of the existing Flood Defence Infrastructure in Dublin City Council's ownership and identified in the Strategic Flood Risk Assessment and to ensure that the new developments do not have the effect of reducing the effectiveness or integrity of any existing or new flood defence infrastructure and that flood defence infrastructure has regard also to nature conservation, open space and amenity issues.
- **SI17:** To require an environmental assessment of all proposed flood protection or flood alleviation works.

Green Infrastructure related policies include:

- **GI1:** To develop a green infrastructure network through the city, thereby interconnecting strategic natural and semi-natural areas with other environmental features including green spaces, rivers, canals and other physical features in terrestrial (including coastal) and marine areas
- **GI3**: To develop linear parks, particularly along waterways, and to link existing parks and open spaces in order to provide green chains throughout the city. Where lands along the waterways are in private ownership, it shall be policy in any development proposal to secure public access along the waterway.
- **GI4:** To co-ordinate open space, biodiversity and flood management requirements, in progressing a green infrastructure network.

Volume 2 Appendix 11 Flood Defence Infrastructure refers to flood defences for a number of rivers, including the Rivers Tolka, Dodder and Liffey. This section of the plan also contains references to a number of rivers which flow into the Liffey, including the River Poddle. It states the following:

The river Poddle is largely culverted in the city area north of the Grand Canal. Existing embankments and walls are significant flood defences; these require some extra defences in Mount Argus, St Martin's Drive, Poddle Park and Ravensdale Park as well as storage in South Dublin County Council to provide estimated flood protection to the hundred-year flood level. Section 10.5.2 of the Dublin City Council Plan contains policies on landscape including the following:

- **GIO7:** To promote the city landscapes, including rivers, canals and bay, as a major resource for the city and forming core areas of green infrastructure network.
- **GI9:** To incorporate open space into the green infrastructure network for the city, providing a multi-functional role including urban drainage, flood management, biodiversity, outdoor recreation and carbon absorption.
- **GI15:** To protect, maintain, and enhance the natural and organic character of the watercourses in the city, including opening up to daylight where safe and feasible. The creation and/or enhancement of riparian buffer zones will be required where possible. It is the policy of Dublin City Council to maintain and enhance the safety of the public in its use and enjoyment of the many public parks, open spaces, waterways and linkages within the city, including the River Dodder between Ringsend and Orwell (Waldron's) bridge, and at the area known as Scully's Field
- **GI16:** To protect and improve the unique natural character and ecological value of all rivers within and forming boundaries to the administrative area of Dublin City Council, in accordance with the Eastern River Basin District management plan.
- **GIO18:** To protect and improve the natural character of watercourses, including the Dodder, and to promote access, walkways, cycleways and other compatible recreational uses along them, having regard to environmental sensitivities.

<u>Trees</u>

Section 16 Development Standards of the plan notes that trees add a sense of character and maturity to a site, and provide screening, shelter and privacy. The maximum retention, preservation and management of important trees, and groups of trees, will be considered by Dublin City Council. The Plan contains the following in relation to trees and development.

Section 16.3.3 of the plan states:

A tree survey must be submitted where there are trees within a proposed planning application site, or on land adjacent to an application site that could influence or be affected by the development. Information will be required on which trees are to be retained and on the means of protecting these trees during construction works. Where development is proposed it is essential that existing trees are considered from the very earliest stages of design and prior to an application for planning permission being submitted. Root systems, stems and canopies, with allowance for future movement and growth, need to be taken into account in all projects.

Views and Prospects

The Dublin City Development Plan includes a map (Figure 4 of the Plan) of Views and Prospects. However, no views are identified in the vicinity of the River Poddle study area. Figure 4 from the plan is reproduced as **Figure 10-1** of this chapter.

• **GIO8:** To undertake a 'Views and Prospects' study to identify and protect the key views and prospects of the city. Additional views and prospects may be identified through the development management process and local area plans.

10.4.3 Summary of Landscape Policies

10.4.3.1 South Dublin County Council

- The need for a Flood Alleviation Scheme for the River Poddle is specifically referred to in the SDCC Plan as well as the Dublin City Plan.
- Land Use Zoning along the River Poddle corridor includes primarily residential areas, open space and a smaller area zoned as District Centre in the Tallaght area. Tymon Park is the largest open space and a Regional Park.
- The importance of rivers and watercourses in the Green Infrastructure network is recognised.
- The importance of trees, tree groups is recognised and the policies and objectives aim to prevent the loss of woodlands, hedgerow and aquatic habitats
- The SDCC Plan recognises the importance of floodplains and promotes strategic measures to accommodate flooding in appropriate locations
- The River Poddle is listed in the Record of Monuments and Places along with Tymon castle site. A weir and mill race are also listed as a Protected Structure.
- Views within the study area are not identified on the zoning maps, however some Prospects are available, primarily from Tymon Park, where there are views from certain areas, to several hills and mountains listed as prospects.

10.4.3.2 Dublin City Council:

- Land Use zoning along adjacent to the River Poddle from Ravensdale Park to Mount Argus includes mainly zoning for residential amenity, and Recreational amenity, open space and green networks.
- The Dublin City Plan recognises the need for flood alleviation and notes specific locations Mount Argus, St Martin's Drive, Poddle Park and Ravensdale Park as well as storage in South Dublin County Council to provide estimated flood protection to the hundred-year flood level.
- Policy aims to ensure that flood defence infrastructure has regard also to nature conservation, open space and amenity issues.
- The River Poddle is defined as a Zone of Archaeological Potential from and including part of the river between Ravensdale Park and Gandon Close. Two locations along the river, at Mount Argus Close and in the green space at St Martin's Drive, are also listed as Sites of Archaeological Potential.
- Tree surveys must be submitted where there are trees within a proposed planning application site.
- Rivers are a core part of Green Infrastructure and their natural character Is to be protected and improved

10.5 Existing Environmental Conditions – Baseline

The River Poddle rises in Cookstown and reaches the River Liffey at Wellington Quay. The study area for landscape and visual effects extends from Tallaght to Mount Argus in Harold's Cross. The river is largely culverted between Cookstown and the Tallaght IT, as well as between Harold's Cross and Wellington Quay. No works are proposed in these sections which would result in landscape and visual effects, so they are not included in the study area and detailed descriptions.

The majority of the river Poddle corridor is relatively enclosed, and views to and from the river itself are not visible over a wide area. Some parts of the river pass through open spaces, vegetation and trees adjacent, and some areas will experience vegetation removal, construction of walls and embankments, and retention basins.

The river corridor is described broadly in terms of landscape character below. The overall river corridor is described in terms of landform (topography and drainage), landcover (vegetation and built form), cultural heritage, settlement as well as any other distinctive features which lend character to the areas. Where relevant, access is also described as this varies along the river corridor.

However, it is possible to identify several distinct character areas along the river. It should be noted that emphasis is on the areas where works are taking place. These areas which are distinctive are as follows:

- Industrial areas on the urban edge (Tallaght)
- Large scale parks on the urban edge Tymon Park
- Residential areas Limekiln Road, Wellington Rd, Whitehall, Kimmage Road, St Martin's Dr, Mount Argus, Gandon Buildings
- Smaller scale parks and open spaces many in residential areas Ravensdale Park, Poddle Park/St Martin's Drive, Mt. Argus Close/Park

10.5.1 Landscape Character of River Poddle Corridor - Overview

The River Poddle runs through a variety of character areas from Tymon Park South, to the vicinity of Mount Argus Close.

Topography and Drainage

In general, the topography is relatively flat throughout the study area. The M50 which divides Tymon Park is at a lower level than the surrounding lands.

Landcover – vegetation and built form

The landcover along the river corridor varies, but is in a suburban and urban context, and the river passes through industrial areas before reaching large open spaces at Tymon Park, north and south of the M50, smaller residential open spaces, and built-up areas where the river is surrounded by built form on both sides. A proportion of the river is culverted.

Cultural Heritage

The river contains some elements of cultural heritage – the mill, weir and mill race at Wainsfort Manor Crescent. The site of Tymon Castle in Tymon Park is listed on the Record of Monuments and Places.

Settlement and access

The river corridor runs through settlement throughout its length, from industrial areas on the edge of the city at Tallaght, south of the M50 road, through the areas of Templeogue, Kimmage, Terenure and Harold's Cross. Access to the river varies from areas which are easily accessed such as Tymon Park, Ravensdale Park, St Martin's Drive, and Mount Argus, Several sections of the river run between the rear of houses and are inaccessible. However overall, a large proportion of the river is accessed and much of this through open spaces of varying sizes.

10.5.2 Landscape Character Areas of River Poddle Corridor

10.5.2.1 Tallaght/Tymon Park

This section of the study area consists of Tymon Park, which is adjacent to a small section of industrial, built up area through which the river flows. From here, the river continues through Bancroft Park, through areas of open grassland with tree clumps, which is well traversed by pedestrian paths. (No works are proposed in the area.) The river is a feature of the park with a number of bridges and the park has an open character. The river runs through to Tymon Park.

Tymon park is a large park, with a network of paths, and characterised by a generally open character with large areas of grassland, and large clumps of trees. Several lakes are also located in the park, which straddles the M50 and is connected by a pedestrian bridge. The river corridor character here is open, and naturalistic, and flowing through a series of ponds. The river is not wide but is easily visible and is a feature of the park, particularly where it flows through the lakes. Plates 10-1 and 10-2 illustrate views of Tymon Park.

South of Limekiln Road, the river and lakes are located at a considerably lower level than the Limekiln road area, and the land slopes to the lake as shown in **Plate 10-3**, with distant views to the hills to the south. The park includes a variety of formal sports areas, but the majority of areas are for informal recreation.

10.5.2.2 Tymon to Kimmage Manor

From Tymon Park, the Poddle flows through several residential areas where it is an open, steeply sided channel, as in **Plate 10-4**. It continues between the rear of houses, and there are some clumps of trees, and access becomes limited. It emerges at Wellington Lane, adjacent to residences where the channel is again open in character, as seen in Plate **10-5**.

The river then passes through several green spaces adjacent to residential areas, between at Wellington Lane and Wellington Park, where the path continues through tree planting and a wall to one side encloses the river. The Poddle emerges through a relatively green space north of Templeville road, where it is walled on one side, partly with sheet piling. The green space is walled on two sides and partially overlooked by houses, with a clump of trees and a wall at the northern end, as shown in **Plate 10-6**.

The river continues through another large residential green space at Wainsfort Manor Crescent, and the river is walled on one side, with vegetation and some trees lining the river corridor. The river corridor has no walls and flows through another green space at Priory Hall.

10.5.2.3 Kimmage Manor to St Anne's (Kimmage Road West)

The river is partly culverted in Kimmage Manor, a large area of green space around a church building, while a branch of the river runs through the grounds to the front of the building, among tree lined areas and open grassed areas. No works are proposed in the section. North of this, the river is culverted until it reaches St Anne's housing estate, where it is bounded by the rear of this estate, and houses on Fortfield Road. Here the river is bounded by walls on both sides, and not accessible. Mature trees line the river and are visible from Kimmage Road West.

10.5.2.4 Ravensdale Park to St Martin's Drive/Poddle Park

Ravensdale Park is a relatively large open space with areas of grass and trees, with some mature trees evident at the southern end of the park. The river Poddle runs through the park and under two bridges, along the western boundary of the park where it is bounded on one side by a concrete wall which varies in height, as shown in **Plates 10-8** and **10-9**.

The river is not a key element of the northern part of the park, as it runs to one side and is bounded by a wall, which is high in a certain section, as seen in **Plate 10-9**, which gives the area a somewhat unkempt and industrial character. Trees and vegetation grow in close proximity to the river, but it is clearly visible though the channel is relatively narrow. Residences on Kimmage Road Lower and Ravensdale Park overlook the park which is bounded by a low wall, as shown in **Plate 10-10**.

The river is partly culverted along Poddle Park, where it reappears above ground enclosed by low concrete walls and runs between Poddle Park and the green space adjacent to St Martin's Drive. This is another green space overlooked by dwellings, with grassed areas and mature trees, many of which are located in close proximity to the river. Railings are located along the Poddle Park side, as seen in **Plate 10-11**, but trees and understory vegetation give a semi naturalistic character and an increased sense of enclosure to the St Martin's Drive side, as shown in **Plates 10-12** and **10-13**.

The river Poddle when seen from St Martin's Drive is somewhat hidden from view but the mature trees give character and enclosure to the area.

The river is not accessible further north of this green space where it runs between the backs of houses, and continues between two built up areas, the shopping centre on Sundrive Road, and a track to the rear of residences at Blarney Park. Some vegetation is seen along here but hedging and wall to the rear of the shopping centre car park encloses the river and prevents views. No works are proposed in this area.

10.5.2.5 St. Martin's Drive – Mount Argus/Mt.Jerome

The river is culverted under Sundrive Road and emerges in the Mount Argus Close, where is emerges to flow between the two housing estates with a narrow grassy bank, with a low wall to one side as shown in **Plates 10-14** and **10-15**. Beyond this, it flows through Mount Argus Church grounds where there are several ponds, where the water level was low, and

the river is open in character and easily visible. Grass, trees and shrubs add some sense of naturalness to the area. No works are proposed in the vicinity of Mount Argus Church rounds.

A construction site lies along the river north of the Mount Argus grounds, and the site was inaccessible at the time of the site visit. The river is culverted north of this, until it reappears between behind the Orthodox church at Mount Jerome Cemetery and flows between the cemetery wall and Gandon Close as seen in **Plate 10-17**. The river is walled on both sides and vegetation grows in close proximity to the river bank.

The river enters a culvert between Mt Jerome and Gandon Close. Only manhole works are proposed beyond this point and no works are proposed in the vicinity of Mount Jerome.

10.5.3 Summary – Landscape Character and Values

In summary, the river Poddle is a relatively narrow watercourse which runs through several areas of differing character, from the urban edge through suburban and urban areas, which can be broadly described as follows:

- Industrial/commercial areas
- Large scale parks on the urban edge
- A variety of smaller open spaces and parks including linear open spaces along the river corridor, and larger spaces which are overlooked by dwellings
- Institutional open spaces

The river Poddle runs through some industrial and commercial areas, but these are few and it mainly runs through residential areas. Industrial areas are found at Airton Close and Greenhills industrial estate, and these areas do not have a strong sense of character. No works are proposed in these locations.

A series of large open spaces (Bancroft Park, Tymon Park) are found at the edge of the city. The river, though not large, is a key element in parts of Tymon Park, where it runs through a series of lakes which area a distinctive feature of the area and increase the visual amenity of the park. The areas around the lakes and woodlands create some sense of naturalness, and the river is accessible and easily visible.

There are a number of smaller open spaces in the primarily residential areas, including a number of smaller green spaces (in the vicinity of Wellington Road, between the northeastern corner of Tymon Park and the Templeville Road area). These include narrow, linear open spaces which connect streets or housing estates, and also larger green spaces many of which are overlooked or partly overlooked by dwellings. Examples of green areas partly overlooked by residences include the open spaces off Templeville Road, (Whitehall Park), Wainsfort Manor Drive, Willington Drive/Crescent, Ravensdale Park, St Martin's Drive and Mount Argus.

The river Poddle also runs through institutional open spaces at Mount Argus church grounds and Kimmage Manor, where it is easily visible and accessible, and further adds to the character of the areas.

The river also runs through and several areas where it is bounded on both sides by rear walls of houses or properties and is not easily accessible. In certain sections the river is culverted.

The river itself is generally only visible in very close proximity, particularly in the residential areas, and often hidden by walls or dense vegetation. It is most open and visible in the larger open spaces. The riverbanks appear to have been modified in many areas. In some areas the riverbanks are vegetated and mature trees are found along the banks, such as in Tymon Park, Ravensdale Park and St Martin's Drive.

The river is a key element in parts of Tymon Park, and in several open spaces such as at Wellington Lane, Wainsfort Manor, the southern end of Ravensdale Park and St Martin's Drive, the river corridor has some sense of naturalness with mature trees along the bank. In other sections the river appears as a channel with grassed banks, or is bounded by walls, which lessen its natural qualities.

10.5.3.1 Values to be retained

The river is an attractive element of many open spaces. The natural qualities of the river are evident in a number of open spaces and should be retained where possible. Bankside vegetation removal should be minimised and where trees are removed, replanting should be carried out where possible. Trees are a feature of a number of areas along the River Poddle and should be retained where possible.

10.5.3.2 Values to be enhanced

The character of certain parts of the river corridor is degraded where the river is walled by high walls and gives it an industrial character such as parts of Ravendsale Park, and Whitehall Park on Templeville Road. In certain locations, opening up access or views to the river may be regarded as a positive feature.

10.5.4 Views and Visual Amenity

As the river itself is narrow, and often not visible from outside its immediate surroundings, views to the river are limited to areas where it is easily accessed, mainly in parks and open spaces as outlined above. In addition, walls and vegetation do restrict views even from some of these open spaces. Many of the views towards the river (and the proposed works) will therefore be visible only in close proximity. However, where the removal of vegetation or larger trees is proposed, these will be more noticeable from outside the immediate vicinity of the river corridor.

Visual Amenity is considered to be high in some of the open spaces, and in Tymon Park in particular, where the combination of open areas, woodland clumps and the lakes connected by the Poddle, result in high visual amenity. Other areas which have some pleasant qualities include sections of the river near Wellington Lane, where mature trees line the bank on one side, and at St Martin's Drive, where the mature trees and bankside vegetation have a semi natural quality. The aesthetic qualities of mature trees also contribute to areas such as Ravensdale Park and Mount Argus. Some areas of the river corridor are degraded with concrete walls or sheet piling, and have a more industrial character, including the end of Mount Argus Close, a part of Ravensdale Park and the green space at Templeville road (Whitehall Park). Areas where the river emerges from or enters a culvert also tend to have few natural qualities and little visual amenity such as at

Mount Argus Close, at Poddle Park adjacent to the pavement, and at the northern end of Ravensdale Park.

10.5.5 Potential Visual Receptors

Potential visual receptors which would be most sensitive to the proposed works include those in residences overlooking the river corridor, and those using the variety of open spaces that occur along the river corridor for recreation and amenity.

Those less sensitive would be those driving through areas close to the river corridor, or those engaging in sport in the larger open spaces, or those working in close proximity of the river corridor.

A number of viewpoint locations were chosen to represent the range of viewers which will experience the proposed works, from the larger Tymon park at the city's edge, to the many residential open spaces and streets where viewers may have views from the houses and immediate vicinity. The photomontages also represent a variety of proposed works, including walls of varying heights, embankments and removal of vegetation. The photomontages are discussed and the locations are listed in **Table 10-7**.

10.6 Proposed Development

The proposed development consists of flood alleviation measures along parts of the River Poddle. The works which are most relevant to the Landscape and Visual Assessment are located along the River Poddle between Tymon Park in Tallaght, and Mount Argus Close in Kimmage. The proposed works include flood defence walls, grass embankments, and regrading of ground and paths, to facilitate attenuation areas. A flow control structure is proposed at Tymon Lake. The river is to be realigned in one location, in the vicinity of Whitehall Park. These works will result in tree and vegetation loss in some locations.

A number of these measures will be concentrated in certain areas, which include Tymon Park, in the vicinity of Tymon Lake, as well as Whitehall Park/Wainsfort Manor in Terenure. Works are also proposed in Ravensdale Park where flood relief walls, path realignment and tree removal are proposed. A number of works are also proposed in the vicinity of St. Martin's Drive.

A full description of the proposed works is included in EIAR Chapter 5. However, the main proposed works which are relevant from a Landscape and Visual aspect are as follows:

- Temporary Works Compounds are proposed at Tymon Park, Wainsfort Manor Crescent, Ravensdale Park and St. Martin's Drive. The compound at Tymon Park is to be fenced with a chain-link fence and site hoarding and will be re-instated using stored topsoil following works. The other compound locations will be fenced works or set down areas.
- Temporary access tracks will be necessary in a number of locations at Tymon Park around Tymon Lake and Tymon North. Temporary River crossings are proposed in Tymon North and Tymon Park.
- Earth embankments ranging in height from approximately 0.5m to 2.7m are proposed at several locations in Tymon Park, with a large embankment at Tymon Lake to the east and south of Tymon Lake to provide the main flood storage. Re-grading of ground and pathways is also proposed. These embankments will be seeded with grass.

- An Integrated Constructed Wetland (ICW) is proposed northeast of Tymon Lake. The river will be diverted into the ICW. This is proposed as an enhancement measure to improve water quality.
- A Proposed spillway/overflow weir at eastern end of lake at Tymon Park
- River channel realignment and regrading in Whitehall Park is proposed.
- Flood defence walls, ranging in height from 0.54m to 1.5m, are proposed in several locations. These will be either reinforced concrete or sheet piles. This will include reinforcing existing walls, construction of new walls and replacement of existing walls. New walls will have a precast base and will be constructed in situ. The walls will be finished in stone cladding or pointed with concrete capping beam on top.

Locations where walls are proposed are as follows:

- Tymon Park flow control structure Whitehall Park/Wainsfort Manor Drive
- Rear of Fortfield Road south of Kimmage Cross Roads (KCR)
- Ravensdale Park (and wall at KCR Builder's Provider's)
- Green space at St Martin's Drive
- Mount Argus Close
- Works at a number of manholes in Poddle Park, Poddle Park, Crumlin and in the vicinity of Saint Teresa's Gardens and Donore Road, and at the rear of the National Stadium, South Circular Road, Merchant's Quay. These works are not expected to have any visual or landscape effects.
- Ancillary works and associated development including drainage channel clearance and removal of trees where required for the works; rehabilitating or replacing culvert screens in locations as required; installing flap valves in all culverts draining to the River; biodiversity enhancements including installation of floating nesting platforms in Tymon Lake, Tymon Park, Tallaght.
- Tree and vegetation removal: The proposed works will involve the removal of trees and vegetation in a number of areas along the River Poddle, including:
 - \circ Tymon Park (both north and south of M50) in several areas
 - Wainsfort Manor Green/Drive, Whitehall Park,
 - Fortfield Road to the rear of St Anne's Terrace
 - Ravensdale Park
 - Green space between St Martin's Drive/Poddle Park
 - Mount Argus Close

10.7 Mitigation/Avoidance by Design

During the design process, it was considered that more detailed landscape design was necessary in some locations, to avoid and minimise adverse landscape and visual effects.

Tree Surveys were carried out in the following locations where works are proposed (See **EIAR Volume 3** for Drawings and **Volume 4**, **Appendix 5-2**, for accompanying Report).

- Tymon Park (both North and South of M50)
- Whitehall Park/ Wainsfort Manor Crescent
- Fortfield Road
- Ravensdale Park
- St. Martin's Drive

Landscape mitigation plans were prepared for the following areas:

- Tymon Park in the vicinity of Tymon Lake
- Ravensdale Park

A tree planting plan was prepared for the green area in the vicinity of St. Martin's Drive to address tree replacement in this area. The drawings are included in Appendix 3 of the EIAR.

The mitigation and avoidance measures are set out at the end of this chapter.

The construction phase of the project is expected to last approximately 24 months.

10.8 Potential Effects

10.8.1 Construction Phase landscape effects

Construction Phase Landscape Effects include setting up of construction compounds removal of trees and vegetation, and movement of machinery and earthworks in the vicinity of the river and associated open spaces and parks.

10.8.1.1 Magnitude of Change

The magnitude of change will vary depending on the location. In general, areas where works are proposed will experience machinery on site to clear vegetation, carry out earthworks and construction. The magnitude of change is considered to be Low in the majority of areas, including Mount Argus, Wainsfort Manor/Drive, Fortfield Road and in Tymon Park south of the M50.

Areas which are likely to experience a Medium to High magnitude of change include Tymon Park, in the vicinity of Tymon Lake, where a construction compound and a considerable network of temporary access tracks is proposed during the construction phase, along with re-grading of areas around Tymon Lake. The construction of the ICW is also in this area.

10.8.1.2 Significance of Effect

The construction phase is likely to last for 24 months in total but the expected timescale for parts of the scheme will vary (see **EIAR Chapter 5, Table 5.1**). Areas such as Tymon Park will experience works for up to the 24 month period with much shorter periods of works in other areas. This will and is considered to have a **Temporary, Slight to Moderate adverse** landscape effect. Effects are expected to be Not Significant to Slight, and adverse in the majority of areas and Moderate, adverse in Tymon Park.

10.8.2 Operational Phase Landscape Effects

The landscape character of the river corridor where works are proposed varies between the large scale parks on the edge of the city, through the more densely built up suburban and urban areas.

- Large scale regional parks
- A variety of smaller open spaces including linear open spaces along the river corridor, and larger spaces which are overlooked by dwellings. These include Whitehall Park, Wainsfort Manor and St. Martin's Drive area.
- Formal parks such as Ravensdale Park are also included

The river passes through a high proportion of open space of varying types, and these spaces are considered the most sensitive to the proposed development.

The Landscape Effects are described below and summarised in Table 10.7

10.8.2.1 Landscape Sensitivity

Landscape Sensitivity, referred to in Table 10.1 refers to the susceptibility of the receptor to change, and also to the value of the landscape.

The landscape sensitivity of the river corridor itself varies throughout the study area. As a watercourse, the river is valued as a component of green infrastructure. The landscape sensitivity for each of the areas identified above is discussed below and ranges from Low to High. Certain areas including the residential areas and open spaces would be considered Medium sensitivity while the regional parks are considered High sensitivity.

There are no specific landscape designations along the river corridor.

10.8.2.2 Magnitude of Change

The magnitude of change varies throughout the river corridor. There are certain areas which will undergo a greater degree of change, including areas such as Ravensdale Park, and St Martin's Drive, and parts of Tymon Park, and other areas where there is a lesser magnitude of change, such as at Mount Argus Close, Fortfield Road, and areas where works consist of manhole replacements, which will not result in changes to the landscape or visual baseline.

The proposed development will result in both the removal of landscape elements and the addition of other elements:

- Removal of bankside vegetation and trees in the vicinity of the river
- Construction of flood defence walls and embankments
- Location of flood attenuation areas
- Realignment of the river with embankments at Whitehall Park

As with landscape sensitivity, the magnitude of change is discussed under each area, and the landscape effects are then discussed.

10.8.2.3 Landscape Effects on Character Areas

Large scale parks on the urban edge - Tymon Park

The landscape sensitivity of the Tymon Park area is considered to be Medium to High. The park is considered an important element in policy of the city's network of parks and open spaces and green infrastructure, and would appear to be a valued resource with a sense of openness and naturalness, in contrast the more confined and built up nature of the river corridor in the lower reaches of the River.

Magnitude of Change

There are several areas in Tymon Park which will undergo change, particularly around Tymon Lake. These changes include tree removal, grass embankments, and earthworks which include re-grading around the lake to facilitate attenuation, and a proposed spillway and flow control structure. An integrated Constructed Wetland (ICW) is also proposed near Tymon Lake, south of Limekiln Avenue.

In the park on the southwest side of the M50, several proposed grass embankments, one in the vicinity of the Tymon Castle site and the second to the west of the ESB substation. These vary in height up to 1.65 m, and length of 32 and 45m respectively. These proposed embankments are located in areas of tree cover and will necessitate some tree removal, however both locations, one near the river south of Tymon Castle and the other near the lake and substation compound, are surrounded by considerably large areas of trees which will remain. These changes are considered of Low magnitude, which are minor interventions in a large scale park of extensive areas of tree planting and will not change the overall character of this part of the park. The magnitude of change in this part of the park is considered Low:

Change that is moderate or limited in scale, resulting in minor alteration of landscape receptors, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character

On the opposite side of the M50, a series of embankments are proposed to allow the attenuation of flood waters in the vicinity of the larger and smaller lakes. A relatively long embankment (232m) is proposed around the eastern side of the main lake, near where the River Poddle flows out of the lake south of Limekiln Avenue. The embankment height varies up to 1.6 metres, however reaches 2.7 metres adjacent to the flow control structure. Some limited tree removal is necessary in the vicinity of the embankment, while a flow control structure and spillway is proposed to the east of the bridge, and a headwall along the River Poddle. To the north of the flow control structure, an embankment will result in the removal of a clump of trees.

A number of lower and shorter embankments, and path re-grading are proposed to the north and northwest, necessitating some tree removal, though this is minor in the context of the overall tree cover. the design proposed re-alignment of the paths and regrading, as shown in the Landscape Mitigation Plans (Drawings contained in Volume 3).

The proposed changes in this part of the park are considered of **Medium** magnitude of change. Medium is defined as:

Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors,

This change is localised, and only occurring mainly in the vicinity of the spillway. The use of a park and existing lake for flood attenuation purposes is represents a multi-functional use of an open space by combining flood attenuation which is an ecosystem service, with recreation and amenity. Significance of Effect

The significance of effect on Tymon Park ranges from Slight to Moderate, depending on the location. In the vicinity of Tymon Lake, effects are more pronounced while effects on the park south of the M50 are considered less evident.

Landscape Effects on the park south of the M50 are considered **Not Significant** effects which are **adverse** in quality.

Landscape Effects on Tymon Park north of the M50 are considered, in the short term, to be **Slight to Moderate effects.** The quality of the effect varies from neutral where areas of minor re-grading and path realignment is proposed, to adverse where the proposed flow control structure imparts a more industrial character to the area and where trees and vegetation are to be removed. The proposed ICW is considered to have a beneficial landscape effect.

Over time, in the medium term, it is considered that the landscape effects are considered to remain Slight, and many of these effects will become neutral as vegetation including marginal vegetation around Tymon Lake and the proposed ICW, establishes and softens the edges. Replacement trees will also mature.

Open spaces including linear open spaces along the river corridor

The majority of areas along the river corridor would be considered of Medium to High sensitivity – these are the open spaces along the river with some trees or vegetation, which lends a certain character to the area - especially important in urban areas. These are valued as important as naturalistic spaces within a built up suburban or urban area and those considered of Medium Sensitivity include Wainsfort, Ravensdale Park, the green space between St Martin's Drive and Poddle Park and Mount Argus,, Whitehall Park of Templeville Road is considered Low-Medium sensitivity.

Medium Sensitivity is defined as:

Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development.

Magnitude of Change

The magnitude of change also varies depending on the location, ranging from No effect in areas where the existing retaining walls are to be assessed, to Moderate effects. The areas experiencing a greater magnitude of change are Ravensdale Park, St Martin's Drive, Whitehall Park, and Wainsfort Manor Court. These areas are described separately below, in terms of the magnitude of change, and the significance of effect.

Whitehall Park, and Wainsfort Manor Crescent

Magnitude of Change

Whitehall Park will undergo a Medium magnitude of change due to the realignment of the river, tree removal and the creation of steep grassed terraces. Wainsfort Manor will undergo tree removal, including removal of some relatively large trees which will result in a change to the character of the area. This tree removal is as a result of proposed retaining walls adjacent to the river on the northern side. Medium is defined as:

Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context

Significance of Effect

The significance of effect is considered **Slight effect.** The quality of the effect is neutral to adverse. The removal of vegetation in particular a number of trees, at Wainsfort Manor, is considered an adverse effect. The building of walls is considered to be neutral to adverse effect. Realignment of the river in the green space near Templeville Road is considered a neutral effect, as the river becomes a central feature in the space and is moved away from the wall. The steep grass terraces may encourage users to spend time in the park.

Ravensdale Park

Magnitude of Change

The changes in Ravensdale Park include some minor tree removal, (Drawing (19150-T-103 included in Volume 3) to facilitate the construction of a flood defence wall along the western boundary and extending along the western side main path through the park, between the entrance on the Kimmage Road Lower and the park entrance at the northern end. This wall along the main path ranges from 0.7 metres to 1.35 metres and so will allow views over the park. The wall along the western boundary ranges from 1.1 to a maximum of 1.5 metres in the north-west corner. A new bridge is proposed to connect the path to the builder's yard to the west

The design was modified to incorporate mitigation and avoidance measures to reduce landscape and visual effects. Very few landscape elements of the park are removed – the bridge is replaced and tree removal was minimised (only 6 trees are to be removed).

The proposed wall height and extent was considerably reduced, and the paths retained. These measures are explained more fully in Section 10.7 under Mitigation and Avoidance measures.

These changes are considered to impart a Low magnitude of change to Ravensdale Park:

Change that is moderate or limited in scale, resulting in minor alteration of landscape receptors, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape and no reduction in landscape quality and perceived value.

Significance of Effect

The significance of effect in Ravensdale Park is considered to be **Slight, neutral effect.** While a small number of trees are to be removed, the majority are to be retained, and any tree removal these will have the effect of slightly opening up the views to the park. The park entrance is to be enlarged, and the walls are designed to facilitate seating and encourage usage of the park. The central wall is very low in the southern end and will appear as a feature of the park with its wavy outline.

St. Martin's Drive

Magnitude of Change

The green space to the rear of St Martin's Drive is also likely to undergo a considerable magnitude of change as a number of trees (approximately 20 and three tree groups) are removed from the southern part of the green. The removal of mature trees and building of the wall will have an adverse effect on the character of the area. The magnitude of change is considered High.

Significance of Effect

The significance of the effect is considered to be **Moderate in the short term.** The quality of the effect is considered **adverse.** As the proposed tree planting plan is implemented and the vegetation establishes, in the medium term, this is expected to reduce to Moderate and neutral.

Other Areas

Other residential areas including the river corridor at Fortfield Road and Mount Argus Close will undergo the construction of flood defence walls and the removal of trees (1 at Mount Argus and 9 no trees and one tree group along Fortfield Road. Effects are considered to have **Not Significant to Slight, adverse effects.**

Location	Landscape Sensitivity	Magnitude of Change	Significance of Effect
Tymon Park South of M50	High	Low	Not Significant, adverse
Tymon Park North of M50	High	Medium	Slight-Moderate, neutral to adverse in Short-term,

				-	
Tahle	10-6'	Landscane	Ftterts	Summarv	Tahle
rubic	10 0.	Lunuscupe	LIICCLS	Summary	rubic

Location	tion Landscape Magnitude of		Significance of Effect
	Sensitivity	Change	
			Slight, neutral in Medium term.
Whitehall Park, Wainsfort Manor	Low to Medium	Medium	Slight, neutral to adverse
Ravensdale Park	Medium	Low	Slight, neutral
St. Martin's Drive	Medium	High	Moderate, adverse in Short term Moderate, neutral in Medium term
Others – Mt. Argus, Fortfield Road	Medium	Low	Not Significant, adverse

10.8.3 Construction Phase Visual Effects

Visual effects along the river corridor are, in general, confined to the river itself and the immediate vicinity. There are no long distance views to or from the river, however visual effects will result in wider areas where substantial tree removal is to take place.

Visual effects are assessed in this chapter, and photomontages are included from 11 viewpoints in the vicinity of the proposed works, as listed in **Table 10-7**.

Viewpoint	Description
1	View from Mount Argus Close towards river
2	St. Martin's Drive - view from pavement towards removed trees and proposed wall
3	View from pavement at corner of Clonard Rd/Poddle Park junction

Table 10-7: Location of Proposed Photomontages

Viewpoint	Description
4	View from pavement at junction of Ravensdale Park and Ravensdale Drive towards Ravensdale Park
5	View from pavement along Kimmage Road Lower towards Ravensdale Park
6	View from Ravensdale Drive towards Park
7	View from Kimmage Road Lower towards Park
8	View from greenspace off Templeville Road towards proposed realigned river and embankments
9	Tymon Park – View towards Tymon Lake East
10	Tymon Park - view from path on Tymon Lake North towards bridge
11	Tymon Park – view from Tymon Lake South towards bridge

These photomontages represent the proposed development at operational stage, at approximately 5-7 years.

Magnitude of Change

Construction phase visual effects are expected to be most pronounced in the vicinity of Tymon Lake and the area to the north and east of this where the construction compound and ICW are proposed. Machinery will be visible in this area to carry out the earthworks and the construction compound will be fenced and hoarding will be visible. The magnitude of change is considered High.

In other locations, the works will be of a smaller scale. Works will include earthworks and vegetation removal, and temporary works compounds are proposed at Wainsfort and Ravensdale Park. The magnitude of change at Whitehall Park (Viewpoint 8) and Wainsfort and at Ravensdale Park (Viewpoints 4,5,6,7) and St. Martin's Drive (Viewpoints 2,3) during construction is considered Medium to High.

The magnitude of change at Fortfield Road and Mount Argus Close (Viewpoint 1) is considered a Low magnitude of change during construction.

Significance of Effect

The visual effects are considered to be temporary, but Significant adverse visual effects in the vicinity of Tymon Lake (Viewpoints 9,10 and 11 represent Tymon Park) during the construction phase.

Visual effects further along the river at Whitehall Park (Viewpoint 8) and Wainsfort and at Ravensdale Park and St. Martin's Drive are considered to be temporary, Moderate, adverse effects during the construction period. Visual effects at Fortfield Road and Mount Argus Close are considered to be Slight, adverse effects.

Additional works in the city north of the Grand Canal and in the vicinity of South Circular Road, where minor works are proposed, are considered to have a Negligible magnitude of change during construction and no visual effects following the construction phase.

10.8.4 Operational Phase Visual Effects

10.8.4.1 Visual Receptor Sensitivity

Visual receptors along the River Poddle includes those of high sensitivity as well as those and those of medium and low sensitivity as outlined in this chapter.

A number of photomontages were produced to represent a range of visual receptors, with an emphasis on the most sensitive receptors including residents and those enjoying parks and open spaces.

Magnitude of Change

The magnitude of change experienced along the river varies, as indicated in the photomontages. Residents in the vicinity of open spaces along the river, and users of their open spaces, including Tymon Park, are likely to be most affected by the proposed development.

10.8.5 Viewpoints Assessment

Eleven viewpoints are included to represent areas where the proposed works will be most prominent, as well as locations where effects will be less obvious. The photomontages include views along the river from Tymon Park, Whitehall, Ravensdale Park, St. Martin's Drive, and Mount Argus. They also show a variety of the proposed works, including the proposed embankments, walls, flow control structure, tree and vegetation removal.

The viewpoints are outlined in **Table 10-7** and summarised in **Table 10-8**. The photomontages with photo location map are included in **EIAR Volume 3**. These are now described.

10.8.5.1 Viewpoint 1 – Mount Argus Close

Existing View

The existing view shows the river Poddle where it runs through a residential area. The river itself is in the centre of the view, bordered by vegetation on both sides, and with a footpath in the foreground. Parked cars are adjacent to the path. A bridge connects the

riverbanks, and a house is visible in the background, with walls and houses partly visible across the river, in the background. A large tree is located on the opposite riverbank.

Proposed View

The proposed view shows a short section of low wall topped with metal railings adjacent to the path, and the removal of the birch tree close to the bridge. The large tree in the foreground is unaffected.

Visual Receptor Sensitivity

The visual receptor sensitivity is considered Medium.

Magnitude of Change

The magnitude of change is considered Low. A low wall is seen adjacent to the path, with metal railings on top of this, similar to the railings on the existing bridge.

Significance of Visual Effect

The significance of the visual effect is considered **Not Significant.**

10.8.5.2 Viewpoint 2 – St Martin's Drive

Existing View

The existing view shows a road in the foreground, with a pavement on the far side. Adjacent to the pavement is a grassed area, with some shrubby undergrowth, and a number of mature trees of considerable size in the background. There are glimpses through the trees of some houses and a terrace of houses is visible to the left of the image.

Proposed View

The proposed view shows the mature trees are removed, with the exception of some trees on the opposite side of the wall. A stone clad wall is visible but mostly screened by proposed vegetation. Some low level planting is shown in the grassed area. Proposed mature tree and shrub planting is shown in the montage, when the trees have matured (after approximately 5-7 years). The houses across the river are partly visible, as a result of tree removal, but the trees provide a certain level of screening.

Visual Receptor Sensitivity

Visual Receptor Sensitivity is considered to be High.

Magnitude of Change

The magnitude of change is considered High. The trees which occupy a large proportion of the view are removed, along with the undergrowth, allowing views to the houses on the opposite street and changing the character of the view. A proposed flood defence wall is visible adjacent to the river.

...introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Though the descriptions primarily refer to the addition of elements to a view, it is also appropriate to the removal of elements from the view which are considered characteristic.

The proposed view also shows the proposed trees to be re-planted along with shrub planting.

Significance of Visual Effect

The visual effect is considered **Significant and adverse** in the short term. However replacement, relatively mature tree planting is proposed, as shown in the montage, as well as shrub planting, and once this establishes, in the **medium term**, the visual effect is expected to reduce the quality of the effect to **neutral**.

10.8.6 Viewpoint 3 – Clonard Road/Poddle Park junction

Existing View

The road is visible in the foreground, with the railing and wall denoting the river. Extensive mature trees are visible behind the wall and fence, which partly screen the view to the houses opposite. The river is not visible in this view.

Proposed View

The proposed view shows a proportion of the mature trees to the right of the image are removed, and more open views are available to the housing estate (across the river). A proposed flood wall clad in stone, is visible. The trees to the left of the image are retained. The view also shows the proposed re-planting of mature trees, which provides some screening to the houses opposite, though views are available through the trees.

Visual Receptor Sensitivity

The visual receptor sensitivity is considered to be Medium at this location.

Magnitude of Change

The magnitude of change is considered to be Medium. The removal of the trees to the right of the image considerably changes the view, and the proposed wall is also visible. Though focussing on the addition of new elements into a view, Medium is defined as:

...introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Proposed re-planting is shown in the view, as outlined on the Tree Replacement Planting Plan included in Volume 3. The trees, once established in the Medium term, are expected to eventually provide a level of screening similar to the existing mature trees.

Significance of Visual Effect

The visual effect is considered to be **Moderate**, **adverse** visual effect in the short term. As the trees and vegetation matures, in the Medium term, the visual effect is likely to be neutral in quality.

10.8.6.1 Viewpoint 4 – Ravensdale Park - Ravensdale Drive junction

Existing View

The existing view shows the road in the foreground. On the opposite side, a low wall separates park from the footpath and an entrance is located to the left of the image. The park consists of grass areas with clumps of trees, with some areas of low planting, surrounded by low walls. In the background, the houses along Kimmage Road Lower are partly visible through the trees.

Proposed View

The proposed view shows a concrete wall, which follows the park boundary, to the left of the image. The existing entrance is retained and enlarged, and the trees in the park are retained.

Visual Receptor Sensitivity

This is an urban park in a residential area and the visual receptor sensitivity is considered High.

Magnitude of Change

The magnitude of change in this view is considered Low to Medium. The only change visible is the proposed wall, and the trees in the park (including the Tree of Hope, visible in the background,) are not affected.

Significance of Visual Effect

The visual effect is considered a **Slight effect**. The quality of the effect is considered to be adverse as some views are restricted in the north west corner. However, some viewers within the park and those walking along the pavement will have visibility over the wall.

10.8.6.2 Viewpoint 5 –Kimmage Road Lower looking southwest (Ravensdale junction)

Existing View

The existing view shows a view from Kimmage Road lower, looking across the road to the park. The road is seen in the foreground, with a low wall separating the park form the adjacent pavement. The park is composed of several trees in an area of grass, with some low planting beneath the trees. In the background, partial views across to Ravensdale Drive and the wall at the KCR Builder's yard are visible through the trees.

Proposed View

The proposed view shows a low concrete wall, part of which is wavy in outline, in the centre of the park. This wall extends throughout the view. Tree removal is very minimal, and barely perceptible, and a proposed tree is visible near the centre of the view.

Visual Receptor Sensitivity

This is an urban park in a residential area and the visual receptor sensitivity is considered High.

Magnitude of Change

The magnitude of change is considered Low to Medium.

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context"

Medium

"Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context"

Th proposed view shows a low, concrete wall, which is partly a 'seat' wall, in the park, to the rear of the row of trees. The wall restricts some views of the park the wall, and the stone wall in the distance, are low enough to allow views to Ravensdale Drive to be retained. A very small number of trees in this view are removed but this is barely noticeable as they are behind other trees.

Significance of Visual Effect

The visual effect is considered **Slight**, **adverse effect**. Though the wall is relatively low and retains views to Ravensdale Drive, it is of considerable length, and screens a proportion of grass and vegetation in the background, reducing the visible area of green space and creating an additional element of hard surface in the view.

10.8.6.3 Viewpoint 6 – Ravensdale Drive (looking East)

Existing View

The existing view shows the road in the foreground, with the riverbank evident in the middleground but the river itself hidden from view. The main element in the view are the large weeping willow trees which line the riverbank, and behind these, grass and some other scattered trees are visible. Partial glimpses of the houses opposite on Kimmage Road Lower are available between the trees.

Proposed View

The proposed view shows a low, stone clad wall in the foreground, and a concrete wall in the rear within the park, which is partly 'wavy' in formation. The weeping willow trees in the foreground are retained and tree removal in the park is barely noticeable. Some planting is proposed within the park, between the walls.

Visual Receptor Sensitivity

This is an urban park in a residential area and the visual receptor sensitivity is considered High.

Magnitude of Change

The magnitude of change is considered Low to Medium. Low is –

"Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context"

Medium:

"Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context"

There are two walls visible, one adjacent to the road, which is stone clad, and another concrete wall in the centre of the park. The walls are relatively low, and do screen some views of the vegetation and grass, but allow views to the trees in the park. The removal of some trees is barely noticeable as they are partly screened by other trees. Views or glimpses across the park to Kimmage Road are maintained.

Significance of Visual Effect

The visual effect is considered **Slight, neutral effect.** Though the stone walls reduce the amount of grass and vegetation visible, they are low enough to allow views in and out of the park. The large weeping willow trees which in the foreground are the key characteristic of the view, remain, and the views across the park to the houses beyond are not affected.

10.8.6.4 Viewpoint 7 –Kimmage Road Lower

Existing View

This view shows the road and pavement in the foreground, with a low brick wall delineating the edge of the park. A gap in the wall serves as a narrow pedestrian entrance. A line of trees is visible inside the wall, with grass and some clumps of vegetation underneath the trees. In the background, other trees are visible, as well as glimpses of the buildings and cars on Ravensdale Drive and Ravensdale Park roads.

Proposed View

The proposed view shows a low concrete wall, which has a wavy outline, along the path within the park. One tree is removed near the end of the wall. The majority of the trees are retained, and the removal of a low number (six) in the park and a proposed new tree, are barely discernible.

Visual Receptor Sensitivity

This is an urban park in a residential area and the visual receptor sensitivity is considered High.

Magnitude of Change

The magnitude of change is considered Low:

"Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context"

The low wall bounding the park remains, and the majority of the trees remain. The removal of a tree near the proposed wall, to the left of the image, is barely noticeable. A low concrete wall is introduced in the park, on the left of the existing path which is low enough to allow views and be used as a seat wall. In the background, the wall adjacent to the river is visible, slightly restricting low-level views of cars on along by Ravensdale Drive.
Significance of Visual Effect

The visual effect is considered **Slight.** The quality of the effect is considered to be **neutral.** The removal of the trees is not noticeable, and the walls are low enough to allow views into and out of the park. The trees, the key elements of the view, are retained.

10.8.6.5 Viewpoint 8 – Whitehall Park, Templeville Road

Existing View

The existing view shows an open grassed area, bounded by a high wall to the right of the image and to the left by the river Poddle. A wall on the left of the river divides the green area from a housing estate. In the background, a number of trees are visible along with other buildings.

Proposed View

The river is realigned and appears in the centre of the green space. The banks are terraced with grass. A gate is located in the wall to the left of the image, and a number of taller trees to the right of the view, in the background, are removed.

Visual Receptor Sensitivity

Viewers would be those in a green space which is partly overlooked by neighbouring residences. Viewers would be of Medium sensitivity.

Magnitude of Change

The magnitude of change is considered Medium to High. Medium is -

"Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context"

The river is to be realigned away from the wall, nearer to the centre of the view. The slopes are to be terraced and grassed. A gate is located in the boundary wall of the adjacent housing estate to the left of the view.

Significance of Visual Effect

The visual effect is considered to be **Moderate** effect. The quality of the effect is considered **neutral.** The river is realigned, but the channel is wider, making the river more visible, and more accessible. The grass terracing has potential to be used as a seating area.

10.8.6.6 Viewpoint 9 – Tymon Lake East, looking southwest

Existing View

The existing view shows a pathway on the right of the view, leading towards Tymon Lake. To the left of the path, a grassy river channel is visible (but no water is seen) and grassed fields beyond. In the middleground, a bridge over the river is visible, and a glimpse of Tymon Lake is available. To the left of the bridge, clumps of tree and shrub planting is visible. In the background of the view are large blocks of woodland planting. A distant view tot the Dublin Mountains is seen to the left of the view.

Proposed View

The ground leading towards the lake has been raised up considerably, and the path now slopes up towards the new bridge which is at a higher level. Stone clad walls are visible along a section of the river channel on this side of the bridge. Some tree planting is evident along the path.

Visual Receptor Sensitivity

The visual receptors are people in a well-used regional park and would be considered of High sensitivity.

Magnitude of Change

The magnitude of change is considered Medium:

"Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context"

The ground leading towards the lake is raised up considerably, and the river channel is lined with stone clad walls, which are part of the flow control structure. The path and bridge are raised up and the lake is not visible from this view. Some open grass fields are seen on the opposite side of the lake.

Significance of Visual Effect

The visual effect is considered **Moderate.** The quality of the effect is considered **adverse.** The view towards the lake is lost, and the views of the trees and the land beyond the lake is restricted. However distant views to the hills are still available to the left of the image. The walling along the river channel somewhat alters the semi natural character of the area. It should be noted that in the winter months, the foreground trees will allow more views to the background vegetation.

10.8.6.7 Viewpoint 10– Tymon Lake North, looking East

Existing View

The existing view shows the lakeside path in the foreground, bordered by some grass and a tree to the right of the image. To the left of the path is a gently sloping grassed area. In the middle ground a pedestrian bridge crosses the water and the margins of the lake are visible. In the background is a stand of relatively young woodland planting.

Proposed View

The proposed view shows the proposed path re-graded and moved away from the lake, and the lakeside tree removed. The ground on the opposite side of the lake has been raised up, and the existing bridge removed and replaced by a new bridge further to the left. The woodland planting in the background, which has been retained with some new tree planting. A seating/picnic area is located adjacent to the lake.

Visual Receptor Sensitivity

The visual receptors are people in a well-used regional park and would be considered of High sensitivity.

Magnitude of Change

The path has been realigned and the embankment raises the ground level around the bridge, however the proposed path makes space for a picnic area, and the main elements of the view, the lake and the woodland in the background, are largely unchanged. The magnitude of change is considered Low, defined as:

"Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context"

Significant of Visual Effect

The significance of the visual effect is considered to be **Slight, and neutral** in quality. The raised path and embankment cause some changes to the view but the character of the view remains.

10.8.6.8 Viewpoint 11– Tymon Lake South, looking Northeast

Existing View

This view shows Tymon lake looking towards the existing bridge where the lake flows into the River Poddle. The lake takes up a considerable proportion of the view, with the sloping grass areas and dense band of woodland planting forming a pleasant backdrop. Trees and grass on the lake shore in the foreground frame the view which has a semi-natural character.

Proposed View

The proposed view shows the proposed embankment across the lake, with the new bridge and flow control structure. Some trees and tree groups have been replaced with new trees but the main backdrop of woodland planting is not affected.

Visual Receptor Sensitivity

The visual receptors are people in a well-used regional park and would be considered of High sensitivity.

Magnitude of Change

The magnitude of change is considered Low. The proposed spillway is visible but at some distance across the lake, and the raised embankment on either side of the spillway and new bridge is evident. Tree removal is very limited, and some new tree planting is proposed on the embankment, and the picnic area is visible. However the main elements of the view, the lake and the woodland planting, remain unchanged, and the changes do not occupy a large proportion of the view.

Significant of Visual Effect

The visual effect is considered to be **Slight**, **adverse**. The spillway contrasts with the character or the area. However, the other aspects of the change are neutral.

10.8.7 Summary of Visual Effects

Table 10-8 summarises the visual effects for each viewpoint.

Table 10-8: Summary of	of Visual	Effects
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Viewpoint	Description	Visual Receptor Sensitivity	Magnitude of Change	Significance of Effect
1	View from Mount Argus Close	Medium	Low	Not Significant, neutral
2	St. Martin's Drive	High	High	Significant, adverse in short term, neutral in medium-long term
3	View from Clonard Rd/Poddle Park junction	High	High	Moderate, adverse in short term, neutral in medium-long term
4	View from Ravensdale Park/ Ravensdale Drive junction	High	Low to Medium	Slight, adverse
5	View from Kimmage Road Lower looking southwest	High	Low to Medium	Slight, adverse
6	View from Ravensdale Drive looking East	High	Low-Medium	Slight, neutral
7	View from Kimmage Road Lower	High	Low	Slight, neutral
8	View of Whitehall Park, Templeville Road	Medium	Medium-High	Moderate, neutral

Viewpoint	Description	Visual Receptor Sensitivity	Magnitude of Change	Significance of Effect
9	View of Tymon Park – View towards Tymon Lake East	High	Medium	Moderate, adverse
10	Tymon Park - view from path on Tymon Lake North towards bridge	High	Low	Slight, neutral
11	Tymon Park – view from Tymon Lake South towards bridge	High	Low	Slight adverse

Sensitive visual Receptors at Tymon Park will experience a Slight to Moderate, neutral to adverse visual effect, but these are restricted to certain locations within the park, mainly around Tymon Lake, and the changes are not considered widespread. The proposed spillway and embankments around the lake are likely to have the most pronounced visual effect. Other visual effects will result in the park, south of the M50, but these are considered very localised effects and will not have a widespread effect on the park as a whole.

Sensitive visual receptors overlooking and using residential open spaces at Ravensdale Park and Poddle Park/St Martin's Drive are also likely to experience visual effects. In Ravensdale Park, the visual effects range from Slight to Moderate visual effects, though these are considered neutral in quality.

Visual receptors in St. Martin's Drive are likely to experience short term Moderate to Moderate/Significant, adverse visual effects as a result of considerable tree removal. The trees are to be replaced, by relatively mature and fast growing species, however, as shown in the Tree Replacement Planting Plan (Drawing 19110-1-120) in Volume 3. Once the planting establishes it will reduce the visual effect, and the trees will, over time, contribute to screening the views (as shown in Viewpoints 2 and 3).

Visual receptors using other open spaces including the green space at Whitehall Park are likely to experience Slight, neutral effects.

10.9 Mitigation and Avoidance Measures

10.9.1 Landscape Effects -Mitigation Measures

Landscape Effects range from Not Significant to Moderate/Significant, adverse effects. Landscape Mitigation plans are proposed for Ravensdale Park, as well as parts of Tymon Park. A tree planting plan is also included for St. Martin's Drive.

Mitigation and avoidance measure were incorporated into the project design, and some of the measures taken and incorporated into the design are as follows:

• One of the project aims is to minimise tree removal. Consideration of alternative construction methods in all locations where walls proposed to minimise vegetation loss, and to ensure retention of trees. Where this is deemed necessary as a result of the proposed works, compensatory planting is proposed as required by the relevant Council's trees policies. Replacement tree planting is proposed where trees are to be removed. Information on the number of trees and tree groups to be removed is provided in Section 3 of the Tree Survey Report.

10.9.1.1 Ravensdale Park

- Consideration of alternative design solutions in Ravensdale Park including retention of the current river alignment, and retention of path alignment from Kimmage Lower entrance to minimise disruption to trees.
- Earlier design proposals would have necessitated extensive tree removal and the design was modified to greatly reduce tree removal with the result that very few trees will be removed. The river channel is not realigned, wall height was reduced through the design process, and high walls surrounding the park were modified, resulting in a lower wall height to the west of the park and a lower wall which doubles as a seating area, in the centre of the park adjacent to the path. It should be noted that a wall impounding the proposed attenuation area was <u>the least impacting solution</u> on the park.
- It should be noted that 'soft' landscape measures which were considered, involved creating earth bunds which required a larger footprint, and ultimately would have resulted in extensive tree removal. The proposals for the park can be seen in the Landscape Mitigation Plan (19110-1-111) in Volume 3)
- Regarding trees along Ravensdale Drive, the design was amended to avoid these trees. The existing retaining wall to the riverbank is retained and the new wall built in front of it. The "toe" of the retaining wall is beneath the channel rather than behind the wall. Construction access is generally from the streamside.
- As stated in Chapter 5, Section 5.4 of the EIAR, replacement planting may not occur in the affected locations due to space constraints but will be planted as closely as possible in nearby green spaces to benefit the local communities. The locations for replacement tree and woodland planting will be agreed with SDCC and DCC at detailed design stage.

10.9.1.2 St. Martin's Drive

• St. Martin's Drive: A tree planting plan (Drawing 19110-1-120 in Appendix 3) is proposed to reduce the effects of tree removal. Proposed replacement planting includes fast growing species and includes tree specification which ranging from 14-16 cm girth to 25-30cm girth.

10.9.1.3 Tymon Park

- The design process for this area included consideration of alternative pathways in Tymon Park to maintain connectivity as a result of the re-grading of certain areas. Tree removal in Tymon Park was minimised. Proposed grass embankments and path re-grading are tied into the contours where possible. Embankments to be seeded with species rich grassland where necessary. Trees which are to be removed will be replaced.
- An Integrated Constructed Wetland (ICW) is proposed as an enhancement measure for Tymon Park. This is located northeast of Tymon Lake and includes marginal planting and is expected to enhance the area and assist in improving water quality.

10.9.2 Visual Effects - Mitigation Measures

A number of mitigation measures were included in the scheme design and in the Landscape Mitigation Plans. Many of the landscape mitigation measures above are also relevant to visual effects - including those relative to tree removal and the change of character of an area.

- Consideration of alternative construction methods in all locations where walls proposed to minimise vegetation loss, and to ensure retention of trees to reduce adverse visual effect.
- Replacement tree planting is proposed where trees are to be removed. Information on the number of trees and tree groups to be removed is provided in Section 3 of the Tree Survey Report. Refer to section 10.9.1.1 above for comments regarding exact location of replacement trees.
- Consideration of alternative design solutions in Ravensdale Park including retention of the current river alignment, and retention of path alignment from Kimmage Lower entrance to minimise disruption to trees.
- Earlier design proposals would have necessitated extensive tree removal and would have resulted in considerable adverse visual effects in the park. Wall height and location was reduced through the design process, and high walls surrounding the park were modified. It should be noted that a wall impounding the proposed attenuation area was the <u>least impacting solution</u> on the park.
- Regarding trees along Ravensdale Drive, the design was amended to avoid these trees. The existing retaining wall to the riverbank is retained and the new wall built in front of it. The "toe" of the retaining wall is beneath the channel rather than behind the wall. Construction access is generally from the streamside.
- Walls vary in height, but are predominantly low enough to and allow for views into and out of the park, though these are restricted in some areas. The retaining wall to the

west of the park reaches a to a maximum of 1.5 metres in the northwest corner, but reduces to the south of the park to a height of 1.1 metres. The wall in the centre of the park ranges from 1.35m metres in the north, to 0.7 metres. at the southern end. All heights are below 1.65 metres which is the average adult eye height. The proposals for the park can be seen in the Landscape Mitigation Plan (Drawing 19110-1-111) in Volume 3)

10.9.2.1 St. Martin's Drive:

• A tree planting plan is proposed to reduce the effects of tree removal, which would remove all trees to the south of the green space at St Martin's Drive, resulting in a change of character and visual quality.

10.9.2.2 Tymon Park

- : The design process for this area included minimising tree removal. Proposed grass embankments and path re-grading are tied into the contours where possible. Embankments to be seeded with species rich grassland where necessary. Trees which are to be removed will be replaced.
- An Integrated Constructed Wetland (ICW) is proposed as an enhancement measure for Tymon Park. This is located northeast of Tymon Lake and includes marginal planting and is expected to enhance the visual amenity of the area.
- Throughout the scheme, consideration was given to alternative wall materials and wall design including to allow visual permeability and passive surveillance

10.10 Residual Impacts

As for Section 10.8.



Figure 10-1. Key Views and Prospects (indicative). Source: Dublin City Development Plan





Plate 10-1: Lake, grassland and trees in Tymon Park

Plate 10-2: Open River channel in grassland at Tymon Park



Plate 10-3: Topography slopes towards the lakes south of Limekiln Road





Plate 10-4: View 1 of open grass lined channel from west of Wellington Lane

Plate 10-5: View 2 of open grass lined channel from west of Wellington Lane



Plate 10-6: River Poddle in open green space north of Templeville Road



Plate 10-7: View 1 of Bridge, wall and trees in southern end of Ravensdale Park *Plate 10-8: View 2 Bridge, wall and trees in southern end of Ravensdale Park*



Plate 10-9: High concrete wall at Ravensdale Park

Plate 10-10: Mature trees and grass with low enclosing wall at Ravensdale Park



 Plate 10-11: View 1 of dense trees and vegetation along riverbank at St.
 Plate 10-12: View 2 of dense trees and vegetation along riverbank at St.

 Martin's Drive
 St. Martin's Drive



Plate 10-13: Mature trees and undergrowth and grass create enclosure give a sense of naturalness along the river corridor



Plate 10-14: View 1 of Poddle corridor at Mount Argus Close

Plate 10-15: View 2 of Poddle corridor at Mount Argus Close



Plate 10-16: River flows through grass with some trees on bank at Mount Argus Church Grounds



Plate 10-17: Wall contains river with dense vegetation along bank at Mt Jerome

11 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

11.1 Introduction

The assessment of potential impacts on the archaeological, architectural and cultural resource of the proposed Flood Alleviation Scheme along the River Poddle, Co. Dublin was completed by Irish Archaeological Consultancy Ltd.

This study determines, as far as reasonably possible from existing records, the nature of the archaeological, architectural and cultural heritage resource along the proposed scheme using appropriate methods of study. In order to provide an appropriate archaeological and historical context, the wider vicinity was also examined. Desk-based assessment is defined by the Chartered Institute for Archaeologists (CIfA) as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets.¹ This leads to the following:

- determining the presence of known archaeological, architectural and cultural heritage sites that may be affected by the proposed scheme;
- assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme; and
- suggested mitigation measures based upon the results of the above research.

The assessment involved detailed interrogation of the archaeological and historical background of the scheme. This included information from the Record of Monuments and Places of County Dublin, the County and City Development Plans, the topographical files of the National Museum of Ireland, the National Inventory of Architectural Heritage, and cartographic and documentary records. Aerial photographs of the assessment area held by Ordnance Survey Ireland were also consulted. A field inspection was carried out on 27 March 2019 in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the study area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed scheme may have on the archaeological, architectural and cultural heritage resource, while the mitigation strategy is designed to avoid or reduce such adverse impacts.

11.1.1 Statement of Authority

This chapter of the EIAR has been compiled by Grace Corbett BA, MA, MCIfA. Grace is a Senior Archaeological Consultant with IAC Ltd. She holds an MA in Landscape Archaeology from the University of Sheffield and a BA in Archaeology and Classics from the University College Cork. She is also a member of the Institute of Archaeologists of Ireland and the Chartered Institute for Archaeologists and has over 15 years' experience working in the commercial archaeological sector, both in Ireland and the U.K. The chapter has been

¹ Chartered Institute for Archaeologists, *Standard and guidance for historic environment desk-based assessment*, December 2014, updated January 2017. https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf [accessed 04/06/19].

reviewed by Faith Bailey, who is an Associate Director and Senior Archaeologist and Cultural Heritage Consultant with IAC Ltd. She holds an MA in Cultural Landscape Management (archaeology and built heritage) and a BA in single honours archaeology from the University of Wales, Lampeter. She is a licence eligible archaeologist, a member of the Chartered Institute of for Archaeologists, of the Institute of Archaeologists of Ireland and has over 17 years' experience working in the commercial archaeological and cultural heritage sector.

11.1.2 Definitions

In order to assess, distil and present the findings of this assessment, the following definitions apply. 'Cultural heritage' where used generically, is an over-arching term applied to describe any combination of archaeological and architectural heritage features, where:

- the term 'archaeological heritage' is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places);
- the term 'architectural heritage' is applied to structures, buildings, their contents and settings of an (assumed) age typically younger than AD 1700; and
- the term 'cultural heritage', where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations. This designation can also accompany an archaeological or architectural designation.

11.2 Methodology

This study determines, as far as reasonably possible from existing records, the nature of the cultural heritage resource along the proposed scheme using appropriate methods of study.

11.2.1 Guidance and Legislation

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Acts, 1930-2014;
- The Planning and Development (Strategic Infrastructure) Bill, 2006;
- Planning and Development Act, 2000;
- Heritage Act, 1995;
- Environmental Protection Agency (EPA) 2015 Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (Draft Sept. 2015). Dublin, Government Publications Office;
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR) (EPA 2017). Dublin: Government Publications Office;
- Guidelines on the Information to be Contained in Environmental Impact Statements, (EPA, 2002);
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements, (EPA, 2003);

- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Local Government (Planning and Development) Act 2000.

11.2.2 Consultation

Following the initial research, the records of a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the baseline environment, receiving environment and study area, as follows:

- Department of Culture, Heritage and the Gaeltacht the Heritage Service, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders and Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- Dublin City Council and South Dublin County Council: Planning Sections; and
- historical and Ordnance Survey Maps.

11.2.3 Paper Survey

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

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- National Monuments in State Care Database;
- Preservation Orders;
- Register of Historic Monuments;
- topographical files of the National Museum of Ireland;
- cartographic and written sources relating to the proposed scheme;
- documentary sources;
- aerial photographs;
- Dublin City Development Plan 2016 2022;
- South Dublin County Council Development Plan 2016 2022;
- National Inventory of Architectural Heritage; and
- Excavations Bulletin (1970–2018).

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Service, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about

archaeological sites and monuments whose precise location is not known *e.g.* only a site type and townland are recorded. These are known to the National Monuments Service as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Culture, Heritage and the Gaeltacht (DoCHG) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each monument. The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent and at the discretion of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

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

Cartographic and Written sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape. The cartographic sources consulted during this assessment are described in **Section 11.4.3** and include:

- William Petty's Down Survey Map, Barony of Newcastle, 1654-56;
- John Roque, An actual survey of the County of Dublin, 1760;
- Taylor's map of the environs of Dublin, 1816;
- Duncan's Map of the County of Dublin, 1821; and

• Ordnance Survey 6-inch, 5-foot and 25-inch maps of County Dublin (1843, 1876, 1906-9).

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey and Google Earth.

Development Plans contain a catalogue of all the Protected Structures, Architectural Conservation Areas (ACAs) and archaeological sites within the city and county. The Dublin City Development Plan 2016 – 2022 and the South Dublin County Council Development Plan 2016 – 2022 were consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed project. Planning policies relating to archaeological, architectural and cultural heritage are listed in **EIAR Volume 4, Appendix 11-4**.

The National Inventory of Architectural Heritage (NIAH) was established under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. It is a government-based organisation tasked with making a nationwide record of locally, regionally, nationally and internationally significant structures dating to post-1700 AD, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures. Only those structures of regional importance or above are included in the Minister's recommendations for inclusion in the RPS. The NIAH have also carried out a nationwide desk-based survey of historic gardens, including demesnes that surround large houses. All NIAH structures are referred to as Built Heritage sites (BH) as part of this assessment.

Whilst the *NIAH Garden Survey* was utilised as part of this assessment, this was carried out in conjunction with detailed analysis of the first edition Ordnance Survey maps and field inspection, in order to identify all designed landscapes (DL) within the receiving environment of the proposed road development.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year. Up until 2018 and since 1987 this publication has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information from 1970 to 2018 is also available online (www.excavations.ie).

11.2.4 Field Inspection

A field inspection is necessary to determine the extent and nature of archaeological, architectural and cultural heritage remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information. The field inspection was carried out on 27 March 2019 and entailed:

- inspecting the proposed scheme and its immediate environs;
- noting and recording the terrain type and land usage;
- noting and recording the presence of features of archaeological or cultural heritage significance;
- verifying the extent and condition of any recorded sites; and
- visually investigating any suspect landscape anomalies to determine the possibility of them being of anthropogenic origin.

11.2.5 Impact Evaluation Methodology

The quality and type of a potential impact can vary to include the following:

- Negative Impact: A change that will detract from or permanently remove an archaeological/architectural heritage site from the landscape.
- Neutral Impact: A change that does not affect the archaeological/architectural heritage.
- Positive Impact: A change that improves or enhances the setting of an archaeological/architectural heritage site.
- Direct Impact: Where an archaeological/architectural heritage site is physically located within the footprint of the proposed Scheme and entails the removal of part, or all of the monument or feature.
- Indirect Impact: Where an archaeological/architectural heritage site or its setting is located in close proximity to the proposed Scheme.
- No Predicted Impact: Where the proposed Scheme does not adversely or positively affect an archaeological/architectural heritage site.

It should be noted that whilst impact levels and definitions are applied consistently to the cultural heritage resource, direct impacts on sites that are subject to statutory protection are considered to be more significant than sites/structures not subject to statutory protection.

Impact Definitions are included in **Tables 11-1** and **11-2** and in **EIAR Volume 4**, **Appendix 11-6**. These are in line with impact definitions as per the most recent EPA guidelines (2017).

Type of Impact	Definitions relating to archaeological heritage
Profound	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise when an archaeological site is completely and irreversibly destroyed by a proposed development.
Very significant	Effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Significant	An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data concerning the archaeological feature/site.
Moderate	A moderate impact arises where a change to the site is proposed, which although noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into modern day development without damage and that all procedures used to facilitate this are reversible
Slight	An impact which causes changes to the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.
Not significant	Impacts which cause noticeable changes in the character of the environment but without noticeable consequences.
Imperceptible	An impact capable of measurement but without noticeable consequences.

Table 11-1: Impact Definitions: Archaeology

Type of Impact	Definitions relating to architectural heritage
Profound	An impact that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse effects.
Very significant	An impact which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Significant	An impact that, by its, magnitude, duration or intensity alters the character and/or setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigation is likely to reduce the impact.
Moderate	An impact that results in a change to the architectural heritage which, although noticeable, is not such that it alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Impacts are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the impact.
Slight	An impact that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. Appropriate mitigation will reduce the impact.
Not significant	An impact which cause noticeable changes in the character of the environment but without noticeable consequences.
Imperceptible	An impact on architectural heritage of local importance that is capable of measurement but without noticeable consequences.

Table 11-2: Impact Definitions: Architecture

11.3 Existing Environment

The proposed scheme is located along the course of the River Poddle from Tymon Park to just north of South Circular Road, extending for c. 7km through largely urban areas, with a number of parks also located along its course. The river flows through the townlands of Tymon North, Whitehall, Perrystown, Templeogue, and Kimmage (Rathdown By), in the electoral divisions of Tallaght Tymon, Templeogue-Osprey, Templeogue -Kimmage Manor in the administrative area of South Dublin County Council, and in in the electoral divisions of Kimmage D, Kimmage C and Merchant's Quay, in the administrative area of Dublin City Council. Nine separate areas will be subject to construction work associated with the proposed scheme including Tymon Park, Whitehall Park, Wainsfort Manor Crescent, Fortfield Terrace, Ravensdale, Poddle Park, Mount Argus, South Circular Road and Donore Avenue (see **Figures 11-1** and **11-2**).

There are a number of recorded monuments and/or their zones of notification located within the construction site boundaries, these include a castle – tower house (DU022-007) at Tymon Park, the city watercourse (DU022-003; DU018-043002; DU018-043004), the zone of notification for a windmill (DU022-078) north of Poddle Park, a weir (DU018-043003) south of Mount Argus Way, the zone of notification for the site of Donore Castle (DU018-047001) and the zone of archaeological potential for Dublin City (DU018-020). A further six recorded monuments and/or zones of notification are located within 250m of the proposed scheme. All recorded monuments are illustrated on **Figures 11-1** and **11-2** and full details are provided in **EIAR Volume 4, Appendix 11-1**.

11.4 Archaeological and Historical Background

11.4.1.1 Prehistoric Period

The Mesolithic period (c. 7000–4000BC) is the earliest time for which there is clear evidence for prehistoric activity in Ireland. During this period people hunted, foraged and gathered food and appear to have had a mobile lifestyle. The nearest evidence for Mesolithic activity to the proposed scheme comprises of fish traps excavated on the shores of the River Liffey at Spencer Dock, c. 3.5km to the northeast.

The River Liffey and smaller watercourses such as the rivers Dodder and Poddle were major resources to be exploited throughout the prehistoric period. During the Neolithic period, the high ground of the Dublin Mountains to the south of Tallaght may have been perceived as being sacred and a large number of burial monuments dating to this period are recorded within this landscape. Extensive Bronze Age burials from the surrounding townlands at the south western end of the proposed scheme, including Greenhills, Kiltaiown, Aghfarrel and Ballinascorney Lower, and stray prehistoric finds from the Bancroft and Dodder river areas of Tallaght Village are indicative of early occupation. Two bronze artefacts (1973:213–214) were found at Bancroft Grove, c. 250m south of Tymon Park. However, there are no recorded sites dating to the Mesolithic, Neolithic, Bronze Age or Iron Age located within the vicinity of the proposed scheme.

11.4.1.2 Early Medieval Period

The name Dublin (Dubhlinn), meaning black pool, is generally taken to refer to the pool or pond that was located directly southeast of the present Dublin Castle, on the southern side of the River Liffey. However, it has been suggested that this name refers to an early Christian monastic settlement south of the black pool and Clarke (1990, 58) believes that this interpretation of Dubhlinn would explain why the town has two names – *Dubhlinn* (for the enclosed ecclesiastical area) and *Baile Ath Cliath* – a secular settlement that was developed to guard over the 'ford of the hurdles'.

The early medieval period is depicted in the surviving sources as largely rural characterised by the basic territorial unit known as the *túath*. Byrne (1973) estimates that there were at least 150 kings in Ireland at any given time during this period, each ruling over their own *túath*. One of the most common indicators of settlement during this period is the ringfort. Ringforts were often constructed to protect rural farmsteads and are usually defined as a broadly circular enclosure. One of the most recent studies of the ringfort (Stout, 1997) has suggested that there is a total of 47,000 potential ringforts or enclosure sites throughout Ireland.

This period was also characterised by the introduction of Christianity to Ireland. The new religion was a catalyst for many changes, one of the most important being literacy. Irish

was written down for the first time using the ogham script. The ogham alphabet is thought to be based on the Latin alphabet of the later Roman Empire and today the majority of the inscriptions that survive are located on pillar stones or boulders. As well as this form of the written word, the Church created impressive tomes in their official language, Latin. Examples of these include the Book of Kells and the Book of Durrow as well as other mundane works such as the Annals, which were an account of the history of the Church. Monasticism was known in St. Patrick's time (mid-5th century) but it was not until the 6th and 7th centuries that the famous monastic houses such as Glendalough, Bangor, Clonfert, Clonard, Clonmacnoise and Durrow were founded.

Archaeological and historical sources provide evidence for 67 pre-Norman ecclesiastical sites in Co. Dublin (Stout and Stout, 1992, p.13). The early medieval ecclesiastical enclosure of St. Maelruan's is recorded in Tallaght (DU021-037002). The Saint established the monastery in 769 AD and a church (DU021-037003) was built on the original location of the monastery.

11.4.1.3 Medieval Period

Political unrest and power struggles at the beginning of the medieval period led to the arrival of an Anglo-Norman contingent in 1169. By the end of the 12th century much of the country had been conquered and Dublin was expanding. The Anglo-Norman administration was responsible for reinforcing the town walls with defensive towers. Further improvements to the defences involved erecting a number of gates on the built-up streets outside the walls and supplementing the defensive gates already in place along the town wall itself.

The proposed scheme lies outside the line of Dublin's medieval town wall. According to Somerville-Large (1979), in the years of medieval growth the town extended beyond its walls with considerable suburban, monastic and industrial development. In the medieval period the landscape surrounding Dublin still served predominantly as farmland, part of a hinterland that helped to feed the city's inhabitants.

The River Poddle has been known as Sallagh, Soulagh, Puddell, Pottle and in 1506, as le Poddell. The river rises in Cookstown, near Tallaght, and flows into Dublin through Kimmage and Harold's Cross (De Courcey 1996, 306). To increase the water supply into the Poddle, a channel (DU022-003) was constructed from the Dodder, c.1.2km southeast of the scheme. The channel from Balrothery, near Firhouse joined the Poddle near the townland of Kimmage. It is generally believed that that this watercourse was ordered in 1244 by the justiciar Maurice Fitzgerald who instructed the City sheriff to 'without delay, by twelve free and lawful men of his country, to make inquisition, with advice of the Mayor and Citizens, as to whence water can be best and most conveniently taken from its course and conducted to the King's city of Dublin, for the benefit of the city and at the cost of the citizens, who have undertaken to pay the amount. By the same twelve men the sheriff is to enquire whether any damage can arise by thus taking and bringing the water. The sheriff under his seal, and the seals of the jurors, is to return the inquisition to the justiciar so that the damage, if any, may be repaired at the cost of the King' (Simpson 1997, 22). The Dodder weir was chosen and had to be enlarged and repaired. In the year 1245 the King directed John FitzGeffrey to have his hall in Dublin (castle) finished and water conveyed there through a pipe from the water supply by the summer of 1246, which indicates the possibility that the watercourse may have been complete by then.

To the northeast of present day Sundrive Road, in an area later known as Tongue Field, another diversion was made, known as the City Watercourse (DU018-043002). This watercourse brought the combined Dodder and Poddle water to the city. It appeared that the city was drawing more water than was allotted and a device known as the Tongue (DU018-043003) was constructed at the second diversion (within the scheme) in an attempt to regulate further the quantity of water reaching the city via the City Watercourse (Jackson 1990). The Tongue was a wedge-shaped pier of stone constructed at the junction of the Poddle and the City Watercourse. The pier partitioned the Poddle in two; the smaller passed into the City Watercourse and the remainder flowed through Harold's Cross. This feature has now been reconstructed as is known as the Stone Boat. An inquisition of 1259 (Berry 1904, 40) outlines an agreement between the monks of St. Thomas and the citizens of Dublin to create the new city watercourse. Simpson suggests that this relates to the fact that the monks had already diverted the Poddle at Firhouse and that the watercourse mentioned in 1244 was the second branch located in present day Harold's Cross. This places the origins for the weir and the channel running from it at Firhouse earlier, possibly from the late 12th century (Simpson 1997, p.25). It is suggested that the reference to the creation of a watercourse relates to the branch from the Tongue at Harold's Cross where the river flowed towards present day James Street where it turned towards Thomas Street (Jackson 1959, 34).

The City Watercourse was relied upon until 1755 when the Grand Canal supplemented much of the water needs of the city. This was in turn replaced in the 19th century when the large reservoirs at Bohernabreena and Vartry began to supply water to the city. The watercourse fed cisterns near to present day James Street and when the Grand Canal Basin was built there this water source became a feeder.

During the medieval period the landscape surrounding the proposed scheme was rural and agricultural in nature. Small settlements were scattered across the region and many provided food and resources for the growing city of Dublin. A small 15th century tower house was located at Tymon Park (DU022-007), however this was demolished in 1960. The structure had two diagonally opposed corner towers, one containing a stair tower. The entrance was placed unusually in the southwest stair tower and defended by machicolation. It rose to three storeys with a vaulted basement and battlements. The zone of notification for this monument extends in to the construction boundary of the proposed scheme. The site of Donore castle (DU018-047001) is located at the northern end of the proposed scheme, with the northern end of the zone of notification for the monument extending in to the construction boundary. This monument is marked as 'site of Donore Castle' on the 1837 Ordnance Survey map, however the area is now occupied by a business park and no evidence for the castle survives above ground.

After the Anglo-Norman invasion Tallaght was confirmed to the See of Dublin in 1179. During the 13th century the O'Byrnes, O'Tooles and many of the Archbishop's tenants took offensive action, as such many agricultural duties were not carried out. A royal grant to enclose the town was issued to the bailiffs of the town in 1310; however, no evidence of the walls has been found. The enclosing of the borough was strategic as Tallaght was positioned along the line of the Pale boundary and the native Irish were carrying out raids on the lands adjacent to Dublin in the 14th to 17th centuries. Between 1324 and 1349 Tallaght Castle was constructed although it was reportedly in need of repair a century later. The castle was raided by the O'Toole's in 1331/2 and devastated by the family in 1540 (askaboutireland.ie; southdublinhistory.ie).

The area formed part of the important ecclesiastical manor lands in the later medieval period. In 1324, the Archbishop of Dublin received the right to build an Archiepiscopal Residence in the town, to the south of the proposed scheme, and by the 16th century Tallaght had become the main residence for the Archbishop of Dublin outside the city. However, by the 17th century, the once important Borough of Tallaght had been reduced to its modern role as a village.

Harold's Cross is an historic suburb of Dublin and stands on lands that were once part of the medieval manor of St. Sepulchure. The name 'Harold's Cross' originated from a cross which marked the boundary between the lands of the Archbishop of Dublin and the Harold's. The growth of the area centred around the triangular green, which occupies a fork in the road, with the 'old road' following the course of the Poddle River southwestwards through to Kimmage.

11.4.1.4 Post-Medieval Period

The 18th century witnessed a more pacified Ireland and during this time industry was developed in the landscape. Due to the relatively rural landscape and the easy access to water in the form of the City Watercourse and the associated weirs, this area flourished in the post-medieval period as an area of industry. In the area of Tallaght, the waterpower of the River Dodder to the south of the proposed scheme was utilised and fed numerous millraces to operate a multitude of mills. Roque's map of the County of Dublin shows several of the mills to the south of Tallaght town during this time, as well as a number of others along the route of the Poddle and City Watercourse. These are described in further detail in the cartographic analysis (**Section 11.4.3**).

With the onset of the 18th century, the political climate settled and this saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland (or demesne) context for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland.

Multiple demesne landscapes and large houses were established throughout County Dublin during this period, due to the proximity of the city. Six designed landscapes are located within the receiving environment, however, due to the urban nature of the landscape today, substantial areas of these demesnes have been destroyed through development over the past two centuries. Mount Jerome (DL 4), located at the north eastern end of the scheme was a large country house and demesne and has some surviving elements despite its current use as a cemetery. Mount Argos (DL 1) to the southwest also has recognisable demesne features. Kimmage demesne (DL 5) is now occupied by institutional buildings and its demesne features are unrecognisable.

The scheme to construct the Grand Canal was preceded by a number of proposals in the early 18th century for a canal connecting Dublin with the Shannon. The project got under way in the mid-1750s and in 1756 work commenced on the canal at Clondalkin. After some years the scheme had moved westwards, but not eastwards towards the city. A new

company was formed in the early 1770s to take over the project and it is unclear how much had been constructed at the Dublin end by then. John Rocque's large-scale map of the city of 1756 shows nothing of the canal, while his smaller scale map of county Dublin of 1760 shows the canal reaching the canal basin at James's Street, with a spur descending to the Liffey. This anticipated the actual construction, however, as the basin shown on the map was not in the right location, while the spur to the Liffey was never built. Rocque's successor, Bernard Scalé, showed the canal on his map of 1773, but without any basin at all. It may have been under construction in Kilmainham area at the time. In 1780 Pool and Cash showed exactly the same "line of the new canal" on their map of Dublin, with a dashed line indicating the intended line to the terminus at Grand Canal Harbour, James's Street. In fact, the canal opened to Dublin in 1779, though not necessarily all the way to James's Street.

11.4.2 Summary of Previous Archaeology Work

A review of the Dublin County Archaeology Archive and Excavations Bulletin (1970–2018) has shown that there have been 40 archaeological investigations within 250m of the proposed scheme.

Three engineering test-pits were monitored at St Teresa's Gardens c. 30m to the north of the proposed development (14E245, Bennett 2014:147). These exposed late medieval/early post-medieval deposits in the form of thick layers of sterile water-deposited silts likely to form part of a medieval watercourse (DU018-043004).

Archaeological testing located 30m north of the course of the river, at Mount Argos identified 19th century drainage and landscape features but nothing of archaeological significance (Hession 2008b, Licence No. 08E0738).

Testing and monitoring were carried out at 23-25 Sundrive Rd, adjacent to the route of the Poddle. Testing revealed 19th and 20th century agricultural activity (Cryherall 2002; Licence No. 02E1826), while nothing of archaeological significance was identified during the programme of monitoring (Cryherall 20023; Licence No. 02E1826).

Nothing of archaeological significance was found during archaeological testing 90m north of the River Poddle at Sundrive Park (Duffy 2018, Licence No. 18E0560) or during testing at 255 Kimmage Rd. Lower, 50m southeast of the Poddle, (Keogh 2002, Licence No. 02E1051).

Testing and monitoring at Mercy Convent, Cork Street, c. 200m to the north-northeast, identified the remains of tanning boxes in the location of a 'Tan Yard' on the 1866 OS map (00E0728, Bennett 2004:0529; 00E0728 ext., Bennett 2005:427; and Bennett 2005:428).

At the south western end of the scheme, four archaeological investigations were undertaken in the vicinity of the River Poddle. Nothing of archaeological significance was found during monitoring at Bancroft Park (Lynch 2003, Licence No. 03E0927) and no archaeologist was present during the excavation of two slit trenches on the R113 directly west of Institute of Technology of Tallaght ('ITT', Bolger 2010, Licence No. 10E0389).

The south side of the diverted River Poddle was exposed during testing at 73 Cork Street c. 170m to the northwest (03E0954, Bennett 2003:515).

The course of the medieval city watercourse was identified during two archaeological investigations to the north of the Grand Canal, both at Ruben Street c.180m-200m west of the scheme boundary (04E0512, Bennett 2004:0583 and 00E0876, Bennett 2002:0571).

No archaeological material was recovered from the following investigations: Testing at Player Wills Factory (06E0994, Bennett 2006:644); testing at 69A Donore Avenue (03E1807, Bennett 2003:524), testing at White Park Business Park (03E0776, Bennett 2003:523), testing at Greenville Avenue (93E0019, Bennett 1993:071), monitoring at Coombe Emergency Theatre (11E0432, Bennett 2011:190 and Bennett 2012:193), testing at Dolphins Barn Ice Rink (03E1021, Bennett 2004:0536), three investigations at Brown Street South (02E0724, Bennett 2002:0522; 02E0724 ext., Bennett 2003:0598; and 04E1340, Bennett 2004:0520), monitoring at 25 Parnell Road (03E0939, Stafford 2003), monitoring at 18 Parnell Road (14E0372, Bennett 2015:493), two investigations at Griffith College (03E0921, Bennett 2003:0579 and 16E0625, Bennett 2017:084), an excavation at Our Lady's Hospice, Harold's Cross (06E0314, Bennett 2003:516; 04E0270, Bennett 2005:429; 04E0996, Bennett 2004:0532; 02E0912, Bennett 2003:514; 04E0270, Bennett 2004:431; 04E0310; 04E0020; 08E0503, Bennett 2008:399; 16E0026, Bennett 2016:479; 03E1648, Bennett 2003:517; and 05E0448, Bennett 2005:430).

11.4.3 Cartographic Analysis

11.4.3.1 John Roque's Map of County Dublin, 1760

John Roque's map of Dublin shows the landscape through which the scheme runs as entirely rural, with small settlements such as Tallaght, Kimmage and Harold's Cross illustrated. The City Watercourse is illustrated from Templeogue to the City, however the course of the Poddle is not illustrated from Kimmage to Tallaght (**Figure 11-3**).

The tower house in Tymon Park (DU022-007) is illustrated on a small hill adjacent to the scheme. However, Donore Castle (DU018-047001) is not shown on this map.

The River Dodder is depicted to the south of the scheme, with a number of paper mills and associated structures located along its length. The City Watercourse, from the Dodder to the Poddle is shown and has a number of structures along its length. A number of mills and associated mill races and ponds are shown at Kimmage and Harold's Cross, some annotated as 'C. Mill' possibly indicating they were Cutler's mills or corn mills. Mount Jerome, it's designed gardens and tree lined avenue leading to the House are shown (**Figure 11-4**), while the area to the north of Mount Jerome is shown as agricultural fields with the River Poddle clearly depicted.

11.4.3.2 John Taylor's Map of the Environs of Dublin, 1816

This map (**Figure 11-5**) shows in clearer detail that which is depicted on Rocque's Map. The tower house at Tymon Park is annotated as 'Timmin Castle' (not reproduced on map extract below). The paper mills along the Dodder, south of the scheme are shown, as are the numerous mills along the scheme in Kimmage and Harold's Cross. The City Watercourse is shown on this map where it is diverted from the Dodder, to join the Poddle. The Tongue (DU018-043003) is shown and labelled for the first time.

Mount Jerome is again depicted, with the City Watercourse flowing to the southeast of the House and demesne. The Grand Canal has been constructed by this time, as has the South Circular Road. A penitentiary can be seen between the canal and South Circular Road, with the land to the north shown as open fields. A building, known as Ropers Rest, is located north of South Circular Road and was the home of Sir Thomas Roper, Baron of Bantry and Viscount Baltinglass (not reproduced on map extract below).

11.4.3.3 William Duncan's Map of County Dublin, 1821

The course of the Poddle from Templeogue to Tallaght is illustrated for the first time on this map (**Figure 11-6**). As with the previous maps, the mills along the Poddle and 'the Tongue', within the scheme, and those along the Dodder to the south are shown. Where the diversion from the Dodder meets the Poddle, a mill labelled as Domville Mill (CH 5) is seen, with its millrace flowing north towards the Poddle. No significant changes are seen in the area north of the Canal.

11.4.3.4 Ordnance Survey first edition 6-inch Map, 1843

A second mill is located along the Poddle and within the scheme to the north and is labelled as a Cutlers Mill (CH 3). The Poddle then flows north westwards through the demesne of Kimmage House (DL 5), which contains another flour mill at its northwest corner (CH 2), on the north bank of the River (**Figure 11-7**).

To the northeast of Kimmage Road West, the scheme flows through the small demesne of Brook Lawn (DL 2), with a flour mill and mill pond (CH 1 and 6) located along the Poddle. A number of quarries are located to the east of the scheme, while another flour mill and mill pond are located along the River to the south of Sundrive road (DU022-077001). The Tongue (DU022-043003) is annotated on this map (**Figure 11-8**).

As the Poddle flows south of Mount Argus, a large paper mill, associated buildings, weir, mill pond and mill race are shown (**Figure 11-8**). The gate lodge associated with Mount Argos is located on the north side of Kimmage Road Lower. The site of Donore Castle is marked for the first time on this map and is located adjacent to a cotton factory and within the grounds of Green Ville House. Much of the very northern end of the scheme is still located across agricultural fields, with some residential development along Donore Avenue (not reproduced on map extract below).

11.4.3.5 Ordnance Survey 5-foot Map, 1876

A small number of the OS 5-foot maps were available for review. One such map covers the scheme at Kimmage and shows the River Poddle as it passes through Brook lawn. The mill to the north is named as 'Tinker Mill', with the building and mill pond shown in detail (CH 1, CH 6; **Figure 11-9**).

The flour mill to the north of Tinker Mill is labelled as Larkfield Mill (flour), with its buildings, mill pond and mill race shown in detail (DU022-077001; **Figure 11-10**).

11.4.3.6 Ordnance Survey 25-inch Map, 1906-9

Mount Down Mill (CH 5) is now labelled as disused, while the cutlers mill (CH 3) to the north also appears to be disused. The main building associated with the flour mill (CH 2) at the northwest corner of Kimmage demesne has been demolished, however some of the associated buildings do survive, as does the mill pond which is still in existence today (not reproduced on map extract below).

The flour mill shown on the 6-inch map has expanded and is now called Ravensdale Mills (Corn; CH 6), with its mill pond also still in use. The flour mill southwest of Sundrive Road is also still in use, it has expanded considerably and is now called Larkfield Mills (Corn; CH 1) (not reproduced on map extract below).

The 'Tongue' is no longer marked on this map, however the field to the north is annotated as 'Tongue-Field'. The paper mill to the southeast of Mount Argus has expanded and is

now called Loader's Park Mill, its mill pond is still present and the lodge of Mount Argus is still depicted.

A row of houses has been constructed along the northern end of Kimmage Road Lower and this appears to have resulted in the culverting of a section of the river at this point. The river emerges again north of Mount Jerome Road, directly to the west of the Mount Jerome Church (**Figure 11-11**). At the northern end of the scheme, Our Lady's Hospice for the Dying has been constructed.

To the north of the Grand Canal there has been significant residential development, however the proposed scheme area here still remains largely greenfield (not reproduced on map extract below).

11.4.4 Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995, 2000 and 2005) and Google Earth (2008-2018) failed to identify any previously unknown features or areas of archaeological potential due to the urban nature of the landscape.

11.4.5 Stray finds

The topographic archives held at the National Museum of Ireland contain lists of artefacts held at the museum or previously seen at the museum and returned to owner. A review of the topographical files for the study area of the proposed development revealed that no stray finds have been recorded (see **EIAR Volume 4, Appendix 11-2**).

11.4.6 County Development Plan

The Dublin City Development Plan 2016 – 2022 and the South Dublin County Council Development Plan 2016 recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930–2014). The Development Plan also lists a number of aims and objectives in relation to archaeological heritage (see **EIAR Volume 4**, **Appendix 11-4**).
RMP No	Description	Location	Distance from proposed scheme
DU022-078	Windmill	Rathfarnham	60m N
DU018-020358	House 18 th / 19 th Century	Weaver's Square	235m NE
DU018-047001	Castle - unclassified	White Swan Business Park	31m SSE
DU022-007	Castle – tower house	Tymon Park	25m NE
DU022-077001	Mill - unclassified	Dublin South City	121m N
DU018-043003	Weir - regulating	Dublin South City	Within the scheme
DU018-043004	Zone of notification for City Watercourse	Dublin South City	Within the scheme
DU022-003	Zone of notification for City Watercourse	Dublin South City	Within the scheme
DU018-043002	Zone of notification for City Watercourse	Dublin South City	Within the scheme
DU018-020	Zone of Archaeological Potential for Dublin City	Dublin City	Within the scheme
DU018-043001	Zone of notification for City Watercourse	Dublin South City	136m E
DU018-048	Mill - unclassified	Harold's Cross	195m S
DU018-020576	Watercourse	Dublin South City	155m W

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The Dublin City Development Plan 2016 – 2022 and the South Dublin County Council Development Plan 2016 – 2022 recognise the statutory protection afforded to all Protected Structures under the Planning and Development Act (2000). The plan also lists a number of aims and objectives in relation to architectural heritage (see **EIAR Volume 4, Appendix 11-5**).

There is one protected structure along the course of the Poddle, BH10 at Kimmage is recorded as a mill, weir, mill-race & possible mound. There is, however, no evidence for these features on historic mapping or on the ground at this particular location.

A further 850 structures are located within 250m, 37 of which are Protected Structures and the remaining are listed on the NIAH. All built heritage assets are illustrated on **Figures 11-1** and **11-2** with further details provided in **EIAR Volume 4, Appendix 11-3**.

BH No	RPS No	NIAH No	Description	Location	Distance from proposed scheme
BH 1	874	50080461	Parnell Bridge	Grand Canal	247m S
BH 2	1849	50080748	Church of Our Lady of Dolour's	South Circular Road	178m SW
BH 3	2308	500080467	Rom Massey and Sons	South Circular Road	215m WSW
BH 4	2053	50080734, 50080735, 50080733, 50080740, 50080736	Bru Chaoimhin	Donore Avenue	170m N
BH 5	2052	50080693	Sophia Housing Association – Nunnery/Convent	Ormond Street	224m NE
BH 6	2325		Donore Castle	White Swan Business Park	50m SE
BH 7	2326	50080771	Church of St. Catherine and James	Donore Avenue	77m SSW
BH 8	1848	50080970	Dublin Mosque	South Circular Road	190m SE
ВН 9	1847	50080971	Islamic Information Centre	South Circular Road	205m SE
BH 10	186		Mill, weir, millrace and mound	Wainsfort Manor Crescent	153m ENE
BH 11	177	11211019	Northbrook	Tymon North	38m SE
BH 12	4260		Mount Argus Church	Mount Argus Park	190m NE

Table 11-4.	Ruilt heritage	assets within	the receiving	environment
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BH No	RPS No	NIAH No	Description	Location	Distance from proposed scheme
BH 13	6342- 6365	50081071- 50081075, 50081077- 50081084	24 Houses	1-24 Parnell Road	52-182m SE
BH 14	3580	50081068	Factory	Greenmount Industrial Estate, Structures A, B & F	204m SSE
BH 15	1846	50080866, 50080972- 50080980	Former Griffith Barracks	Griffith College	Immediate east
BH 16		50080781	Church of St Theresa of the Child Jesus	Donore Avenue	5m W
BH 17		50080782	Church of St Theresa of the Child Jesus - rectory	Donore Avenue	25m E
BH 18		50080783	Church of St Theresa of the Child Jesus - House	Donore Avenue	7m N
BH 19		50080794	St. Catherine's National School	Donore Avenue	Immediate southwest
BH 20		50080816	House	White Swan Business Park	30m E
BH 21		11211017	Kimmage Manor Church	Kimmage	190m E
BH 22		50081085, 50081086	15 Houses	29-43 Parnell Road	38-102m S/SW
N/A		Various	Group of 808 structures dating to the 19 th and early 20 th centuries representing residential development to the north and south of South Circular Road and to the west of Dolphin's Barn Street.	Various	Various

11.4.7 Cultural Heritage

11.4.7.1 Place Name Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main reference used for the place name analysis is Irish Local Names Explained by P.W Joyce (1870). A description and possible explanation of each townland, parish, and barony name in the environs of the proposed development are provided in the **Table 11-5**.

Name	Derivation	Possible meaning	
Tymon North	Tigh Motháin Thuaidh	Motháin's House North	
Limekilnfarm -		Limekilnfarm	
Templeogue	Theach Mealóg	Mealóg's House	
Kimmage	Camaigh	Unknown	
Terenure	Tír an Iúir	Land of the yew	
Harold's Cross	-	Harold's Cross	

Table	11-5:	Place	name	analysis
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11.4.7.2 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English tun land and meant 'the land forming an estate or manor' (Culleton 1999, 174). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland. The proposed scheme crosses or flows along five townland boundaries including that between Tymon North and Limekilnfarm, Limekilnfarm and Templeogue, Whitehall and Templeogue, and Kimmage and Perrystown. The River Poddle forms the townland boundaries between Limekilnfarm and Templeogue, Whitehall and Perrystown.

11.4.7.3 Demesne Landscapes

Six demesne landscape were identified from historic map sources. These are illustrated on **Figures 11-1** and **11-2** and details listed in **Table 11-6**.

Table 11-6:	Demesne	landscapes	within	the	receivina	environme	nt
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DL No	NIAH No	Description	Location	Distance from proposed scheme
DL 1	DU-50-O-142315	Mount Argus. Main features substantially present - some loss of integrity. Residential development in parkland area to the north east of the principal building. Mature planting visible near the principal building. River flows through the parkland, it has been widened in two places to give two small pools.	Harold's Cross	90m NE
DL 2	DU-50-O-073356	Brook Lawn. Main features substantially present - peripheral features unrecognisable. Industrial development in parkland area to the south east of the house.	Kimmage	36m N
DL 3	DU-50-O-138303	St. John's. Virtually no recognisable features. Site completely covered by residential development.	Kimmage	30m E
DL 4	DU-50-O-144318	Mount Jerome. Main features unrecognisable - peripheral features visible. Area completely covered by graves etc. some mature trees and very little grass visible.	Harold's Cross	210m N
DL 5	DU-50-O-128299	Kimmage House. Main features unrecognisable - peripheral features visible. Site of principal building covered by complex of institutional buildings, much of parkland covered by residential development. Remnants visible near the principal building.	Kimmage	Within the scheme
DL 6	DU-50-O-105291	Tymon Castle. Main features substantially present - some loss of integrity. Parkland divided by a major road. New building on site of principal building. Gate visible on southern entrance.	Tymon North	30m N

11.4.7.4 Cultural Heritage Assets

A review of cartographic sources has identified a number of cultural heritage assets which have not been recorded by the RMP. These are illustrated on **Figures 11-1** and **11-2** and listed in **Table 11-7**.

CH no	Description	Location	Distance from proposed scheme
СН 1	Flour mill on 1843 map, named as Ravensdale Mills (Corn) on 25" map	Kimmage	Within the scheme
CH 2	Flour mill on 1843 map	Kimmage	61m NW
СН З	Cutlers Mill on 1843 map	Kimmage	12m NW
CH 4	Mill race for Cutler's Mill	Kimmage	Within the scheme
CH 5	Domville Mill on 1821 historic map	Templeogue	177m S
СН 6	Mill pond for Ravensdale Mills	Kimmage	Within the scheme

11.4.7.5 Field Inspection

A field inspection was carried out on 27 March 2019, in sunny and clear conditions. The scheme begins at Tymon Park, no trace of DU022-007 (tower house) was seen during the site inspection. The river at the location of the proposed flood defence embankment to the southwest of the tower house is flanked by mature trees on the eastern bank, and scrub on the western bank (**Plate 11-1**).

The Poddle continues within Tymon Park on the northeast side of the M50, where a number of ponds are located (**Plate 11-2**). A number of flood defence banks are proposed in this area, which will be located on the landscaped grounds of the park (**Plate 11-4**). A compound area is also proposed at the northern edge of the park, adjacent to Limekiln Road. This area is part of the landscape park, no evidence for any archaeological features was noted during the site inspection however (**Plate 11-3**). At the eastern end of the Tymon Park, the Poddle flows through a housing estate, with existing modern breeze block and cement walls in place along the ends of the gardens parallel to the River (**Plate 11-4**). These walls are not considered to be of historical value.

To the north of Templeville Road the Poddle flows through a small green area (**Plate 11-5**) which was once the location of a mill race (CH 4), marked on historic maps from at least 1816. A cutlers mill is located to the northeast of the green area (CH 3), however the accuracy of the mapping is not exact, therefore mill buildings may have once stood within the green area. While no sign of these features was identified during the site inspection, below ground remains may survive.

The zone of notification for the extent of the City Watercourse, as recorded by the RMP, begins at the junction of Kimmage Road West and Kimmage Road Lower (DU022-003). The proposed scheme passes through the zone of notification here, where it is proposed to construct defence walls within Ravensdale park. This Park consists of a flat area of land

with mature trees (**Plate 11-6**). A mill is recorded here from at least 1816 (CH 1) and is named as a flour mill on the 1st edition 6-inch map and on the 25-inch edition. While no trace of the mill or its associated mill race were seen on the ground, there is potential for remains to survive below ground.

A proposed flood defence wall in Poddle Park is located along the eastern bank of the river (**Plate 11-7**). No archaeological features were noted in this area, although it is located within the zone of notification for the City Watercourse (DU022-003).

A weir (DU018-043003), located south of Mount Argos Square, is the location of what was known as the 'Tongue', which separated two branches of the City Watercourse (DU018-04302 and DU018-04304). This weir is now a modern construction with no evidence for the survival of any historic elements above ground (**Plate 11-8**).

11.4.8 Conclusions

The baseline assessment has shown that there are a number of recorded monuments and/or their zones of notification located within the construction site boundaries, these include a castle – tower house (DU022-007) at Tymon Park; the City watercourse (DU022-003, DU018-043002, DU018-043004; a weir (DU018-043003) south of Mount Argus Way; the zone of notification for a windmill (DU022-078) north of Poddle Park; the zone of notification for the site of Donore Castle (DU018-047001); and the zone of archaeological potential for Dublin City (DU018-020). From the northern end of the scheme to Kimmage Cross, the River Poddle also flows along the zone of notification for the City Watercourse (DU018-04304 and DU022-003) which supplied the city of Dublin with fresh water from at least the 13th century. A further six recorded monuments and/or zones of notification are located within 250m of the proposed scheme.

A review of cartographic sources has indicated that post-medieval mills and associated structures and infrastructure were located along the course of the Poddle and, although above ground evidence for these has not been found, there is potential for features associated with the milling industry to survive below ground.

There is one protected structure along the course of the Poddle, BH10 at Kimmage is recorded as a mill, weir, mill-race and possible mound. There is, however, no evidence for these features on historic mapping or on the ground at this particular location and there are no proposed construction works in this area. A further 850 structures are located within 250m, 37 of which are Protected Structures, with the remaining listed on the NIAH.

The Poddle also flowed through a number of post-medieval demesne landscapes, many of which have been significantly altered as a result of the expansion of Dublin since the mid-19th century.

11.5 Predicted Impacts during Construction

A number of interventions are proposed as part of the proposed scheme which may impact on archaeological, architectural and cultural heritage assets. These are illustrated on **Figures 11-1** and **11-2** and include:

- the construction of flood defence embankments and an integrated constructed wetland in Tymon Park;
- the construction of flood defence walls and the re-construction of existing flood defence walls at locations along the River and at Ravensdale Park;

- the construction of a flow control structure at Tymon Lake;
- the re-alignment of the river in at Whitehall Park (off Templeville Road);
- tree clearance as required in works areas; and
- public realm improvements including regrading and construction of footpaths.

Site preparation work will involve the stripping of existing vegetation / topsoil from the work areas, the creation of works compound areas and the removal of any existing walls or defences as required. Where bank space is available a new defence wall will be constructed in-front of the existing wall which will then be removed. Where new flood defence walls are to replace existing walls, the old wall will be removed and excavated below existing foundations.

11.5.1 Archaeology

There are a number of recorded monuments and/or their zones of notification located within the construction site boundaries, these include the zone of notification for a windmill (DU022-078) north of Poddle Park, a castle – tower house (DU022-007) at Tymon Park; the City watercourse (DU022-003, DU018-043002, DU018-043004); a weir (DU018-043003) south of Mount Argus Way; the zone of notification for the site of Donore Castle (DU018-047001); and the zone of archaeological potential for Dublin City (DU018-020).

Predicted impacts to archaeological sites and monuments include:

- Castle tower house (DU022-007): Proposed works located within the zone of notification for this castle include the construction of an embankment parallel to the River. Works will involve the removal of trees and stripping of topsoil along the footprint of the embankment. These works may have a direct moderate negative impact on remains associated with the castle which may survive in this area.
- Weir (DU018-043003): Proposed works adjacent to the weir include the construction of a proposed defence wall around it, which is within the zone of notification for the monument. There will be no direct impact to the weir structure during these works.
- City watercourse (DU022-003; DU018-043002 and DU018-043004): Works along the course of the Poddle (where it corresponds to the zone of notification for the City Watercourse), including all excavation works associated with the diversion of the river at Whitehall Park and the construction of new flood defence walls and flood defence embankments, may have a direct moderate negative impact on the historic watercourse.
- Zone of notification for the site of Donore Castle (DU018-047001) and the zone of archaeological potential for Dublin City (DU018-020): Works in these areas include manhole chambers sealing or replacement across the area which may have a direct moderate negative impact on remains associated with the castle and the historic city, should they survive below ground.
- Zone of notification for a windmill (DU022-078) north of Poddle Park: Works within this zone of notification include the removal of existing trees and the construction of a retaining wall. Only the very southern edge of the zone of notification for the windmill is located within the works area, therefore impacts are not considered to be significant.

 Unknown archaeological remains: There is potential for previously unknown archaeological remains to be found along the route of the proposed scheme, particularly in greenfield areas which have had limited previous disturbance, such as Tymon Park. Potential impacts to any such features may be direct and range from Slight to Profound negative.

11.5.2 Architecture

There are no built heritage assets located within any of the construction boundaries, therefore there are no predicted impacts on the architectural resource as a result of the construction or operation of the proposed scheme.

11.5.3 Cultural Heritage

Three cultural heritage assets have been identified within the proposed construction areas, these relate to post-medieval mills and mill features (CH 01, 04 and 06), as well as one designed landscape (DL 5).

Predicted impacts to cultural heritage assets include:

- Ravensdale Mills and its mill pond (CH 01 and CH 06): Works which may impact on Ravensdale Mills and its mill pond include reinforcing existing walls and the construction of new walls (to middle of Ravensdale park); replacement of the existing footbridge; the creation of a temporary works / set down area in Ravensdale Park; and sealing manholes in Poddle Park. Although no above ground evidence for the mill or its associated features were noted during the assessment, there is potential for features to survive below ground. Therefore, the scheme may have a moderate negative direct impact on these cultural heritage assets.
- Cutlers Mill and its mill race (CH 03 and CH 04): Works which may impact on Cutlers Mill and its mill race include the re-alignment of the river channel and reinforcing of the existing walls, construction of a flood defence embankment and the infilling the existing course of the river at Whitehall Park. Although no above ground evidence for this mill or its associated features were noted, there is potential for features to survive below ground. Therefore, the scheme may have a significant negative direct impact on these cultural heritage assets.
- Kimmage House demesne landscape (DL 05): The proposed scheme passes through the former demesne landscape of Kimmage House; however, this landscape has been largely altered in the 19th and 20th centuries and due to the minimal scope of the proposed works, the predicted impacts on these landscapes is not considered significant.

11.6 Mitigation Measures

Table 11-8 presents a range of proposed mitigation measures which will be implemented prior to and during works associated with construction of the proposed scheme. See **EIAR Volume 4, Appendix 11-7** for definition of mitigation strategies for Archaeology and Architectural Resources.

Unique ID	Description	Proposed mitigation
DU022-007	Zone of notification for castle – tower house	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018- 043003	Weir	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018- 043004, DU022-003, and DU018- 043002	Zone of notification for the City watercourse	Where it is proposed to divert the watercourse, a wade survey should be carried out along the existing stretch of the Poddle prior to commencement of construction activities. This should be carried out under licence from the National Monuments Service of the DoCHG. Archaeological monitoring of any excavation works along the course of the city watercourse should be carried out during construction. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU022-078	Zone of notification for a windmill	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
DU018- 047001	Zone of notification for the site of Donore Castle	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

Table 11-8: Proposed mitigation measures

Unique ID	Description	Proposed mitigation
DU018-020	Zone of archaeological potential for Dublin City	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
CH 01 and CH 06	Ravensdale Mills and its mill pond	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
СН 03	Cutlers Mill	Archaeological testing in the first instance. This should be carried out by an archaeologist under licence from the DoCHG. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
СН 04	Cutlers mill race	Archaeological testing in the first instance. This should be carried out by an archaeologist under licence from the DoCHG. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
n/a	Greenfield areas	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

11.7 Residual Impacts

There will be no residual impacts to the archaeological, architectural or cultural heritage resulting from the proposed development.



Figure 11-1: South western end of the proposed Scheme showing archaeological, architectural and cultural heritage assets



Figure 11-2: North eastern end of the proposed Scheme showing archaeological, architectural and cultural heritage assets



Figure 11-3: Extract from Roque's Map of County Dublin, 1760



Figure 11-4: Extract from Roque's Map of County Dublin, 1760



Figure 11-5: Extract from Taylor's map of the environs of Dublin, 1816 from Kimmage to Harold's Cross



Figure 11-6: Extract from Duncan's Map of the County of Dublin 1821, showing the course of the Poddle from Tallaght flowing north eastwards



Figure 11-7: Extract from Ordnance Survey 6-inch map, 1843 showing the Poddle as it flows through Kimmage



Figure 11-8: Extract from Ordnance Survey 6-inch map, 1843 showing the Poddle as it flows northeast of Kimmage towards Harold's Cross



Figure 11-9: Extract from Ordnance Survey 5-foot map, 1876 showing Tinker Mill and Brook Lawn



Figure 11-10: Extract from Ordnance Survey 5-foot map, 1876 showing Larkfield Mill



Figure 11-11: Extract from Ordnance Survey 25-inch map, 1906-9 showing Mount Jerome









12 NOISE AND VIBRATION

12.1 Introduction

This noise and vibration impact assessment has been prepared by AONA Environmental Consulting Ltd. to assess the existing noise and vibration levels in the area of the proposed River Poddle Flood Alleviation Scheme and to assess the potential impacts of construction of the Scheme from noise and vibration on the nearest sensitive receivers.

There are no mechanical elements such as removable flood defences proposed in the River Poddle Flood Alleviation Scheme. Therefore, there will be no operational noise impact.

The assessment and evaluation of the noise impact involved the following:

- Baseline Noise Survey noise monitoring during daytime in proximity to the residential receivers in the vicinity of the development. The purpose of the noise monitoring survey was to evaluate the existing daytime noise climate in the area.
- Noise level predictions of the main likely noisy components of the construction of the proposed development at the nearest noise sensitive receivers.
- An assessment of the predicted noise and vibration impact on the nearest residential receivers against relevant noise and vibration guidelines and a review of the potential for noise and vibration nuisance and complaint. Appropriate construction noise and vibration limits have been outlined.
- A recommendation of appropriate noise and vibration mitigation measures, if required.

12.2 Statement of Authority

The Noise & Vibration Impact Assessment has been prepared by Mervyn Keegan. Mervyn Keegan is a Director of the environmental consultancy, AONA Environmental Consulting Ltd. Mervyn Keegan's areas of professional expertise includes Noise and Vibration & Air Quality and Climate impact assessment and mitigation design. Mervyn Keegan has over 20 years of environmental consultancy experience. Mervyn is a full member of the Institute of Acoustics, with a Bachelor of Science Degree (Applied Sciences), a Master of Science Degree (Environmental Science) and a Diploma in Acoustics in Noise Control. AONA Environmental Consulting Ltd. is an independent consultancy specialising in Environmental Impact Assessment and Licensing. Mervyn Keegan (AONA Environmental Consulting Ltd.) has prepared numerous Noise & Vibration impact assessments per annum for a wide range of development types in the Republic of Ireland, Northern Ireland and the UK in the last 15 years. Mervyn Keegan is an expert in the awareness and understanding of the relevant legislation and guidance that pertains to best practise in such assessments. Mervyn Keegan has appeared as an Expert Witness at oral hearings, public inquiries and legal proceedings. Mervyn Keegan has produced Noise and Vibration Impact Assessment reports to assess the impacts of a range of development types including roads, residential developments, industrial developments, quarries and mines and wind energy developments among others.

12.3 Methodology

12.3.1 Construction Noise Guidelines

There are no national construction noise limit guidelines. Instead, there are indicative levels of acceptability for construction noise, as contained in the National Roads Authority (now Transport Infrastructure Ireland or TII) "*Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*" (March 2014) and outlined in **Table 12-1**.

Table 12-1: Maximum permissible noise levels at the façade of dwellings during construction

Days & Times	L _{Aeq (1hr)} dB	L _{AMax} dB
Monday to Friday - 07.00 to 19.00	70	80*
Monday to Friday - 19.00 to 22.00	60*	65*
Saturday - 08.00 to 16.30	65	75
Sundays and Bank Holidays - 08.00 to 16.30	60*	65*

* Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

(Ref. TII Guidelines)

12.3.2 Assessing Significance of Construction Noise Impacts

Annex E of BS5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*, provides guidance on assessing the potential significance of noise effects from construction activities. In relation to construction noise limits, BS 5228-1:2009+A1: 2014 *Noise and Vibration Control on Construction and Open Sites Part 1: Noise* details the 'ABC method', which recommends a construction noise limit based on the existing ambient noise level. General and short-term construction noise impacts that are deemed typical of any construction site noise sources, including activities such as ground preparation, site clearance, foundation earthworks, erection of new buildings, etc. are assessed in accordance with the 'ABC method' defined in BS 5228.

For the proposed River Poddle Flood Alleviation Scheme, the ambient noise levels have been determined through the baseline noise survey and then rounded to the nearest 5dB to determine the appropriate category (A, B or C) and subsequent threshold value. A potential significant effect is indicated if the construction noise level exceeds the appropriate category threshold value. If the existing ambient level exceeds the threshold category values, then a potential significant impact is indicated if the total noise level, including both the ambient noise and the various contributions of construction noise, is greater than the ambient noise level by more than 3dB. **Table 12-2**, reproduced from BS5228, demonstrates the criteria for selection of a noise limit for a specific receiver location. Table 12-2: Construction noise threshold levels based on the BS 5228 'ABC' method

Assessment Category and Threshold value period (Lage)	Threshold value, in decibels (dB)			
	Category A (A)	Category B (B)	Category C (C)	
Night time (23.00 to 07.00)	45	50	55	
Evening and weekends ^(D)	55	60	65	
Daytime (07.00 – 19.00) and Saturdays (07.00 - 13.00)	65	70	75	

Notes:

Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

12.3.3 Construction Vibration Guidelines

The relevant guidelines for vibration limits are the following:

- British Standards Institution. *British Standard 7385: Evaluation and measurement for vibration in buildings. Part 1: Guide for measurement of vibration and evaluation of their effects on buildings.* 1990.
- British Standards Institution. British Standard 7385: Evaluation and measurement for vibration in buildings. Part 2: Guide for damage levels from ground borne vibration. 1993.
- British Standards Institution. *British Standard 6472: Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting.* 2008.
- National Roads Authority (now TII), *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*, March 2014.

Relevant vibration limits and guidelines can be divided into two categories, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. Higher levels of vibration are typically tolerated for single events or events of short duration such as during construction projects compared to permanent vibration from operational industrial sources. For example, blasting (an instantaneous activity) and piling (a repetitive/continuous activity), two of the primary sources of vibration during construction projects, are typically tolerated at vibration levels up to 12mm/s and 2.5mm/s, respectively.

The TII Guidelines (March 2014) identify limits for protection against cosmetic damage as a function of vibration frequency, and are:

- 8 mm/s (vibration frequency <10Hz)
- 12.5 mm/s (vibration frequency 10 to 50Hz)

• 20 mm/s (vibration frequency >50 Hz).

Guidance relevant to acceptable vibration at the foundation of buildings is contained within BS 7385 (1993): *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration.* This guidance states that there should typically be no cosmetic damage to buildings if transient vibration does not exceed 15mm/s at low frequencies rising to 20mm/s at 15Hz and 50mm/s at 40Hz and above. These guidelines refer to relatively modern buildings.

12.3.4 Noise Survey Methodology Guidelines

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

In the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* the steps to be followed in order to derive appropriate noise limit criteria are outlined as follows: Step 1 – Quiet Area Screening of the Development Location

- Step 2 Baseline Environmental Noise Survey
- Step 3 Screen for Areas of Low Background Noise
- Step 4 Determine Appropriate Noise Criteria

The methodology in the EPA Guidance Note NG4 has been followed in order to screen for areas of low background noise and determine appropriate construction noise limits over the course of the project duration as described in **Figure 12-1**.

Table 12-3 outlines the noise limit criteria to be applied depending on the results of the screening processes in Steps 1 and 3, and the noise survey discussed in Step 2.

Scenario	Daytime Noise Criterion, dB L _{Ar,T} (07:00 to 19:00hrs)	Evening Noise Criterion, dB L _{Ar,T} (19:00 to 23:00hrs)	Night-time Noise Criterion, dB L _{Aeq,T} (23:00 to 07:00hrs)
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey.
Areas of Low Background Noise	45dB	40dB	35dB
All other Areas	55dB	50dB	45dB

Table 12-3: The noise limit criteria to be applied depending on the results of the screening
processes

(Ref. EPA Guidance Note NG4)

12.3.5 Noise survey methodology

A daytime noise survey at the nearest residential properties to the main areas of construction activity was undertaken on Tuesday 14th May 2019. See **Figure 12-2** showing noise monitoring locations in relation to the works areas.

The noise monitoring survey was undertaken in accordance with ISO 1996 *Description and Measurement of Environmental Noise*. A Cirrus Optimus Green CR:171B sound level meter (Serial No. G068599 - Calibration Date – 09/01/2018) was used during the noise monitoring surveys. The sound level meter was placed at a height of approximately 1.5m and away from reflecting surfaces at each monitoring location. A wind shield was used on the microphone throughout the survey and the sound level meter was calibrated before and after the survey period.

The weather conditions recorded during the daytime noise monitoring surveys were sunny and dry with a temperature of approximately 16°C and a light breeze.

Sound level measurements were recorded over 15-minute intervals to allow for an assessment of fluctuating noise levels due to passing traffic on surrounding roads. All measurement data was downloaded, exported from the manufacturer's software and stored as Microsoft Excel spreadsheet files. The measurement parameters recorded during the noise surveys are defined as follows:

- L_{Aeq} is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.
- L_{Amax} is the maximum A-weighted sound level measured during the sample period.
- L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise in the absence of the main noise source.

Subjective observations of the audible noise sources at each monitoring location were noted during the survey period. During the daytime monitoring periods it was noted that traffic noise from the adjacent heavily trafficked roads dominates the background noise level in the area of the proposed River Poddle Flood Alleviation Scheme.

12.3.6 Noise Prediction Methodology

As stated at the outset, the proposed River Poddle Flood Alleviation Scheme will have no operational noise impact, so this Chapter deals with the potential for daytime noise impacts during the construction phase only. The worst-case construction noise levels at specific locations in proximity to the expected main areas of construction activity have been predicted assuming specific operating 'on' times for typical equipment associated with such a construction project.

BS 5228-1:2009+A1:2014 sets out methods of predicting construction noise levels. Methods are presented for stationary and quasi-stationary activities and for mobile plant using a regular well-defined route (*e.g.* site haul roads). The predictions account for source-receiver distance, reflections and screening or soft ground attenuation and a percentage on-time.

The closest noise sensitive receivers to the expected main areas of construction activity and the construction compound have been selected to assess if there will be an exceedance of typical daytime construction noise limits at the noise sensitive receivers in the area.

12.4 Existing Environment

The results of the baseline noise monitoring survey are presented in **Table 12-4**. As stated previously, the background noise levels recorded were dominated by road traffic noise.

The results of the baseline noise monitoring data indicate that the noise levels at the sensitive receivers in the area of the proposed works are broadly in accordance with the World Health Organisation (WHO) *Guidelines for Community Noise*, recommended daytime levels of 50 – 55 dB(A) for outdoor living areas.

Some relatively high background noise levels of $50.2 - 52.7 \text{ dB}(A) L_{90}$ were recorded at Limekiln Road, at Castletymon Road and in proximity to Ravensdale Park due to relatively constant traffic flows in these areas. L_{Amax} levels in excess of 65 dB(A) were frequently recorded due to noise from passing traffic. In the existing green area at the rear of the properties at Grosvenor Court and Whitehall Park along the existing River Poddle alignment, lower background noise levels of $38.1 - 43.5 \text{ dB}(A) L_{90}$ were recorded. This is because this a relatively sheltered area with lower road traffic noise from Templeville Road.

Location	Time	Duration	L _{Aeq} (dB)	L _{AMax} (dB)	L _{AMin} (dB)	L _{A10} (dB)	L _{A90} (dB)
NML 1 – Limekiln	09:47:48	00:15:00	56.7	68.3	49.9	59.8	52.7
KUdu	10:02:48	00:15:00	58.2	68.4	50.6	61.9	52.4
	10:17:48	00:15:00	57.1	67.2	50.1	61	51.8
	10:32:48	00:15:00	57.4	69	48.3	61.7	49.8
	10:47:48	00:15:00	56.9	68.6	48.9	61.3	50.2
	11:02:48	00:04:27	57.8	74.4	51.1	60.8	52.1
NML 2 - St. Aongus	11:15:07	00:15:00	57.2	64.1	49.1	61.3	50.6
GIOVE	11:30:07	00:15:00	57.3	64.6	50.1	60.3	51.9
	11:45:07	00:15:00	56.5	65.2	48.9	59.3	51.6
NML 3 - Grosvenor	12:07:38	00:15:00	48.1	53.9	40	50.9	43.5
	12:22:38	00:15:00	49.2	58.3	39.4	51.9	43.1
	12:37:38	00:15:00	51.1	65.4	38.7	53.3	42
NML 3 - Grosvenor Court (Loc 2)	12:56:38	00:15:00	40.7	51.1	35.4	42.7	38.1
NML 4 - Poddle Park	13:13:17	00:15:00	55.5	73.3	46.3	58.5	50.1
	13:28:17	00:15:00	58.5	72.2	47.2	61.7	51.5
	13:43:17	00:04:23	60.1	76.3	46.1	63.2	50.8

Table 12-4: Noise monitoring data during the daytime period on Tuesday 14th May 2019

When compared to the recommended noise limit criteria provided in the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* and reproduced in **Table 12-3**, the noise measurement data obtained from the survey and reported in **Table 12-4** indicates that none of the areas could be described as 'Areas of Low Background Noise'.

12.5 Noise Impact Assessment

12.5.1 Summary of Proposed Works with potential for Noise Impact

A full description of all of the proposed works can be found in **EIAR Chapter 5The Proposed Development**. The main areas and works which are predicted to give rise to noise and vibration during construction of the River Poddle Flood Alleviation Scheme are described below. The drawings referred to are provided in **Part 2 Planning Drawings** of the planning documentation.

- At Tymon North where embankments will be constructed [Site Layout Drawing Nos. 08132 & 08133] (Baseline Noise Survey Location – NML 2, ITT / St. Aongus Grove).
- 2) At Tymon Park where significant embankments with a flow control structure at Tymon Lake, and an Integrated Constructed Wetland will be constructed [Site Layout Drawing Nos. 08141, 08142, 08143, & 08146] (Baseline Noise Survey Location – NML 1, at front of No. 117 Limekiln Drive). The primary construction compound will be located within Tymon Park adjacent to the public carpark off Limekiln Road.
- 3) At green spaces at Whitehall Park and Wainsfort Manor Crescent where there is a channel diversion and flood walls planned [Site Layout Drawing Nos. 08151 &08152]; (Baseline Noise Survey Location – NML 3, at rear of properties at Grosvenor Court and Whitehall Park). A temporary works / set down area will be established at Wainsfort Manor Crescent.
- 4) At Fortfield Road south of Kimmage Cross Roads and Ravensdale Park where there is a combination of replacing and reinforcing existing walls and new walls (to middle of park) [Site Layout Drawing No. 08155 &08160] and at Poddle Park where manhole chambers are to be rehabilitated or replaced [Site Layout Drawing No. 08250]; (Baseline Noise Survey Location – NML 4, at side of No. 24 Ravensdale Drive). A temporary works / set down area will be established at Ravensdale Park.
- 5) The proposed works will include for construction of new flood defence walls at St. Martin's Drive, and Mount Argus, and the establishment of a secure storage area at St. Martin's Drive [Site Layout Drawing Nos. 08165 & 08170]. The construction of new flood defence walls will result in short-term construction noise impact which will not be significant at the nearest receivers. The existing background noise at these locations is represented by NML 4.
- 6) Manhole rehabilitation or replacement works will be carried out in the middle and lower reach of the River in public roads at Ravensdale Park in Kimmage, Poddle Park in Crumlin, and Saint Teresa's Garden in Merchant's Quay [Site Layout Drawing Nos. 08250 & 08251]. These works will take place predominantly within the existing public road network with works in proximity to St. Teresa's Gardens

and at the rear of the National Stadium. Construction noise impacts will be shortterm at each works location and not significant in comparison to the existing background traffic noise.

7) Ancillary works and associated development will include rehabilitating culvert screens in locations as required; installing flap valves in all culverts draining to the River to prevent ingress of flood water to the drainage network; removal of trees where required for the proposed works; landscaping and landscape mitigation and public realm improvements in Tymon North, Tymon Park, Whitehall Park, and Ravensdale Park including replacing footbridges in Tymon Park and Ravensdale Park. These construction works will result in short-term construction noise impacts which will not be significant at the nearest receivers.

The nature of proposed construction works in each area and distance to nearest noise sensitive receivers are summarised in **Table 12-5**.

Section 12.6 describes the mitigation measures that are required relevant to the nature of the proposed works and proximity to noise sensitive receivers.

Table 12-5: Areas of proposed construction works and whether these are likely to result in a construction noise impact and require construction
mitigation measures

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Noise Impacts?
08132	Tymon North	Left bank embankment	 Tree removal, temporary access road, excavating & saving topsoil, importing material, temporary crossing of river, piling, landscape mitigation works. 	St. Aongus Crescent - ~130m to SW	Yes
08133	Tymon North (adj to ESB substation)	Left bank embankment	 Tree removal, temporary access road, excavating & saving topsoil, importing material, piling, landscape mitigation works 	St. Aongus Grove - ~190m to SW	Yes
08140	Tymon Park	Main site compound	 Access off Limekiln Road Offices, carpark spaces, storage units Welfare facilities Water ESB and foul Temporary stockpile location in this area Pedestrian access management to prevent access to works area. 	Limekiln Road – ~25m to N.	Yes
08140	Tymon North and Tymon Park	Material stockpiling and landscape restoration & mitigation.	 The aim is to reuse 50% of excavated material in landscape mitigation and restoration. The remainder to be removed from site. All topsoil excavated from the works areas (first 200mm depth) in Tymon North and Tymon Park will be reserved on site for reuse in final landscape mitigation and restoration. 	St. Aongus Crescent, St. Aongus Grove & Limekiln Road.	Yes
08141	Tymon Park	Left bank embankment	 Tree removal, temporary access roads, excavating & saving topsoil, importing material, piling, landscape mitigation works 	Limekiln Road – ~150m to N.	Yes

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Noise Impacts?
08142	Tymon Park	Left bank embankment	 Tree removal, temporary access roads, excavating & saving topsoil, importing material, piling, landscape mitigation works 	Limekiln Road – ~100m to N.	Yes
08143	Tymon Lake	Main flood storage embankment and flow control structure	 Tree removal, excavating & saving topsoil, importing material, temporary diversion, removal of existing weir and footbridge, temporary crossing of river, temporary access roads, piling, landscape mitigation works. For the embankment: Excavated top soil at foot of embankment and store for reuse; Excavate central core; Fill with embankment material compacting in layers (consider use of remote control roller); construct embankment in 300mm layers, compact using 14T single drum vibrating roller; Surface of completed layer to be toothed with bucket to bond to next layer; Repeat; Embankment is overfilled and shaped to correct size and slope geometry. For flow control structure: Necessary to install channel diversion to dry out works area; fill in area of lake for works access; Design of structure to be passive with no mechanical electrical elements; Use of precast elements if possible; Reinstatement of diversion channel to All Reservoir Panel Engineer's (ARPE) satisfaction. A new footbridge will be provided on top of embankment, landscape mitigation will incorporate new pedestrian path on top of embankment. 	Limekiln Road – ~165m to N.	Yes

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Noise Impacts?
08146	Tymon Park	Integrated Constructed Wetland	• Tree removal, temporary diversion of river, some instream works, excavating & saving topsoil, excavating to river level & removal of material, temporary access road, landscape mitigation works.	Limekiln Road – ~45m to N.	Yes
08151	Whitehall Park	Channel re-alignment, re- grading, and reinforcing existing walls	 Tree removal, temporary diversion, excavating & saving topsoil, excavation and landscape mitigation works. Access gate from Whitehall Park to be installed for SDCC Parks Maintenance General existing services to be brought to new channel and flapped Remove penstock at Lakelands overflow weir Access improvement works at weir. 	Whitehall Park, Whitehall Park & Grosvenor Court – ~15m to works.	Yes
08152	Wainsfort Manor Crescent	Reinforcing existing walls (Glendale Park and Terenure Badminton Club) & constructing new walls where none exist (at end of long gardens of houses on Limekiln Road) & temporary works / set down area with access off Wainsfort Manor Drive.	 Tree removal, instream works, walls construction. • 	Wainsfort Manor Green – ~15m to works. Wainsfort Manor Crescent– ~15m to works.	Yes
08155	Rear gardens at terrace of houses on Fortfield Road south of Kimmage Cross Roads	Replace existing walls	Tree removal, instream works, removing existing walls. walls pre-cast, Provide safe access for future clearance of inlet to culvert	Fortfield Road - ~10m to works.	Yes
08160	Ravensdale Park & Poddle Park	Combination of reinforcing existing walls and new walls to middle of park; replacement footbridge; temporary works / set down area in Ravensdale	 Tree removal, wall construction and manhole chamber replacement / rehabilitation 	Ravensdale Park & Poddle Park - ~15m to works.	Yes

Drawing No.	Location	Scheduled Works	Comments Location of Nearest Sensitive Receivers	Potential Noise Impacts?
		Park; and sealed manholes in Poddle Park.	Manhole upgrades involves work in the public roads in mainly residential areas	
08165	St Martin's Drive	New wall at end of St Martin's Drive and recladding existing wall along Poddle Park to match	Tree removal, wall construction Poddle Park - ~15m to works.	Yes
08170	Mount Argus	New walls at footbridge	Tree removal, wall construction Mount Argus Clos - ~10m to works	e Yes
08250 & 08251	Within public roads in Ravensdale Park, Donore Avenue, and St. Teresa's Gardens, and at National Stadium off S. Circular Road	Manhole chamber replacement / rehabilitation	Involves work in the public roads in mainly residential areas Within the public roads at Donore Avenue & St. Teresa's Gdns. ar at the National Stadium off S. Circular Road	Not significant d
12.5.2 Predicted Construction Noise Levels at Sensitive Receivers

Noise impact as a result of the construction phase of the proposed development will be perceptible at nearby properties but this will be intermittent and temporary. Construction activities will not take place during night-time hours. The following construction practices have the potential to produce intermittent and temporary noise impacts:

- Site Clearance & Excavation Rock hammers, dozers, tracked excavators & dump trucks;
- Infilling / Levelling / Piling Excavators, wheeled loaders, and rollers;
- Wall removal & construction Concrete mixer trucks, cranes & delivery vehicles;
- General Construction Masonry construction, etc.

The proposed development will generate HGV movements throughout the duration of the construction period.

Construction noise can be assessed in terms of the equivalent continuous sound level and/or in terms of the maximum level. The level of sound in the neighbourhood that arises from a construction site depends on a number of factors and the estimation procedures need to take into account the following significant factors;

- the sound power outputs of processes and plant;
- the periods of operation of processes and plant;
- the distances from sources to receiver;
- the presence of screening by barriers;
- the reflection of sound;
- ground attenuation;
- meteorological conditions (particularly wind speed and direction), and
- atmospheric absorption.

Typical noise levels from construction works likely to take place during construction phase of proposed River Poddle Flood Alleviation Scheme are outlined in **Table 12-6**.

Table 12-6: Typical Noise Levels from Construction Works likely to take place during the
construction of proposed development

Ref No.	Equipment	A-weighted sound pressure level,
		L _{Aeq} , dB @ 10m
	Table C.2 Sound level data on site preparation	
Clearing Site & Gro	ound excavation/earthworks	
1	Dozer ж (142 kW, 20Т)	75 ж
3	Tracked excavator (102 kW, 22T)	78
12	Dozer (142 kW, 20T)	80
14	Tracked excavator (226 kW, 40T)	79
Loading lorries		
27	Wheeled loader (493 kW)	80
Distribution of ma	terial	
30	Dump truck (tipping fill) (306 kW, 29T)	79
31	Dump truck (empty) (306 kW, 29T)	87
Rolling and compa	ction	
37	Roller (rolling fill) ж	79 ж
Table	e C.3 Sound level data on piling and ancillary opera	tions
Pre-cast concrete	piling – hydraulic hammer	
1	Hydraulic hammer rig	89
٦	Table C.4 Sound level data on general site activities	5
Distribution of ma	terials	
1	Articulated dump truck x	81 ж
Mixing & Pumping	concrete	
20	Concrete mixer truck	80
Lifting		
38	Wheeled Mobile Telescopic Crane	78
Trenching		
63	Tracked excavator	77
Power for site cab	ins	
84	Diesel generator	74
Pumping water		
88	Water pump (diesel) (10 kW, 100Kg)	68
Sweeping and dus	t suppression	

Ref No.	Equipment	A-weighted sound pressure level, L _{Aeq} , dB @ 10m			
90	Road sweeper (70 kW)	76			
91	Dust suppression unit trailer	78			
Table C.5 Sound level data on road construction works					
Breaking road surf	ace & concrete				
1	Backhoe mounted hydraulic breaker	88			
6	Hand-held pneumatic breaker	95			

ж Drive-by maximum sound pressure level in LAmax (overall level)

(Ref: BS 5228 Noise on Construction and Open sites)

It is most likely that the above outlined construction activities will occur separately throughout periods of construction at each works location. The proposed construction works over the entire scheme are programmed over 24 months. Works will not be continuous over the 24-month period at any one location. By its nature, construction phases of such a proposed development are transient in terms of locations of precise activities on site from time to time. Therefore, the predicted worst-case LAeq,1 hour noise levels at specific locations have been outlined to present a worst-case range of noise levels that have the potential to occur at various stages throughout the 24-month construction period.

There will be four main works areas, namely Tymon North and Tymon Park; Whitehall Park and Wainsfort Manor Crescent; Fortfield Road, Ravensdale Park, St. Martin's Drive and Mount Argus; and at St. Teresa's Gardens. The expected construction duration for each area are summarised in Error! Reference source not found.**Table 12-7**.

Location	Main Flood Alleviation Scheme works	Estimated construction period (cumulative months)
Tymon North and Tymon Park	Establish & maintain main contractor's compound for Scheme duration	24 months
	Tree removal, excavations, demolition of flow control structure, stockpiling earth material, removal and import of earth material, embankments, demolition and replacement of flow control structure incorporating footbridge, ICW, site restoration, landscape mitigation/replacement tree planting, and biodiversity enhancements	4 months

Table 12-7: Estimated construction programme

Location	Main Flood Alleviation Scheme works	Estimated construction period (cumulative months)
Whitehall Park / Wainsfort Manor Crescent	Temporary works/set down area, excavations, removal and import of earth material, channel re-alignment and re-grading, flood protection walls, site restoration and biodiversity enhancements	2 months
Fortfield Road	Tree removal, demolition of existing boundary walls, erection of new flood protection walls, site restoration	1 month
Ravensdale Park / Poddle Park	Temporary works/set down area, tree removal, flood protection walls, demolition and replacement of footbridge, landscape mitigation/public realm improvements and replacement tree planting. Works to seal manholes.	2 months
St. Martin's Drive and Mount Argus	Establish secure works area, tree removal, flood protection walls, tree planting	1 month
St Teresa's Gardens/ Donore Avenue/ National Stadium	Temporary works area, traffic management, road works to rehabilitate or replace existing manholes	1 month

The predicted worst-case construction noise levels at specific locations in proximity to potential future construction works are summarised in **Table 12-8** below.

Table 12-8: Predicted	worst-case	construction	noise	levels	at specific	locations in	n proximity to
	pote	ential future o	constru	ction	works.		

Location	Likely Construction Noise Sources	Worst-case Predicted Noise Level L _{Aeq, 1 Hour} (dB)
At St Aongus Crescent during Embankment Construction in Tymon North (near NML 2)	1. Tracked excavator, Dump Trucks x 2 & Dozer	60 dB(A) (at 130m from works)
	2. Sheet piles driven using a Movax pile driver	65 dB(A) (at 130m from works)
	3. Tracked excavator, Dump Trucks x 2 & Dozer	56 dB(A) (at 190m from works)

Location	Likely Construction Noise Sources	Worst-case Predicted Noise Level L _{Aeq, 1 Hour} (dB)
At St Aongus Grove during Embankment Construction in Tymon North (near NML 2)	4. Sheet piles driven using a Movax pile driver	61 dB(A) (at 190m from works)
At nearest receivers on Limekiln Road during Embankment Construction in	5. Tracked excavator, Dump Trucks x 2 & Dozer	63 dB(A) (at 100m from works)
Tymon Park (near NML 1)	6. Sheet piles driven using a Movax pile driver	67 dB(A) (at 100m from works)
At nearest receivers on Limekiln Road to Construction Compound in Tymon Park (near NML 1)	7. Excavator, Dump Trucks , Lorry, Cement Mixer, Roller & 2 x Generators	70 dB(A) (at 25m from works)
At nearest receivers on Limekiln Road during Construction at Tymon Lake (near NML 1)	8. Tracked excavator, Dump Trucks x 2 & Dozer	58 dB(A) (at 165m from works)
At nearest receivers on Limekiln Road during Construction of ICW (near NML 1)	9. Tracked excavator, Dump Trucks x 2 & Dozer	72 dB(A) (at 45m from works)
At Whitehall Park (near NML 3)	10. Tracked excavator, Dump Truck, Water Pump & Place and vibrate concrete cycle	78 dB(A) (at 20m from works)
At Wainsfort Manor Crescent (near NML 3)	11. Tracked excavator, Dump Truck, Water Pump & Place and vibrate concrete cycle	78 dB(A) (at 20m from works)
	12. At receivers nearest to temporary works / set down area	72 dB(A) (at 20m from works)
At Rear gardens at terrace of houses on Fortfield Road (near NML 4)	13. Tracked excavator, Dump Truck, Water Pump & Place and vibrate concrete cycle	79 dB(A) (at 10m from works)
At Ravensdale Park & Poddle Park (near NML 4)	14. Tracked excavator, Dump Truck, Water Pump & Place and vibrate concrete cycle	80 dB(A) (at 15m from works)
	15. At receivers nearest to temporary works / set down area	72 dB(A) (at 20m from works)
At St Martin's Drive & Mount Argus	16. Tracked excavator, Dump Truck, Water Pump & Place and vibrate concrete cycle	79 dB(A) (at 10m from works)
Pedestrians and park users at Tymon North and in Tymon Park - @40m from works.	17. Tracked excavator, Dump Trucks x 2 & Dozer	73 dB(A) (at 40m from works)
	18. Sheet piles driven using a Movax pile driver	75 dB(A) (at 40m from works)

Location	Likely Construction Noise Sources	Worst-case Predicted Noise Level L _{Aeq, 1 Hour} (dB)	
At Noise sensitive receivers @ 20m from manhole sealing and repair and stormwater upgrade works.	19. Tracked excavator, Dump Truck & Place and vibrate concrete cycle	76 dB(A) (at 20m from works)	
At 20m from worst-case works when repairing flood defence walls	20. Tracked excavator, Dump Trucks, water pump & place and vibrate concrete cycle.	78 dB(A) (at 20m from works)	

(*Note:* Calculations of the above worst-case construction noise levels are presented in **EIAR Volume** *4*, *Appendix 12*)

12.5.3 Construction Noise Impact Significance

In accordance with the BS 5228-1:2009+A1: 2014 Noise and Vibration Control on Construction and Open Sites Part 1: Noise 'ABC method', the ambient noise levels (rounded to the nearest 5 dB) in the area of the proposed construction works are approximately 55 - 60 dB LAeq,T during daytime. As a result, the noise sensitive receivers fall into Category A of the 'ABC' assessment methodology.

It is important to note that construction noise impacts will occur during daytime hours only and will be short-term at each area of construction along the River Poddle. Not all construction noise sources will operate at once and construction noise levels are likely to vary throughout the typical working day.

A pragmatic approach needs to be taken when assessing the significance of noise effects of any construction project. The significance of the construction noise from the project has been determined by considering the change in the ambient noise level with the construction noise on-going. BS5228 states that noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq, Period, from construction noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact. BS5228 also states that for public open space, impact might be deemed to be significant if the total noise (pre-construction noise) exceeds the pre-construction ambient plus construction noise) exceeds the pre-construction are likely to result in significant impact. BS5228 also states that for public open space, impact might be deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise (LAeq, Period) by 5 dB or more for a period of one month or more.

Based on the BS5228 'ABC' assessment methodology, the contractor should aim to limit daytime construction noise to 65 dB LAeq,12 Hour at all works areas with the application of appropriate mitigation measures.

Based on the estimated duration of works at each location as outlined in **Table 12-7** there will be a short-term noise impact at the nearest sensitive receivers to the proposed works. In some of the works areas, the predicted worst-case 1-hour construction noise levels may be in excess of the recommended maximum noise level of 70 dB LAeq / 80 dB LAMax at 1m from the façade of the nearest residential properties as outlined by the TII Guidelines (March 2014). Noise from construction works will fluctuate throughout the course of a typical working day as well as over the course of the construction works being undertaken in any one location. Therefore, the daytime construction noise limit of 65 dB LAeq, 12 Hour

should be achieved at the nearest residential properties. The construction noise impacts will be short-term and will not be significant.

Appropriate construction mitigation measures outlined below will be implemented as part of the Construction Environmental Management Plan (CEMP).

12.5.4 Construction Vibration at Sensitive Receivers

Construction vibration impacts have the potential to occur if piling works are undertaken in very close proximity to sensitive receivers. Piling works are proposed in Tymon Park where sheet piles will be driven to form part of the main embankment at Tymon Lake, and at Tymon North.

The nearest sensitive receivers to proposed piling works at Tymon North and Tymon Park will be at St. Aongus Crescent, St. Aongus Grove and Limekiln Road. Sheet piles will be approximately 6m long and will be driven using a Movax pile driver (Vibratory side grip pile driver) attached to a 25Te tracked excavator. This is a low noise and vibration method that is used in urban settings. At the distances to nearest sensitive receivers, vibration will not be discernible. A worst-case piling noise prediction has been used by assessing impacts with an assumed Pre-cast concrete piling – hydraulic hammer with a sound level of 89 dB(A) at 10m.

If after detailed design, sheet piling is required to construct the flood defence walls as part of the proposed scheme, vibration monitoring will need to be carried out at any requisite monitoring points in the vicinity of residential properties. The chosen locations will be agreed in advance with SDCC / DCC. This will help to ensure that any vibration generated by the construction of the proposed scheme would not give rise to nuisance in the vicinity of the proposed scheme.

It is proposed that vibration monitoring will be carried out for all properties in close proximity to construction works where piling is required. Precondition surveys will be carried out at properties in close proximity to the construction works. Survey and monitoring locations will be identified during detailed design and agreed with residents/owners as part of the CEMP in advance of the construction works. A programme of noise monitoring and vibration monitoring (if required) at sensitive receivers will be detailed by the Contractor prior to works beginning. This will allow for a constant review of noise and vibration (if required) levels generated by the construction of the proposed scheme and will highlight the need for further mitigation measures should they be required.

The relevant vibration limits for the duration of the construction works are set out and represent the allowable vibration in order to minimise the risk of building damage. Specifically, Noise & Vibration levels shall be kept below the levels specified, or of limits which may be imposed by the Competent Authority. If vibration monitoring results indicate that levels are approaching the standard limits, appropriate mitigation measures will to be put in place to ensure that vibration levels are reduced to acceptable levels.

The movement of construction vehicles to each of the proposed works areas will be *via* the existing road network. The resultant vibration levels will be no greater than is currently experienced when HGVs pass along the road network.

Accurate vibration level prediction is extremely difficult due to a significant number of variables that apply to such calculations, *e.g.* piling methods, ground conditions, etc. Therefore, the contractor will ensure that the TII Guidelines which identify limits for

protection against cosmetic damage as a function of vibration frequency are not exceeded through the use of the selected low vibration piling method and continuous monitoring of vibration levels during any piling that may have the potential to result in a vibration impact at nearby properties. However, as stated above, at distances of in excess of 100m from the nearest residences, vibration from the Movax pile driver will not be perceptible.

12.5.5 Predicted Operational Noise Levels at Sensitive Receivers

12.5.5.1 Predicted Operational Impact

There are no mechanical elements such as removable flood defences proposed in the River Poddle Flood Alleviation Scheme. Therefore, there will be no operational noise impact.

12.6 Mitigation Measures

12.6.1 Construction Mitigation

Appropriate mitigation measures have been identified to ensure the Construction Phase target noise limits are not exceeded. The contractor will be required to implement the control measures recommended in BS 5228 and apply the appropriate measures where applicable. Other measures will include:

- Working hours during site construction operations will be restricted to daytime hours from 07:30 hours to 16:30 hours (Monday to Friday) and, as may be required, from 08.00 hours to 13.00 hours (Saturdays). Evening and night-time work is not expected to take place although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of SDCC and DCC.
- An on-site speed limit will be enforced for all traffic. Drivers of vehicles will be advised of the speed limits through the erection of signs *i.e.* a typically recommended on site speed limit is 10 km/hr.
- Where practicable, the use of quiet working methods and the most suitable plant will be selected for each activity having due regard to the need for noise control.
- Best practicable means will be employed to minimise noise emissions and will comply with the general recommendations of BS 5228. To this end operators will use "noise reduced" plant and/or will modify their construction methods so that noisy plant is unnecessary.
- By positioning potentially noisy plant as far as possible from noise sensitive receivers the transmission of sound can be minimised. Earth mounds and/or stockpiles of material or perimeter hoarding on site can be used as a physical barrier between the source and the receiver.
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately in order to minimise noise breakout from the site while still maintaining their effectiveness.
- All plant will be maintained in good working order. Where practicable, machines will be operated at low speeds and will be shut down when not in use.
- Compressors will be of the "noise reduced" variety and fitted with properly lined and sealed acoustic covers.

- In all cases engine and/or machinery covers will be closed whenever the machines or engines are in use.
- All pneumatic percussive tools will be fitted with mufflers or silencers as recommended by the equipment manufactures. Where practicable, all mechanical static plant will be enclosed by acoustic sheds or screens.
- Employees working on the site will be informed about the requirement to minimise noise and will undergo training on the following aspects:
 - The proper use and maintenance of tools and equipment.
 - The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receivers.
 - Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment.
 - The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.
- Cognisance will also be taken of the *Environmental good practice site guide* 2005 compiled by CIRIA and the UK Environment Agency. This guide provides useful and practical information regarding the control of noise at construction sites.
- Where excessive noise levels are recorded, further mitigation measures will be employed which may include temporary wooden hoarding / acoustic screening to be installed to a height of no less than 2m around areas of construction where loud noise levels occur.
- The contractor will ensure that the TII Guidelines which identify limits for protection against cosmetic damage as a function of vibration frequency are not exceeded through the use of the selected low vibration piling method.
- Responsible Person –The Contractor will appoint a responsible and trained person who will be present on site and who will be willing to answer and act upon complaints and queries from the local public.
- Night-time Working If there are items of plant (*e.g.* dewatering pumps and similar) in use during night-time hours they will be chosen, sited and enclosed such that levels at the nearest properties do not exceed the measured background noise levels.

12.6.2 Monitoring

- Where deemed necessary due to excessive impact or complaints received, noise monitoring will be undertaken during construction works to determine noise levels at noise sensitive receivers. On the basis of the findings of such noise monitoring, appropriate noise mitigation measures will be implemented to reduce noise impacts.
- The contractor will conduct continuous monitoring of vibration levels during any piling that may have the potential to result in a vibration impact at nearby properties.

12.6.3 Operational Mitigation

The proposed River Poddle Flood Alleviation Scheme will not result in an operational noise impact. Therefore, no operational mitigation measures are deemed necessary.

12.7 Residual impacts

The assessment of construction noise impacts from the proposed development has indicated that construction noise limit criteria may be exceeded at the nearest residential properties for short periods during daytime. This may occur on occasions when heavy construction activity occurs in close proximity to noise sensitive receivers. Noise from construction works will fluctuate throughout the course of a typical working day as well as over the course of the construction works being undertaken in any one location. Therefore, the daytime construction noise limit of 65 dB L_{Aeq,12 Hour} should be achieved at the nearest residential properties. The construction noise impacts will be short-term and will not be significant. Also, while the overall construction activities for the River Poddle Flood Alleviation scheme will occur over 24 months, the nature of the proposed works and its duration will mean that noise sensitive receivers will not be exposed to continuous construction noise impact during this 24-month period.

Once the above mitigation measures have been implemented, the residual impacts from the development will not be significant.



Figure 12-1: Flow Chart for the Identification of Appropriate Noise Criteria (Ref. EPA Guidance Note NG4).



Figure 12-2: Baseline noise monitoring locations - Tuesday 14th May 2019

13 AIR QUALITY AND CLIMATE

13.1 Introduction

The impact assessment for air quality and climate was prepared by AONA Environmental Consulting Limited to assess the potential air quality and dust deposition impact at each area of the proposed River Poddle Flood Alleviation Scheme on the nearest sensitive receivers. The construction activities have been examined to identify those that have the potential to give rise to dust and air pollutant emissions. Where appropriate, mitigation measures have been outlined.

The assessment and evaluation of the potential air quality and dust impact arising from the proposed development involved the following:

- Review of ambient air quality in the vicinity of the proposed River Poddle Flood Alleviation Scheme using available reference data available from the EPA.
- Identification of potential air quality and dust emissions released from the construction of the proposed River Poddle Flood Alleviation Scheme.
- A recommendation of appropriate construction mitigation measures.
- The operation of the proposed development will not result in air quality and/or dust deposition impacts.

13.2 Statement of Authority

The Air Quality & Climate Impact Assessment has been prepared by Mervyn Keegan. Mervyn Keegan is a Director of the environmental consultancy, AONA Environmental Consulting Ltd. Mervyn Keegan's areas of professional expertise are in Noise Control & Acoustics and Air Quality & Odour consultancy, including Air Quality & Climate impact assessment and mitigation design. Mervyn Keegan has over 20 years of environmental consultancy experience. Mervyn is a full member of the Institute of Acoustics, with a Bachelor of Science Degree (Applied Sciences), a Master of Science Degree (Environmental Science) and a Diploma in Acoustics in Noise Control. AONA Environmental Consulting Ltd. is an independent consultancy specialising in Environmental Impact Assessment and Licensing. Mervyn Keegan (AONA Environmental Consulting Ltd.) has prepared numerous Air Quality & Climate impact assessments per annum for a wide range of development types in the Republic of Ireland, Northern Ireland and the UK in the last 15 years. Mervyn Keegan is an expert in the awareness and understanding of the relevant legislation and guidance that pertains to best practise in such assessments. Mervyn Keegan has appeared as an Expert Witness at oral hearings, public inquiries and legal proceedings. Mervyn Keegan has produced Air Quality & Climate Impact Assessment reports to assess the impacts of a range of development types including roads, residential developments, industrial developments, quarries and mines and wind energy developments among others.

13.3 Methodology

13.3.1 Air Quality Standards Regulations

In order to protect our health, vegetation and ecosystems, EU directives set down air quality standards in Ireland and the other member states for a wide variety of pollutants. These rules include how we should monitor, assess and manage ambient air quality. **Tables 13-1** to **13-6** set out the limit values or target values specified by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) & CAFE Directive 2008/50/EC.

Pollutant	Limit Value Objective	Averaging Period	Limit Value	Basis of Application of the Limit Value	Limit Value Attainment Date
SO ₂	Protection of human health	1 hour	350	Not to be exceeded more than 24 times in a calendar year	1 Jan 2005
	Protection of human health	24 hours	125	Not to be exceeded more than 3 times a calendar year	1 Jan 2005
	Protection of vegetation	calendar year	20	Annual mean	19 July 2001
	Protection of vegetation	1 Oct to 31 Mar	20	Winter mean	19 July 2001
NO ₂	Protection of human health	1 hour	200	Not to be exceeded more than 18 times a calendar year	1 Jan 2010
	Protection of human health	calendar year	40	Annual mean	1 Jan 2010
NOx	Protection of ecosystems	calendar year	30	Annual mean	19 July 2001
PM ₁₀	Protection of human health	24 hours	50	Not to be exceeded more than 35 times a calendar year	1 Jan 2005
	Protection of human health	calendar year	40	Annual mean	1 Jan 2005
PM _{2.5} - Stage 1	Protection of human health	calendar year	25	Annual mean	1 Jan 2015
PM _{2.5} - Stage 2	Protection of human health	calendar year	20	Annual mean	1 Jan 2020
Lead	Protection of human health	calendar year	0.5	Annual mean	1 Jan 2005
Carbon Monoxide	Protection of human health	8 hours	10,00 0	Not to be exceeded	1 Jan 2005
Benzene	Protection of human health	calendar year	5	Annual mean	1 Jan 2010

Table 13-2: Alert Thresholds for Sulphur Dioxide & Nitrogen Dioxide.

Pollutant	Averaging Period	Limit Value
Sulphur Dioxide	1 hour	500 μg/m³
Nitrogen Dioxide	1 hour	400 µg/m ³

Note: The public must be informed if the following thresholds are exceeded for three consecutive hours.

Table 13-3: Target Values of Directive 2004/107/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ng/m ³	Limit Value Attainment Date
Arsenic	Protection of human health	calendar year	6	31 Dec 2012
Cadmium	Protection of human health	calendar year	5	31 Dec 2012
Nickel	Protection of human health	calendar year	20	31 Dec 2012
Benzo (a) pyrene	Protection of human health	calendar year	1	31 Dec 2012

13.3.2 Target Values and Long-Term Objectives of CAFE Directive 2008/50/EC

The ozone daughter directive is different from the previous two in that it sets target values and long-term objectives for ozone levels rather than limit values. They are as follows:

Objective		Parameter	Value
Protection human health	of	Maximum daily 8 hour mean	120 μ g/m ³ not to be exceeded more than 25 days per calendar year averaged over 3 years
Protection vegetation	of	AOT 40 calculated from 1 hour values from May to July	18000 μ g/m ³ -h averaged over 5 years

Table 13-5: Long Term Objectives for Ozone from 2020

Objective	Parameter	Value
Protection of human health	Maximum daily 8 hour mean	120 µg/m³
Protection of vegetation	AOT40 calculated from 1 hour values from May to July	6000 µg/m³- h

Objective	Parameter	Threshold
Information Threshold	1 hour average	180 μg/m³
Alert Threshold	1 hour average	240 µg/m ³

Table 13-6: Information and Alert Thresholds for Ozone

Note: The public must be informed if ozone levels exceed the following thresholds

13.3.3 Dust Deposition Limits

There are many types of particulate matter (PM) that are included in the definition of dust, including variations in terms of size and chemical composition. A basic classification of particles may be made into those that are easily deposited and those that remain suspended in the air for long periods. This division is useful as deposited dust is usually the coarse fraction of particulates that causes dust annoyance, whereas suspended particulate matter is implicated more in exposure impacts.

Airborne particles have a large range of diameters, from nano-particles and ultrafine particles (diameters less than 0.1μ m) to the very large particles with diameters up towards 100µm. There is no clear dividing line between the sizes of suspended particulates and deposited particulates, although particles with diameters >50 µm tend to be deposited quickly and particles of diameter <10 μm have an extremely low deposition rate in comparison. Therefore, the size of suspended and deposited dust particles affects their distribution and as such requires two very different approaches to sampling these fractions. Large dust particles, (greater than 30µm), which make up the greatest proportion of dust emitted from mineral workings, will largely deposit within 100m of source. Intermediate-sized particles (10 to 30µm) are likely to travel 200 to 500m. Smaller particles (less than 10µm) which make up a small proportion of the dust emitted from most mineral workings are only deposited slowly but may travel 1000m or more. Concentrations decrease rapidly on moving away from the source, due to dispersion and dilution. Smaller particles, particularly those <10 µm in diameter, have a greater potential to have their settling rate impeded by atmospheric turbulence and to be transported further from their source. Dust emissions are exacerbated by dry weather and high wind speeds. The impact of dust therefore, also depends on the wind direction and the relative location of the dust source and receiver.

 PM_{10} is the fraction of airborne (suspended) PM which contains particles of diameter less than 10µm. PM_{10} includes all particles, of different sizes and types, which are relevant for potential health effects. PM_{10} can penetrate deep into the respiratory system increasing the risk of respiratory and cardiovascular disorders. Relevant limit values for PM_{10} are outlined in the CAFE Directive 2008/50/EC.

There are no Irish or EU air quality standards with which levels of dust deposition can be compared. However, a figure of 350 mg/m²/day (measured using Bergerhoff type dust deposit gauges as per German Standard Method for determination of dust deposition rate, VDI 2119) is commonly applied to ensure that no nuisance effects will occur. This guideline limit value of 350 mg/m²/day is obtained from the commonly applied *German TA Luft Air Quality Standard* immission limit value which was established to protect significant nuisance or significant disadvantage due to dustfall (deposition). This use of this limit value is generally considered appropriate by both Local Authorities and the EPA (see

previously referenced guidance) to minimise the impact of airborne dust levels on the receiving environment beyond site boundaries. The German TA Luft criteria for '*possible nuisance*' and '*very likely nuisance*' are 350mg/m²/day and 650mg/m²/day, respectively. The German TA Luft Air Quality Standard also specifies immission limit values for certain trace metals and their inorganic compounds.

13.4 Existing Environment

The EPA has divided the country into zones for the assessment and management of air quality. The zones adopted in Ireland are Zone A, the Dublin conurbation; Zone B, the Cork conurbation; Zone C, comprising 21 large towns in Ireland with a population >15,000; and Zone D, the remaining area of Ireland. The site is located in 'Zone A' as denoted by the EPA.

Nitrogen oxides (NOx, NO and NO₂) and Particulate (PM_{10}) background concentrations in 2015, 2016 and 2017 have been referenced from the Rathmines EPA air quality monitoring station. Particulate Matter (PM_{10}) background concentrations in 2015, 2016 and 2017 have been referenced from the Tallaght EPA air quality monitoring station.

Both of these air quality monitoring stations are located in proximity to the River Poddle and provide an accurate representation of air quality in the area of the River Poddle Flood Alleviation Scheme.

Based on the reported nitrogen oxides (NOx, NO and NO₂) and particulate (PM₁₀) background concentrations from the Rathmines and Tallaght EPA air quality monitoring stations, the background air quality in the area of the proposed development is of good quality. As shown **Tables 13-7** and **13-8**, the reported annual mean NO₂ and particulate (PM₁₀) concentrations at Rathmines and Tallaght are less than 50% of the relevant ambient air quality limit value.

Year	Annual Mean Concentration (µg/m³)				
	NO _x	NO	NO ₂	PM ₁₀	
2015	27.7	6.2	18.3	15.33	
2016	31.14	7.33	19.95	14.76	
2017	26.75	6.31	17.10	13.4	
Limit Value	30 µg/m ³	-	40 µg/m ³	40 µg/m ³	

Table 13-7: Rathmines EPA Air Quality monitoring station data (µg/m3)

Table 13-8: Tallaght EPA Air Quality monitoring station data (µg/m3)

Year	Concentration (μ g/m ³) PM ₁₀
2015	14.11
2016	14.1
2017	11.8
Limit Value	40 μg/m ³

13.5 Air Quality & Dust Impact Assessment

13.5.1 Construction Dust Impact at Sensitive Receivers

The construction works along the proposed the River Poddle Flood Alleviation Scheme have the potential to generate dust.

Dust becomes airborne due to the action of wind on material stockpiles and other dusty surfaces, or when thrown up by mechanical action, for example the movement of tyres on a dusty haul road or activities such as site clearance, excavation, infilling, etc. Dust emissions can arise as a result of operational activities, and /or wind erosion of exposed surfaces. The amount of dust that is raised is highly dependent upon a number of interrelated factors, which include:

- The nature of the material and activities being undertaken;
- The duration of each activity,
- The particular items of plant in use,
- The prevailing weather conditions in terms of rainfall and wind direction and strength,
- The influence of any on site mitigation measures.

Dust is generally perceived as being a nuisance when a deposit accumulates on a surface. However, the level at which soiling becomes a nuisance is highly subjective. Whether or not a nuisance exists is determined, in the first instance, by the professional judgement of a Local Authority Environmental Health Officer. In order to aid this judgement, the mean rates of dust deposition, based upon gravimetric values, are used to indicate any potential nuisance impact.

13.5.2 Predicted Construction Phase Impacts at Sensitive Receivers

All practical measures will be taken to ensure that the dust emissions associated with the proposed River Poddle Flood Alleviation Scheme do not cause an unacceptable significant adverse impact upon local residents and road users or in the case of Tymon North and Tymon Park, upon Park users.

Soil stripping is required to create the main site compound off Limekiln Road, and to prepare haul roads through the works areas in Tymon North and Tymon Park. Excavations, and infilling of clay materials will be required to create the embankments in Tymon North and Tymon Park, and excavations are required for the Integrated Constructed Wetlands (ICW). Works on the flood defence walls and manhole chambers will entail some excavations and tree removal, with removal of existing walls in some locations. All of these works have the potential for dust generation.

Construction of the flood defence walls will in some places be approximately 20m from the nearest sensitive receivers. Construction works for the embankments and ICW in Tymon North and Tymon Park will be significantly further away from the closest receivers. Although construction activity will be of limited duration, it will require implementation of the recommended dust mitigation measures. The potential for dust nuisance impact during construction would be limited to the immediate vicinity of the activities, even without dust

suppression measures in operation, because of the predominantly coarse and expected wet nature of the excavated materials.

The movement of earth will be the most significant potential source of dust generation. Excavated material and imported clay materials will be transported by dump trucks to the various locations at which embankment construction will be required in Tymon North and Tymon Park. Recommendations regarding mitigation for haul roads, vehicles and mobile plant are outlined below.

Un-cleaned vehicles leaving the site also have the potential to deposit mud and dirt along the public roads. This has the potential to generate fugitive dust which will be mitigated by containment and / or wet suppression in close proximity to the works areas and the site compound. There is the potential for roadways, stockpiles and other un-vegetated surfaces to produce dust emissions during dry, windy conditions. Stockpiles and haul roads would require mitigation measures as outlined below.

The areas of proposed construction works and whether these have the potential to result in a construction dust impact and require construction mitigation measures are summarised in **Table 13-9**.

Emissions from construction plant and equipment will be short-term and insignificant.

Table 13-9: Areas of proposed construction works and whether these are likely to result in a construction noise impact and requireconstruction mitigation measures

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Dust Impacts?
08132	Tymon North	Left bank embankment	 Tree removal, temporary access road, excavating & saving topsoil, importing material, temporary crossing of river, piling, landscape mitigation works. 	St. Aongus Crescent – ~130m to SW	No.
08133	Tymon North (adj to ESB substation)	Left bank embankment	 Tree removal, temporary access road, excavating & saving topsoil, importing material, piling, landscape mitigation works 	St. Aongus Grove – ~190m to SW	No.
08140	Tymon Park	Main site compound	 Access off Limekiln Road Offices, carpark spaces, storage units Welfare facilities Water ESB and foul Temporary stockpile location in this area Pedestrian access management to prevent access to works area. 	Limekiln Road – ~25m to N.	Yes.
08140	Tymon North and Tymon Park	Material stockpiling and landscape restoration & mitigation.	 The aim is to reuse excavated material in landscape mitigation and restoration. Topsoil excavated from the works areas (first 200mm depth) in Tymon North and Tymon Park will be reserved on site for reuse in final landscape mitigation and restoration. 	St. Aongus Crescent, St. Aongus Grove & Limekiln Road.	Yes.
08141	Tymon Park	Left bank embankment	 Tree removal, temporary access roads, excavating & saving topsoil, importing material, piling, landscape mitigation works 	Limekiln Road – ~150m to N.	No.

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Dust Impacts?
08142	Tymon Park	Left bank embankment	 Tree removal, temporary access roads, excavating & saving topsoil, importing material, piling, landscape mitigation works 	Limekiln Road – ~100m to N.	No.
08143	Tymon Lake	Main flood storage embankment and flow control structure	 Tree removal, excavating & saving topsoil, importing material, temporary diversion, removal of existing weir and footbridge, temporary crossing of river, temporary access roads, piling, landscape mitigation works. For the embankment: Excavated top soil at foot of embankment and store for re use; Excavate central core; Fill with embankment material compacting in layers (consider use of remote control roller); construct embankment in 300mm layers, compact using 14T single drum vibrating roller; Surface of completed layer to be toothed with bucket to bond to next layer; Repeat; Embankment is overfilled and shaped to correct size and slope geometry. For flow control structure: Necessary to install channel diversion to dry out works area; fill in area of lake for works access; Design of structure to be passive with no mechanical electrical elements; Use of precast elements if possible; Reinstatement of diversion channel. A new footbridge will be provided on top of embankment, landscape mitigation will incorporate new pedestrian path on top of embankment. 	Limekiln Road – ~165m to N.	No.
08146	Tymon Park	Integrated Constructed Wetland	 Tree removal, temporary diversion of river, some instream works, excavating & saving topsoil, excavating to river level & removal of material, temporary access road, landscape mitigation works. 	Limekiln Road – ~45m to N.	Yes.
08151	Whitehall Park	Channel re-alignment, re- grading, and reinforcing existing walls	 Tree removal, temporary diversion, excavating & saving topsoil, excavation and landscape mitigation works. Access gate from Whitehall Park to be installed for SDCC Parks Maintenance 	Whitehall Park, Whitehall Park & Grosvenor Court –	Yes.

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Dust Impacts?
			 General existing services to be brought to new channel and flapped Remove penstock at lakelands overflow weir Access improvement works at weir. 	~15m to works.	
08152	Wainsfort Manor Crescent	Reinforcing existing walls (Glendale Park and Terenure Badminton Club) & constructing new walls where none exist (at end of long gardens of houses on Limekiln Road) & temporary works / set down area with access off Wainsfort Manor Drive	• Tree removal, instream works, walls construction.	Wainsfort Manor Green – ~15m to works. Wainsfort Manor Crescent– ~15m to works.	No.
08155	Rear gardens at terrace of houses on Fortfield Road south of Kimmage Cross Roads	Replace existing walls	 Tree removal, instream works, removing existing walls. walls pre-cast, Provide safe access for future clearance of inlet to culvert 	Fortfield Road - ~10m to works.	No.
08160	Ravensdale Park & Poddle Park	Combination of reinforcing existing walls and new walls (to middle of park); replacement footbridge; temporary works / set down area in Ravensdale Park; and sealed manholes in Poddle Park.	 Tree removal, wall construction and manhole chamber replacement / rehabilitation Manhole upgrades involves work in the public roads in mainly residential areas 	Ravensdale Park & Poddle Park - ~15m to works.	No.
08165	St Martin's Drive	New wall at end of St Martin's Drive and	Tree removal, wall construction	Poddle Park - ~15m to works.	No.

Drawing No.	Location	Scheduled Works	Comments	Location of Nearest Sensitive Receivers	Potential Dust Impacts?
		recladding existing wall along Poddle Park to match			
08170	Mount Argus	New walls at footbridge	Tree removal, wall construction	Mount Argus Close - ~10m to works.	No.
08250 & 08251	Within public roads in Ravensdale Park, Donore Avenue, and St. Teresa's Gardens, and at National Stadium off S. Circular Road	Manhole chamber replacement / rehabilitation	 Involves work mainly in the public roads in residential areas 	Within the public roads at Donore Avenue & St. Terese's Gdns. at the National Stadium off S. Circular Road	No.

13.5.3 Predicted Operational Impact at Sensitive Receivers

There will be no significant operational air quality and dust impact from this development.

13.6 Mitigation Measures

13.6.1 Construction Mitigation

The following dust mitigation measures will be employed to minimise construction dust impacts, the aim of which will be to minimise the release of dust to the environment. Outlined in detail below are the proposed dust suppression measures.

13.6.1.1 *Operating and Dust Mitigation Measures*

The site manager has the overall responsibility for ensuring that operations comply with the requirements of any planning authorisation. The site will have at its disposal a suitable water bowser and associated water supply to allow for dampening down of areas of the site works when windblown dust arises. The occurrence of potential wind-blown dust is very much weather dependent but suitable facilities will be available to minimise windblown dust from the site surfaces.

13.6.1.2 Working Hours

Construction activities will take place Monday to Friday, between 07:30 and 16:30, and as may be required on Saturdays from 08.00 hours to 13.00 hours. Evening and night-time work is not expected to take place, although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of SDCC and DCC.

13.6.1.3 Access Roads, Site Roads and Vehicles Loading Activities & Movements

The objective of these procedures is to minimise the creation and release of dust generated by transportation activities carried out during both access to and movements within various areas of the construction site. This includes minimising dust from transport vehicles entering and leaving the facility.

- Regular attention shall be paid to cleaning dust material from all roadways, hard surfaced areas and working areas of the construction site. Dust from clean-up will be re-incorporated into stockpiles within the construction compound and adjacent to working areas. This will be done at appropriate intervals during the day and at the end of each working period.
- Roadways and other areas within the construction compound where vehicles are regularly moving shall be kept clean, by sweeping or by wetting;
- When loading vehicles within the construction compound and overall construction site, the following procedures will be adhered to:
- No overloading of vehicles or containers resulting in either peaks of cargo or overspill onto the working areas or roadways.
- Keep fall heights of the material into the transport vehicles to a minimum.
- Strictly applied, suitable on-site speed limits shall be set, displayed and observed for the movement of all vehicles (10 mph)

• Mandatory use of the wheel wash provided.

13.6.1.4 Stockpiling Operations

The aims of these procedures are to ensure that materials are stockpiled only within the designated process working areas and any release of dust to atmosphere is minimised.

- Stockpiling shall be co-ordinated in such a way as to minimise the potential for double handling of material and carefully planned to ensure minimum exposure to winds, thereby reducing dust emission to air.
- Stockpile areas will be clearly and physically delineated to deter vehicles from running over extracted material at the stock edge.
- Stockpiles shall be managed to ensure that the profile of material will be no higher than 2m which will minimise wind whipping.
- During embankment construction and any stockpiling, embankments and stockpiles shall be profiled and compacted by flattening out peaks and ridges and when partially worked, shall be re-contoured to prevent ridges or overhanging falls.
- Whenever possible, embankments and stockpiles shall not be broken into when the wind is likely to lift newly exposed dry dust. When this is unavoidable, effective dust control methods shall be implemented.
- Prior to carrying out any stockpile handling operations, the dust suppression equipment will be checked to ensure that it is working properly.

13.6.2 Monitoring & Reporting

- A high standard of housekeeping will be maintained on site.
- Contingency plans shall be made to provide dust control in the event of equipment malfunction, whether by loan, hire or other arrangements.
- Systems for monitoring processes, responding to and reporting pollution incidents shall be devised. This information shall be kept in a logbook, together with information regarding equipment failure, periods of significant dust emissions offsite and the inspection of roadways, together with any remedial action taken.
- Any complaints received from neighbouring properties will be logged and appropriate actions taken to reduce the potential for further complaint.

13.6.3 Dust Management Plan

The Dust Management Plan provided in **Table 13-10** will be implemented by the contractors at all times and special importance will be placed on these actions on high wind days.

Parameter	Action	Responsibility
Induction	 Induction for all employees will include information on: Potential sources of dust Dust Management Plan, Monitoring program and awareness Speed limits onsite and staying on designated roads Who to report dust issues too 	Site Manager
Windy Conditions	 Monitor wind and weather forecasts and cease operations where dust cannot be controlled. 	Site Manager
Traffic	Adhere to site speed limits and designated roadsUse of wheel wash when leaving site	Drivers
Open Areas	 Minimise open areas exposed to wind erosion as much as practical by completing an assessment of all construction areas. 	Site Manager
Dust Suppression	 Operate water bowsers during dry, windy conditions and during the summer months, generally from April to September, across the site and construction compound to apply water to operational areas (<i>i.e.</i> roads, stockpile and loading areas) All roads being used for heavy vehicle traffic within the construction area will be treated with dust suppression, where appropriate. Apply dust suppression to all stockpiles prone to wind erosion. 	Site Manager
Soil stripping	• Conduct soil stripping only during suitable wind and weather conditions, so as to minimise the generation of dust.	Site Manager
Loading & haulage	 Haul truck operators to monitor loading conditions and call on water bowser to dampen areas in dusty conditions. Haul truck operators to monitor road conditions and call on water trucks to dampen roads when dusty Haul truck operators to reduce speed to minimise dust. On days where dust cannot be controlled shut down operations until dust can be satisfactorily managed. 	Site Operators
Record Keeping	 All actions undertaken for mitigation of dust during dusty conditions will be recorded by the site. supervisor. Document all readings, wind directions, area omitting dust and actions undertaken. Determine compliance when auditing and reporting. 	Site Manager
Dust Monitoring	 Monitoring is required to enable an assessment of the effectiveness of the dust management controls and improvements to be made, where required. Bergerhoff dust deposition monitoring along the construction compound perimeter and site boundaries where any prolonged construction activities will occur 	Site Manager

Table	13-10:	Dust	Management	Plan
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Parameter	Action	Responsibility	
	and where there are any reported construction dust complaints.		
	 A report on the results of this monitoring shall be available to the local authority on a quarterly basis. 		
Complaint Records	Complaints will be logged and maintained on site.	Site Manager	
Performance Indicators	The effectiveness of the Dust Management Plan will be reviewed against the following indicators:	Site Manager	
	Compliance with guideline values for dust deposition monitoring.		
	 The level of substantiated complaints received and registered. 		
	The level of complaints satisfaction achieved.		
	• The absence of fugitive dust originating from the site.		
	Audit results of compliance with actions		

13.6.4 Operational Mitigation

Not applicable. The proposed River Poddle Flood Alleviation Scheme will not result in an operational air quality and / or dust impact.

13.7 Residual Impacts

The potential for any air quality impact and dust deposition impact arising from the construction works along the River Poddle Flood Alleviation Scheme has been assessed.

The potential for nuisance dust impacts is considered to be negligible at the nearest sensitive receivers with appropriate mitigation measures employed. Dust deposition rates will be in accordance with relevant guideline limits assuming the recommended construction mitigation measures are adhered to. No significant air quality impacts are expected in an area of Dublin city that currently experiences good air quality, with reference to the EPA air quality monitoring data from the Rathmines and Tallaght EPA air quality monitoring stations.

There will be no air quality and dust impacts from the operation of the proposed River Poddle Flood Alleviation Scheme.

Once the above mitigation measures have been implemented, the residual impacts from the development will not be significant.

14 TRAFFIC AND TRANSPORT

14.1 Introduction

This chapter was prepared by Nicholas O' Dwyer Ltd. and considers the likely traffic and transport impacts associated with the construction and operation of the proposed River Poddle Flood Alleviation Scheme. After setting out the methodology to be followed, this chapter describes the existing environment and the main works in the proposed Flood Alleviation Scheme that are of relevance to roads and traffic. The chapter then presents a consideration of the likely significant impacts of the proposed scheme on traffic and the transport and the measures proposed where necessary to mitigate the impacts, and any residual impacts.

The dominant traffic impact will be during the construction stage. The operational stage will have no discernible increase in traffic from Council and OPW staff who will carry out maintenance checks and works. This will approximate the current situation. Therefore, the assessment focuses on the traffic impacts associated with the construction phase of the proposed project.

The substantial works proposed as part of the Scheme will be at three locations: Tymon Park, Whitehall Park / Wainsfort Manor Crescent, and Ravensdale Park. These locations will require access from the public roads for Heavy Construction Vehicles (HCVs) and Heavy Goods Vehicles (HGVs) for the duration of the works as described in the sections below. There will be no exceptional loads. Other works will involve the construction of new walls or the replacement or reinforcement of existing walls in multiple points along the River. These works areas will be accessed by small teams of workers who will park equipment and trailers either within a works/set down area or on the public roads nearby. Some works will require access to private property. The remainder of the works to seal manholes will be primarily within public roads. The estimated duration of construction for the project is 24 months overall.

14.2 Statement of Authority

The Traffic and Transport Impact Assessment of the EIAR for the River Poddle Flood Alleviation Scheme has been prepared by Graham Young. Graham Young is a senior engineer of the civil and structural consultancy, Nicholas O'Dwyer Ltd. Graham Young's areas of professional expertise are in pipeline and roads civil works design, including traffic and transport impact assessment and mitigation design. Graham Young has over 23 years of civil consultancy experience. Graham is a Chartered member of Engineers Ireland, with a bachelor's degree in Engineering (Civil, Structural and Environmental), and a postgraduate Diploma in Project Management. Graham has attended the National Roads Authority (NRA) three-day Road Safety Audit course.

14.3 Transport Assessment Methodology

14.3.1 Guidelines

This traffic and transport impact assessment has been prepared with reference to the following documents:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports – Environmental Protection Agency (Draft 2017)
- Project Appraisal Guidelines for National Roads Transport Infrastructure Ireland (2016)
- EPA: Revised Guidelines on the Information to be contained in Environmental
- Impact Statements, (2002 and Draft, September 2015)
- EPA: Advice Notes for Preparing Environmental Impact Statements, (2003 and Draft, September 2015)
- Traffic and Transport Assessment Guidelines NRA (2014)

14.3.2 Methodology

The methodology for the traffic and transport assessment can be summarised as follows:

- Inspection of the existing roads and environments at the proposed access locations
- Determination of construction phase traffic generated by the proposed works
- Identification of the impacts during the construction phase and assessment of significance of those impacts
- Proposed mitigation measures to remove and/or reduce any identified negative traffic impacts
- Determine any residual impacts arising after application of proposed mitigation measures

14.3.3 Assumptions

The dominant traffic impact will be during the construction stage. The operational stage will have no discernible increase in traffic from Council and OPW staff who will carry out maintenance checks and works. This will approximate the existing site traffic. Therefore, the assessment focuses on the traffic impacts on the public road network associated with the construction phase of the proposed project.

It is intended where possible to reuse arisings for site restoration and as fill materials to construct the embankments, subject to testing. For determination of the worst-case impact, it is assumed in this assessment that 50% of materials for construction of the embankments must be imported *via* the public road network. The remainder of arisings on site are deemed surplus or unsuitable and must be disposed to appropriate licenced facilities. For material that cannot be reused on site, where feasible its export will be co-ordinated with deliveries of imported fill in order to minimise traffic movements.

Due to the nature of the sites being within public spaces in an urban setting where space is limited, it is intended that materials required for the works will not be stockpiled on the sites but will be delivered in the quantities as required. As a consequence of this method of work, the traffic associated with the construction phase is expected to be a relatively steady stream over the duration. For determination of the worst-case impact, it is considered in this assessment that the deliveries can peak to twice the averaged daily requirement of construction materials.

It is considered that the main transport effects will be associated with the movement and turning of HCVs into the works sites as described above. The effect of light vehicle movements will be low when compared to the background level of light vehicle traffic. However, for completeness, the impact of light vehicles is also considered in this assessment.

The numbers of construction workers will vary over the construction period due to the phasing of the works. However, based on similar developments, it is estimated that the number of workers will peak at approximately 30 in any one day at the large sites, and up to 12 at the smaller wall construction sites. Assuming 2 occupants per car/van this equates to a total of 10 to 15 light vehicle trips to Tymon Park or Ravensdale Park, and 5 to 6 trips to the smaller sites.

As described above, the maximum volume of HCVs and light vehicles are likely to be generated during the movement of material to and from the sites to construct the earthen embankments and landscaping.

14.3.4 Impact Assessment Methodology

The significance of effects on traffic and transport as presented in this Chapter of the EIAR has been assessed based on the criteria presented in **Table 14-1**. It is based on the projected change in prevailing travel conditions which has regard to the EPA draft guidance referenced above and based on the professional judgement of the author who has 23 years' experience in undertaking traffic and transportation assessments.

Significance of Effects	Criteria	
Imperceptible	No perceived impact on prevailing travel conditions	
Not Significant	A small change in traffic flows without causing a real change in travel conditions	
Slight Effects	A change in traffic flow resulting in a minor change in travel conditions	
Moderate Effects	A change in traffic flows resulting in a modest change in travel conditions	
Significant Effects	A marked change in travel conditions resulting in long delays to traffic	

Table	14-1:	Assessment	Criteria
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Significance of Effects	Criteria
Very Significant Effects	A significant change in travel conditions resulting in very long delays to traffic
Profound Effects	A major change in travel conditions resulting in the breakdown in traffic flow and significant delays to traffic

14.4 Existing Environment

This section of the chapter lists the main transport routes which could potentially be affected by the proposed works.

14.4.1 Site Location

The works in the proposed Flood Alleviation Scheme are located in several areas along and adjacent the River Poddle from Tymon North, Tallaght to Mt. Argus, Harold's Cross. Additional works to seal manholes are proposed within public roads in Ravensdale Park, Harold's Cross, St. Teresa's Gardens and Donore Avenue, and at the National Stadium, South Circular Road in Merchant's Quay, Dublin.

The road network to be utilised during the construction phase of the project is shown on **EIAR Volume 3.**

14.4.2 Wider Road Network

A brief description of the wider road network including major roundabouts, Regional Roads, National Primary Roads and Motorways in proximity to sites in the proposed development is provided below.

14.4.2.1 N81 Blessington Road / Tallaght Bypass

The N81 is the arterial route between Wicklow, Tallaght, Templeogue, Terenure, Harold's Cross and Dublin City Centre. It is approximately 1.5km south of the works at Tymon Park, and 1km from the other works sites along the Poddle. The transport of materials to and from the site is likely to be the N81, coming from the M50 motorway, as the quarries and landfill in closest proximity to the project are in Wicklow and Kildare.

14.4.2.2 R819 Greenhills Road

The R819 Greenhills Road is the link from the N81 near Tallaght to the Walkinstown roundabout. It is approximately 0.6km north of the works at Tymon Park.

14.4.2.3 Walkinstown Roundabout

Walkinstown roundabout provides connection to the following destinations / routes:

• Ballymount, via L4005 Ballymount Road

- Bluebell / R810 Naas Road / R110 Longmile Road (R110), via R112 Walkinstown Avenue
- Crumlin Children's Hospital / R110 Longmile Road / Dolphins Barn, via R819 Walkinstown Road
- Terenure / Kimmage / Crumlin, *via* R818 Kimmage Road West
- Templeogue / Perrystown, via R112 Peters Road / Greentrees Road

The roundabout is *ca.* 2.4km from the works at Tymon Park (north) and *ca.* 1.6km from the works at Whitehall Park.

14.4.3 Local Road Network

A brief description of the local road network in the vicinity of sites in the proposed development is provided below.

14.4.3.1 Tymon North (Tymon Park west of M50)

The L3036 Castletymon Road links the N81 near Balrothery to the R819 Greenhills Road near Kilnamanagh. The works at Tymon North (Tymon Park west of M50) will be accessed off this road *via* a gated entrance to Tymon Park which has public parking and a roundabout. This entrance is *ca.* 650m from the junction with Greenhills Road and *ca.* 1.5km from the roundabout on the N81.

14.4.3.2 Tymon Park (East of M50)

The L4013 Limekiln Road links the L4019 Wellington Road and R819 Greenhill Road. The works at Tymon Park will be accessed from a temporary entrance off this road. There is a school on this road approximately 350m east, and a public car park for Tymon Park approximately 400m west of the proposed temporary works entrance.

14.4.3.3 Whitehall Park / Wainsfort Manor Crescent

The R112 Templeville Road links the Walkinstown roundabout and Templeogue. The works at the public open space in Whitehall Park will be accessed from Templeville Road.

The R817 Wainsfort Road links Templeogue and the R112 to Kimmage and the R818. The works to be carried out the rear gardens of properties on Whitehall Road and Glendale Park will be from the opposite bank, accessed from the public open space at Wainsfort Manor Crescent. Access to this works area will be from Wainsfort Manor Drive, a residential road in an estate accessed from Wainsfort Road (R817).

14.4.3.4 Rear of Fortfield Road (south of Kimmage Cross Roads)

The R818 Kimmage Road West links Crumlin and the Walkinstown roundabout to the R817 and to Terenure. The proposed access to the river to undertake these works will be from a gated access to a private lane off Kimmage Road West, *ca.* 35m from the Kimmage Cross Roads (KCR) junction. A one-way system of traffic will operate where vehicles will exit from the site via the private lane, entering on to Fortfield Road adjacent to the An Post Delivery Office.

14.4.3.5 Ravensdale Park

The R817 Kimmage Road Lower is the extension of Wainsfort Road and links KCR (R818) to Harold's Cross. The works area at Ravensdale Park, including the works to the manholes at Ravensdale and Poddle Park, will be accessed from the R817.

Construction access to the Park is proposed from Ravensdale Park, *ca.* 25m from the junction with Poddle Park, and *ca.* 40m from the junction with Kimmage Road Lower (R817). The works to replace the footbridge and reinforce the wall to the south of the footbridge will require access through residential areas at Ravensdale Park and from Ravensdale Drive where there is a builders' providers.

14.4.3.6 St. Martin's Drive

Access to the works will be from St. Martin's Drive, which is a residential cul-de-sac accessed from Kimmage Road Lower (R817).

14.4.3.7 Mt. Argus Close

Access to the works will be from Mount Argus Close, a residential cul-de-sac accessed from Kimmage Road Lower (R817).

14.4.3.8 St. Teresa's Gardens and Donore Avenue

Donore Avenue in Dublin 8 links the R818 South Circular Road and Parnell Road on the Grand Canal to Cork Street. The manhole works will be located at various junctions on this road may be arranged to the adjacent streets and may add between 500m and 900mm distance to a journey.

14.4.3.9 National Stadium

Minor works are proposed to replace and widen a manhole cover at the rear car park of the National Stadium on South Circular Road.

14.4.4 Public Transport

Dublin Bus routes pass most works locations as follows:

- Castletymon Road: Route 77a
- Limekiln Road: Route 15a
- Templeville Road: Route 54a
- Wainsfort Road: Route 54a
- Kimmage Road West: Routes 9, 15a, 17
- Kimmage Road Lower: Routes 9, 54a

The locations of bus stops in proximity to the works areas are shown on **EIAR Volume 3.**

14.5 Characteristics of the Proposed Development

The following sections describe the works proposed for each location, the proposed access routes, the quantities and types of materials expected to be brought to or removed from

the works areas, and from that an estimation of the number of vehicle movements projected to be generated at each location.

14.5.1 Works to Tymon North (Tymon Park west of M50)

Proposed works at this location include removal of trees from the works areas, the removal of excavated earth and the import of earth materials to create the embankments.

Construction phase vehicle movements to this site will be generated by the delivery and removal of materials, significantly:

- hardcore stone materials for construction of a temporary access road;
- engineered fill for the embankment; and
- felled trees.

It is estimated that 35 to 40 HCV trips could be generated for deliveries to this site over a duration of 4 weeks. The HCV trips generated are therefore estimated to peak at 4 per day.

An estimated 30 to 35 trips will be generated from the removal of trees and earth excavated to create the embankments. Disposal of earthworks would take place during a 3-month work programme and peak trips is estimated at 6 per day.

In total there will be an estimated 75 HCV trips over 16 weeks.

14.5.2 Works to Tymon Park (east of M50)

It is proposed to construct a temporary entrance to the site compound off Limekiln Road. This entrance will be in place for the entire duration of the Scheme (24 months). It will be the main point of access to and exit from the site during construction of the embankments, flow control structure, and the ICW at Tymon Park. It will also be used for secure storage of equipment and vehicles for works in the remainder of the Scheme.

14.5.2.1 Site setup

Initially a site compound and the works areas in the Park will be fenced off, and the construction routes for transport of materials will be constructed for access to the works areas within the Park. The topsoil will be stripped and stockpiled on site. The hardcore for the construction routes must be imported. The main deliveries to site over this period will be generated by:

- fencing for securing the site and works areas;
- site offices and welfare facilities;
- earthworks machinery;
- hardcore stone materials for construction of a temporary access roads; and
- the removal of trees from the works areas.

It is estimated that 170 to 185 HCV trips could be generated for deliveries and removals to and from this site over an initial 8 to 12-week period. The trips generated are therefore estimated to peak at 6 per day.

14.5.2.2 Main Works

After site setup, the main works will then commence, including the removal and stockpiling of topsoil in the designated areas, the removal of subsoils in the works areas, sheet piling and construction of the main embankment, construction of the flow control structure, earthen embankments, and excavation of earth materials to create the Integrated Constructed Wetland (ICW).

For the purposes of general fill, it is expected that the arisings will be mostly deemed acceptable material for reuse to create the embankments and final site regrading and restoration. However, for determination of the worst-case traffic impact, it is conservatively assumed in this assessment that 50% of the arisings are unsuitable and that this volume of fill must be exported, and the remainder of materials required will be imported *via* the public road network.

Deliveries of imported material for the embankments are estimated at 230 trips over a 12-week period, with an estimated peak of 8 trips per day.

Concrete works tend towards high delivery volumes for discrete works activities. Based on the shape of the flow control structure, it is estimated that the construction of the base will require 5 concrete trucks to deliver in a single activity, possibly queued on the public road. Similarly, the construction of the walls may generate 5-6 concrete trucks.

It is possible that some concrete elements may be constructed using precast, fabricated offsite, delivered and placed. This option would eliminate the concrete deliveries for the walls of the flow control structure and avoid the potential queues of concrete trucks. A total of 5 HCV trips would be required to deliver the precast concrete elements.

A final finishing works phase will require the import of bituminous macadam for the footpaths over the control structure, and to restore the paths within the Park, with the export of surplus arisings.

The footpaths are estimated to generate 30 HCV trips over a 4 to 6-week period, peaking at 4 trips per day.

14.5.2.3 Disposal

The surplus arisings may be significant, particularly where the excavation of the Integrated Constructed Wetland is estimated to amount to 4,000 to 5,000 tonnes of surplus material for disposal. The highest feasible rate at which the 275 to 300 HCV trips generated to export the material onto the public road system is largely dependent on the capacity of the temporary access roads within the Park, and the amount of storage for stockpiled material that the Park can accommodate. At a worst-case, it is estimated that 12 to 15 trips may occur in an 8-hour working day for a period of 15 days to dispose of the surplus.

In total 545 trips are anticipated over a 20 to 24-week period.

14.5.3 Works at Whitehall Park

It is proposed to realign the river in public open space lands bounded by Whitehall Close, Whitehall Park, Grosvenor Court and Templeville Road.

The cutting for the proposed realignment of the Poddle is similar in volume to the proposed filling to the west side of the works area. For the purposes of general fill, it is expected that the arisings will be mostly deemed acceptable material for reuse. However, for determination of the worst-case traffic impact, it is conservatively assumed in this assessment that 50% of the arisings are unsuitable and that this volume of fill must be exported, and the equivalent of materials imported *via* the public road network.

Deliveries for filling the west side are estimated at 50 trips over a 6-week period, with an estimated peak of 4 trips per day.

Some tree felling is required which it is estimated will generate 4 to 8 HCV trips during the same period.

In total 55 to 60 trips are anticipated over a 7-week period.

14.5.4 Works at Wainsfort Manor Crescent

It is proposed to construct flood protection walls on both banks of the River a length of approximately 50m on both sides of the Lakelands Overflow, and on the left bank of the river from the Overflow as far as the Terenure Badminton Club for a length of 157m. These works will be accessed from the open space at Wainsfort Manor Crescent. A temporary works / set down area will be established in the open space area at Wainsfort Manor Crescent with access from Wainsfort Manor Drive for the duration of works in this location. Initial imports of fencing, hardcore, machinery and facilities are estimated to generate 3 to 6 HCVs.

Some tree felling is required which is estimated will generate 8 to 12 HCV trips to dispose of.

The construction of the concrete retaining walls is expected to be slow work due to difficulty of accessing the opposite back of the river, and the deep excavations required for the mass concrete bases. Stone facing to these walls will also be slow manual work.

Concrete works tend towards high delivery volumes for discrete works activities. Based on the linear shape of the structure, it is estimated that the construction of the mass concrete will be done in 15 activities, each requiring 12 concrete trucks to deliver in a day and possibly queued on the public road. The construction of the reinforced concrete bases and walls will progress at a slower rate, and there may be 12 to 24 activities of 1 to 2 deliveries each.

Stone facing to these walls is manual work and the stone may be stored in the compound. An estimated 30 HCV trips is required to provide the volume of stone, but the rate of use does not demand an intense schedule of delivery. A duration of 9 weeks is estimated for this work, requiring typically 4 HCV trips per week.

In total 250 to 260 trips are anticipated over a 14-week period.
14.5.5 Works to Rear of Fortfield Road, South of KCR

It is proposed to construct flood protection walls a length of 94m on the right bank of the River, to the rear boundary of the properties at nos. 1 to 21 Fortfield Road, South of KCR.

Some tree felling is required at this works location which is estimated will generate 6 to 8 HCV trips to dispose.

The construction of the concrete retaining walls is expected to be slow work due to the linear nature of the works area, the constrained site and access, and the deep excavations at the river's edge. Stone facing to these walls will also be slow manual work.

Concrete works at this location are expected to be done in typically 8 to 12m lengths of base or wall, with 1 to 2 concrete truck deliveries for each day of pouring. The concrete works are estimated to continue for a 5-week period at this rate.

Stone facing to these walls is manual work and the stone will have to be delivered as required. An estimated 20 HCV trips is required to provide the volume of stone, but the rate of use does not demand an intense schedule of delivery. A duration of 16 weeks is estimated for this work, requiring typically 2 HCV trips per week.

In total 50 trips are anticipated over a 22-week period.

14.5.6 Works to Ravensdale Park

It is proposed to construct flood protection walls on the left bank of the River within the Park from the northwest corner of the Park ending at the southeast corner of the builders' providers property. A replacement pedestrian bridge is proposed over the river within the Park, ensuring access from the Ravensdale Drive to Kimmage Road Lower is maintained in the Scheme. A new flood defence wall a length of 190m will be constructed through the centre of Park.

A temporary works / set down area will be established in the Park and will be fenced off. This will be in place for the duration of works at this location.

Initial imports of fencing, hardcore, machinery and facilities are estimated to generate 3 to 6 HCVs.

Some tree felling is required which is estimated will generate 12 to 16 HCV trips to dispose of.

The construction of the concrete walls is expected to be slow work due to the deep excavations at the river's edge. Stone facing to these walls will also be slow manual work.

Concrete works at this location are expected to be done in typically 8 to 12m lengths of base or wall, with 1 to 2 concrete truck deliveries for each day of pouring. The concrete works are estimated to continue for a 5 to 7-week period at this rate.

Stone facing to these walls is manual work and the stone may be stored in the set-down in the Park. An estimated 11 HCV trips are required to provide the volume of stone, but

the rate of use does not demand an intense schedule of delivery. A duration of 4 weeks is estimated for this work, requiring typically 3 HCV trips per week.

In total 70 trips are anticipated over a 14-week period.

14.5.7 Works at St. Martin's Drive

It is proposed to construct a retaining wall a length of 120m on the right bank of the River in an area of open space at the end of St. Martin's Drive.

The construction of the concrete retaining wall is expected to progress at a reasonable rate. Concrete works tend towards high delivery volumes for discrete works activities. Based on the linear shape of the structure, it is estimated that the construction of the mass concrete will be done in 5 activities, each requiring 11 concrete trucks to deliver in a day and possibly queued on the public road. The construction of the reinforced concrete bases and walls will progress at a slower rate, and there may be 4 to 8 activities of 1 to 2 deliveries each.

Stone facing is slow manual work and the stone may be stored in a secure area at the site . An estimated 5 HCV trips are required to provide the volume of stone, but the rate of use does not demand an intense schedule of delivery. A duration of 3 weeks is estimated for this work, requiring typically 2 HCV trips per week.

Tree felling is required which it is estimated will generate 18 to 22 HCV trips to dispose.

In total 100 trips are anticipated over a 10-week period.

14.5.8 Works at Mount Argus Close

It is proposed to construct a retaining wall for approximately 15m on either side of a footbridge crossing of the River at Mount Argus Close.

The construction of the concrete retaining walls is expected to be progress at a reasonable rate.

Concrete works tend towards high delivery volumes for discrete works activities. It is estimated that the construction of the mass concrete will be done in 3 activities, each requiring 2 concrete trucks to deliver in a day and possibly queued on the public road. The construction of the reinforced concrete bases and walls will progress at a slower rate, and there may be 6 activities of 1 to 2 deliveries each.

In total 15 trips are anticipated over an 8-week period.

14.5.9 Sealing Manholes

Construction works within public roads and associated areas for the River Poddle Flood Alleviation Scheme are the construction of sealed covers on existing manholes, or complete reconstruction of the manholes, depending on their condition at the following locations:

- Poddle Park Ravensdale Park / Poddle Park junction
- Saint Teresa's Gardens and Donore Avenue

The manhole at the rear of the car park at the National Stadium is required to be rehabilitated to improve access for maintenance. This is not expected to cause extra traffic or disruption on the public road so does not figure in the estimates.

For determining the worst-case impact, it will be assumed in this assessment that in all cases where works are required the poor condition of the existing manhole requires that they will either be excavated to full depth and surrounded with mass concrete or completely reconstructed.

The works require an area to be fenced off at each manhole location of suitable size to accommodate the excavation, materials and equipment, a mini-digger, 3t swivel dumper, earth lorry and concrete delivery. The presence of existing services traversing the excavation areas may cause difficulties with the works, thus increasing the footprint of the excavation so that these can be diverted or made safe.

The estimated duration of the works to each manhole is 5 working days to finish with reinstatement with a temporary surface. It is assumed that the permanent resurfacing to all locations will follow in a period of 2 to 6 months.

14.5.10 Summary of traffic Estimates at Each Works Location

Table 14-2 provides a summary of the traffic estimates at all of the works locations as described above.

Location	Works	Duration (Weeks)	HGVs/HCVs	Peak (loads per day)
Tymon Park (East	Site Setup	8-12	170-185	6
	Embankment Works	12	230	8
	Footpath Works	4-6	30	4
	Concrete Works	3	10	5
	Disposal	12-15	545	12-15
	Total	20	1000	
Tymon North (west of M50)	Deliveries	4	35-40	4

	Table	14-2:	Traffic	estimates	based	on	loads	and	estimated	duration	of	works
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Location	Works	Duration (Weeks)	HGVs/HCVs	Peak (loads per day)
	Earthworks disposal and Tree Removal	12	30-35	6
	Total	12	75	
Whitehall Park	Deliveries	6	50	4
	Tree Removal	6	4-8	
	Total	7	55-60	
Wainsfort Manor	Site Setup		3-6	
Crestent	Tree Removal		8-12	
	Concrete Works	10	235	12
	Stone Deliveries	9	30	4 (per week)
	Total	14	275-285	
Rear of Fortfield	Tree Removal		6-8	
коаа	Concrete Works	5	22	2
	Stone Deliveries	16	20	2 (per weeks)
	Total	22	50	
Ravensdale Park	Site Setup		3-6	
	Tree Removal		12-16	
	Concrete Works	5-7	35	2
	Stone Deliveries	4	11	3 (per week)
	Total	14	70	
St. Martin's Drive	Concrete Works	6	75	11
	Stone Deliveries	3	5	2 (per week)
	Tree Removal		18-22	
	Total	10	100	
Mount Argus Close	Concrete Works		10	2
	Total	Q	30	
Sopling of	iotai	2 months	50	
manholes		2 months		

14.6 Likely Significant Effects

As discussed in the previous sections, it is considered that the main transport effects will be associated with the movement of HCVs and HGVs travelling to and from and turning into the sites when delivering and removing materials. At each site location, the following are the likely impacts for public road users including pedestrians.

14.6.1 Disruption or Diversion of Traffic and Pedestrians at the Works Locations

14.6.1.1 Tymon Park (east and west of the M50)

The main works sites in Tymon Park are located off public roads, where there is enough space available to provide access and set back gates and fencing to establish safe working areas without a requirement to divert pedestrians or traffic. It is considered that the impact to public road and footpath users will be Not Significant as traffic disruption will be restricted to times when vehicles are entering or exiting the sites. No residual impact is anticipated.

14.6.1.2 Whitehall Park / Wainsfort Manor Crescent, rear of Fortfield Road, St. Martin's Drive

The works at Whitehall Park / Wainsfort Manor Crescent are in locations that are currently used for access for maintenance of drainage infrastructure for the Poddle. Being existing public open spaces there is sufficient space within these locations to set back fencing and gates without a requirement to divert pedestrians or traffic.

Access to the works area to the rear of Fortfield Road will require unrestricted use of the gated entrance off Kimmage Road West during the works. The informal parking spaces currently in use at this location will not be available for the duration of the works.

Additionally, the works at St. Martin's Drive may cause displacement of parking at the end of the cul-de-sac and to pedestrians along the footpaths on the river side of the Drive for the duration of the works planned here. However, there is ample space elsewhere along the Drive for car parking, and a footpath along the opposite side of the Drive. In addition, the hours of working on Monday to Friday between 07:30 and 16:30, and as may be required on Saturdays from 08.00 hours to 13.00 hours should mean that there is no undue impact on road users and pedestrians at this location.

All of the above impacts are considered to be Slight, with no residual impact to public road and footpath users anticipated.

14.6.1.3 Ravensdale Park

Ravensdale Park is one of the main works sites in the Scheme. A temporary works / set down area will be established at the Park, with access from the north along Ravensdale Park. The informal parking spaces on Ravensdale Park will be coned off as part of the Traffic Management Plan details to ensure visibility at the access.

Access to works areas will also be from points along Ravensdale Drive and in front of the builders' providers to construct the walls and footbridge in this location. As there are no alternative vehicular routes out of Ravensdale Drive, and access to the footbridge will be restricted during the works, at this location there will inevitably be disruption to road users

along Ravensdale Drive, to the builders' providers, and to pedestrians who normally use the footbridge to cross through the Park from Ravensdale Drive to Kimmage Road Lower. In addition, residents of Ravensdale Park and Poddle Park who might normally use the Park to walk through to Kimmage Cross Roads will have to be diverted to Kimmage Road Lower as there will be no access through the Park for the duration of the works at this location.

These impacts are considered to be Moderate on road users and pedestrians. No residual impact is anticipated when the works are complete.

14.6.1.4 Mount Argus Close

At Mount Argus Close minimal space is available between the river edge and the road edge for works set-up. The road shoulder is used for informal parallel parking and this will be closed off for the duration of the works. There is a footpath on the opposite side of the Close for pedestrian use. The footbridge over the river at the works location will be closed for the duration of the works, which will add *ca.* 220m on footpaths to a pedestrian journey between the Mount Argus Close and Mount Argus Way cul-de-sacs. These works will cause disruption to habitual parking and walking routes of the residents, but there are safe alternatives for both. The impact is considered to be Slight due to the temporary loss of parking and restrictions to pedestrian access with no residual impact anticipated.

14.6.2 Disruption to Traffic During Large Vehicle Movements at Site Access Locations

14.6.2.1 Tymon Park (east and west of M50)

The Tymon Park works sites are located off the public roads, with enough space available to set back gates from the public road and footpaths. It is considered therefore that the access layouts can accommodate large vehicle movements. The impact is considered to be Imperceptible with no residual impacts.

14.6.2.2 Rear of Fortfield Road

The access to the works area at the rear of gardens on Fortfield Road is immediately after the left-turn lane from the Kimmage Crossroads (junction R817 and R818). A short length of the road shoulder is used for informal parallel parking which will obstruct visibility of the access to oncoming traffic. It is considered that the set-up at this site will involve closing off the shoulder and informal parking spaces for the duration of the works and using flagmen to coordinate the large vehicle movements with the traffic light controlled public traffic.

A bus stop serving three routes is located immediately beside the access gate at Kimmage Road West (rear of Fortfield Road) and may be disrupted if large vehicles are turning in this area. It is noted that the road verge at the access is currently used as informal parking without apparent disruption to the bus service, and it is therefore considered that the impact to Dublin Bus to be Not Significant and temporary with no residual impact anticipated.

14.6.2.3 Whitehall Park, Wainsfort Manor Crescent, St. Martin's Drive

These smaller works sites are generally at locations of existing maintenance access to the Poddle. The sites are generally narrow and do not accommodate turning of large vehicles or reverse manoeuvres. There will be an impact to road users when vehicles are undertaking these manoeuvres, and this will be Not Significant and for a temporary duration with no residual impact.

14.6.2.4 Ravensdale Park

The access to the works Ravensdale Park is close to the traffic-light controlled junction with the R817 Lower Kimmage Road. The shoulder along the near side of the road is used for informal parallel parking. This parking will obstruct sightlines to the access and may impede the turning movement of large vehicles entering or leaving the site. It is considered that the set-up at this site will involve closing off the parking spaces at the entrance for the duration of the works with flagmen to coordinate large vehicle movements turning from Kimmage Road Lower onto Ravensdale Park. There will be a Slight impact to road users when vehicles are using the access, but this will be of short duration and temporary. There will be no residual impact.

14.6.2.5 Mount Argus Close

Mount Argus Close is expected to have a linear site set-down on the hard-shoulder. The residential road is a cul-de-sac with insufficient road width to accommodate vehicle turning movements. HCVs and vehicles for the workers may use the junction with Mount Argus Court which is located c65m before the works to reverse in and exit the cul-de-sac. There will be Slight impact on the road users at this location due to the low number of residential road users, and that it will be infrequent occurring only when vehicles are turning. There will be no residual impact.

14.6.3 Disruption Due to Vehicles Queued at the Site Access or Nearby

14.6.3.1 Tymon North (Tymon Park west of M50)

There is sufficient length of existing access road within Tymon North (west of M50) to accommodate vehicles queueing off the public road. The impact of vehicles queueing at this location would therefore be Imperceptible.

14.6.3.2 Tymon Park (east of M50)

At Tymon Park (east), Limekiln Road is single lane and cannot accommodate queues of vehicles without causing disruption, especially at school drop off and collection times and at busy periods for Park visitors. Dublin Bus also have a route on this road. The impact to road users would be Very Significant if vehicles were to queue at this location.

14.6.3.3 Whitehall Park, rear of Fortfield Road

The smaller sites at Whitehall Park and the rear of Fortfield Road are accessed off Regional roads and could not accommodate vehicle queues without causing disruption to the flow of traffic. St. Anne's Terrace is a residential cul-de-sac close to the left-turn lane from Fortfield Road. All roads at KCR are on Dublin Bus routes. The impact of vehicles queued at these locations would be Very Significant.

14.6.3.4 Ravensdale Park

Ravensdale Park could possibly accommodate queued vehicles on Brookfield Green, the road which borders the north park boundary. The builders' providers and one private access would be impacted by a lane closure, but as this is a residential cul-de-sac it is considered that the disruption would not be severe. The impact of vehicles queued at these locations would be Moderate.

14.6.3.5 Wainsfort Manor Crescent, St. Martin's Drive, Mount Argus Close

The smaller sites which are accessed from residential roads could potentially accommodate vehicle queues. This however can cause disruptions to residents at these locations, especially during times of the day when they would be going to work or returning home. The impact of vehicles queued at these locations would be Slight.

14.6.4 Disruption Caused by Additional Parking on Main Roads by Workers

It is considered that the main works sites have sufficient space to provide for on-site parking by the workers for the on the Scheme. The smaller works areas are restricted and while it may be possible to provide for a small number of vehicles within the works, the peak light vehicle parking could not be accommodated within these works areas. Surplus vehicles must therefore find parking in the general vicinity. The impact to parking availability on local roads in proximity to works areas would be Imperceptible.

14.6.5 Additional Congestion to Traffic in the Wider Area

The expected peak vehicles at each works area are described in the foregoing sections.

The transport of materials to and from the site are likely to utilise the N81 as part of the route, as the quarries and landfills in closest proximity to the area are in the Wicklow and Kildare directions which are accessible via the M50 Motorway. The impact would be Slight for the duration of the works with no residual impact.

14.6.6 Lane Closures at Manhole Works

Where the manhole is located close to the verge, it may be possible to close off only one lane and implement traffic management in the other lane using a stop-go system. Where the manhole is located centrally in the road, it is likely to necessitate a road closure and diversion, otherwise works should be done outside of peak hours. The details for traffic management at each specific location will be subject to review and direction by DCC as part of the Road Opening Licence application. Potential lane or road closures and diversions would be required at the following locations with potential to affect road users at the locations described following.

14.6.6.1 Along Poddle Park and Junction with Ravensdale Park

These works would be in proximity to an entrance to KCR Industrial Estate and many residences at this location. An alternative route would be to approach the Industrial Estate from the west along Cashel Road from Stannaway Road. Residences along Poddle Park could be approached from the north along Bangor Road from Stannaway Road or from Blarney Park from Larkfield Avenue.

Lane or road closures and diversions at these locations would have Significant effects on road users with knock on effects on diverted routes.

14.6.6.2 Along Donore Avenue and in Vicinity of St. Teresa's Gardens

These works would be in proximity to White Swan Business Centre, St. Catherine's National School, St. Teresa's Church, at the entrance to St. Teresa's Gardens and Donore Boxing Club, and to many residences along the route. Works at manholes located centrally in the road may require a road closure and diversion of traffic through the adjacent streets, with knock-on effects on the diverted routes.

Lane or road closures and diversions at these locations would have Significant effects on road users. No residual impact is anticipated.

14.6.7 Impact Assessment Summary

Table 14-4 provides a summary of the traffic estimates at all of the works locations as described above.

Description	Location	Factors	Significance
Disruption or diversion of traffic and nedestrians	Tymon Park & (east & west of M50)	Pedestrians	Not Significant
peucotnuno		Traffic	Not Significant
	Whitehall Park / Wainsfort Manor Cresent, rear of Fortfield Road, St. Martin's Drive	Parking	Slight
		Pedestrians	Slight
	Ravensdale Park	Pedestrian diversion	Moderate
		Parks/park users	Moderate
		Builders' providers	Moderate
		Residential road users	Moderate
	Mount Argus Close	Parking	Slight
		Pedestrian diversion	Slight

Table 14-3: Summary of Impacts

Disruption to traffic during large vehicle movements	Tymon Park (east and west sites)	Traffic	Imperceptible		
	Rear of Fortfield Road	Parking	Not Significant and Temporary		
		Public buses	Not Significant and Temporary		
	Whitehall Park, Wainsfort Manor Cresent, St. Martin's Drive	Road users	Not Significant and Temporary		
	Ravensdale Park	Parking	Slight and Temporary		
		Road users	Slight and Temporary		
	Mount Argus Close	Residential road users	Slight		
Disruption due to vehicles queued at site access or nearby	Tymon North (west of M50)	Queueing on public road	Imperceptible		
	Tymon Park (east of M50)	Schools	Very Significant		
		Park visitors	Very significant		
		Dublin bus routes	Very significant		
	Whitehall Park, rear of Fortfield Road	Residential road users	Very Significant		
		Dublin bus routes	Very Significant		
	Ravensdale Park	Builders' providers	Moderate		
		Private access	Moderate		

	Wainsfort Manor Crescent, St. Martin's Drive, Mount Argus Close	Residential road users	Slight
Disruption caused by additional parking on main roads by workers	In smaller works areas	Local roads	Imperceptible
Additional congestion to traffic in the wider area	M50 Motorway and N81	Traffic and road users	Slight
Lane closures at manhole works	Along Poddle Park and junction with Ravensdale	Traffic diversions	Significant
	Park	Road Closures	Significant
		KCR Industrial Estate	Significant
		Residential road users	Significant
	Along Donore Avenue and in vicinity of St. Teresa's Gardens	Residential road users	Significant
		Road closures	Significant

14.7 Mitigation Measures

The impacts to site access are described in the previous section and cannot be eliminated. They can be managed, and their impact reduced by the implementation of appropriate traffic management by the contractor.

14.7.1 Disruption or diversion of traffic and pedestrians at the access locations

For each access, the contractor shall be required to design and implement a specific Traffic Management Plan, which will include advance signage (Traffic Signs Manual Chapter 8), permitted delivery times and control measures.

At Ravensdale Park, the Traffic Management Plan will include the management of pedestrians who must divert around the works and the measures to ensure continuity of access to the builders' providers and to dwellings on Ravensdale Drive.

In residential areas, the initial communication with the residents prior to commencing works has proven to reduce the number of complaints which arise during projects. Ongoing communication during the works is also essential. Notice will be provided on the project website and SDCC/DCC will provide a letter drop to the local residents in advance of the works commencing.

14.7.2 Disruption to traffic during large vehicle movements at site access locations

The contractor shall be required to design and implement a specific Traffic Management Plan, which will include advance signage (Traffic Signs Manual Chapter 8), permitted delivery times and control measures..

14.7.2.1 Ravensdale Park

Flagmen will be present during these manoeuvres to manage traffic safety as part of the specific Traffic Management Plan.

14.7.2.2 Mount Argus Close

The initial communication with the residents prior to commencing works has proven to reduce the number of complaints which arise during projects. Ongoing communication during the works is also essential to maintain the relationship.

14.7.2.3 Whitehall Park, Wainsfort Manor Crescent, St. Martin's Drive

Flagmen will be present during large vehicle manoeuvres to manage traffic safety, as part of the specific Traffic Management Plan.

The Traffic Management Plan will also identify any restrictions on times of deliveries that are deemed appropriate such as no deliveries during morning and evening commuting times for work and school runs.

14.7.3 Disruption due to vehicles queued at the site access or nearby

14.7.3.1 Tymon Park (east of M50)

It was identified in the previous section that very significant disruption would result from queued vehicles on Limekiln Road. The works at this location have the highest quantities in terms of earthworks import and disposal, but less so for concrete delivery.

The programming and management of earthworks deliveries, stockpiling and disposal will greatly affect the frequency of HCVs using the access, and this element of the construction plan should give careful consideration to the impact on the road network.

Any anticipated activities which result in queuing will be contained in the Traffic Management Plan and both the local roads authority and Dublin Bus will be consulted as

part of this process. A diversion route is identified in the previous sections which would add *ca.* 3km to the road users' trip.

14.7.3.2 Whitehall Park

It was identified in the previous section that very significant disruption would result from queued vehicles at this location. The proposed works are predominantly cut-and-fill earthworks and careful planning of deliveries will mitigate the potential for vehicles to be queued.

14.7.3.3 Rear of Fortfield Road

It was identified in the previous section that moderate disruption would result from queued vehicles at this location. The proposed works include in-situ concrete construction which has the potential for periods of high activity and potential queues of concrete trucks.

The use of precast concrete walls would mitigate some of the concrete works and mitigate the associated disruption.

The concrete bases are more likely to be in-situ concrete, and careful planning of the works to minimise the quantities to be delivered at each pour would also mitigate this impact.

The Contractor will consult with Dublin bus as part of the development of the construction and traffic management plans.

14.7.4 Disruption caused by additional parking on main roads by workers

Parking by workers in the vicinity of the sites may be difficult to accommodate. The sites are spread over a distance of 4.5km (excluding St. Teresa's Gardens) however, all work sites will not be undertaken concurrently.

14.7.5 Lane Closures at Manhole Works

Lane closures are unavoidable where the works involve deep excavation in the road. These works will be done by DCC who are familiar with these operations and will implement the appropriate Traffic Management Plan for the works as a whole, and for each location. The measures to be implemented will include advance warning signage and alternative route signage.

14.8 Residual Impacts

On completion of construction of the Flood Alleviation Scheme there will be no residual impacts on traffic and transport in the receiving environment.

15 MATERIAL ASSETS

15.1 Introduction

This chapter describes and assesses the potential impacts of the proposed River Poddle Flood Alleviation Scheme material assets. The existing environment is also described. Mitigation measures are proposed where required, and the predicted residual impacts are described.

The proposed development consists of flood alleviation works along and adjacent to the River Poddle on sites totalling 12ha from Tymon North, Tallaght to Mount Argus Close in Harold's Cross with further works to rehabilitate or replace manholes in the vicinity of St. Teresa's Gardens and Donore Avenue, and at the National Stadium, Merchant's Quay, Dublin.The "*Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*" (August 2017)¹ defines material assets as concerning built services and infrastructure, including traffic because in effect traffic consumes roads infrastructure.

This chapter addresses the following aspects:

- Local Settlement and Land Uses
- Natural Resources
- Waste Management

15.2 Methodology

This chapter has been prepared with reference to the following guidelines and sources:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, August 2017);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoEHLG, August 2018);
- Latest Census of Population and Housing, 2016 (CSO);
- South Dublin County Development Plan 2016-2022;
- Dublin City Development Plan 2016 2022;
- Eastern & Midlands Regional Assembly Regional Spatial and Economic Strategy 2019 – 2031;
- Eastern Midlands Region Waste Management Plan 2015 2021.

A desk study was carried out on the existing material assets associated with the sites of the proposed Flood Alleviation Scheme. Projections of resource use were made, for both the construction and operational phases of the development, and the impacts assessed. Impacts on particular material assets such as the road network are considered in detail elsewhere in this EIAR (refer to **Chapter 14 Traffic and Transport**).

15.3 Characteristics of the Proposed Scheme

The intervention area of the proposed Flood Alleviation Scheme extends along the Poddle River and in the wider catchment from the townland of Tymon North in Tallaght to

¹ Environmental Protection Agency, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft August 2017, <u>https://bit.ly/2kurbam</u>, [accessed 04/09/19].

Merchant's Quay, Dublin. There are three areas where more substantial works are proposed in green spaces and parks including Tymon North and Tymon Park in Tallaght where the main flood storage embankment is to be constructed and an Integrated Constructed Wetland (ICW) is also planned; at Whitehall/Wainsfort Manor Crescent in Terenure where a channel re-alignment is proposed; and at Ravensdale Park in Kimmage where flood walls are to be constructed to provide flood protection and storage.

Additional works are proposed in the Scheme to alleviate flooding include rehabilitating or replacing manholes to provide sealed manholes in the public roads in Poddle Park, Crumlin and in, and the vicinity of, Saint Teresa's Gardens Merchant's Quay, and at the National Stadium, South Circular Road, Merchant's Quay.

Ancillary works and associated development, include drainage channel clearance and removal of trees, where required for the works; rehabilitating culvert screens in locations as required; installing flap valves in all culverts draining to the River; biodiversity enhancements including installation of floating nesting platforms in Tymon Lake, Tymon Park, Tallaght; and landscape mitigation and restoration at Tymon Park, Tallaght, and Ravensdale Park, Kimmage including public realm improvements, replacement footbridges and tree planting and landscaping.

Temporary works include establishing a main construction compound in Tymon Park with access off Limekiln Road, which will be in operation for the entire duration of the works; and temporary works / set down areas at Wainsfort Manor Crescent and Ravensdale Park, which will be in use for the duration of the works to be carried out in these locations. Other temporary works include temporary stockpiling of excavated earth in Tymon Park; temporary channel crossings at Tymon North and Tymon Park, and channel diversions at Tymon Park and Whitehall Park to enable the works along the River channel to be carried out.

Refer to **Chapter 5 The Proposed Development** for a detailed description of the proposed development and proposed construction methods, and the accompanying planning drawings.

Once the Scheme is completed a robust programme of maintenance will ensure that culvert screens and channels are kept clear of debris to ensure the Flood Alleviation Scheme functions correctly during a storm event. This includes carrying out repair works on existing walls and instituting a robust maintenance programme to ensure that debris that has accumulated in the channel is removed and vegetation cleared in order to prevent blockages in the future. These measures will be undertaken by each Council.

15.4 Existing Environment

15.4.1 Local Settlement and Land Uses

The working areas in the proposed Poddle River Flood Alleviation project is in an urban / suburban setting in the south-west of Dublin City in the administrative areas of SDCC and DCC.

The Poddle River passes through areas of industrial, commercial, residential and open space/recreational uses. Much of the area in the vicinity of the proposed works is urban and well developed.

15.4.2 Utilities

This section provides a baseline description of the utilities services within the study area that interface with the proposed Scheme. Utility data for the study area has been collated from the following sources:

- South Dublin County Council;
- Dublin City Council;
- Irish Water;
- ESB;
- Telecoms: Virgin Media, Eir, BT, Three;
- Gas Networks Ireland;
- Site topographic surveys; and
- Geotechnical site investigations including slit trenches, trial pits and boreholes.

15.4.2.1 Wastewater

This section reviews the existing wastewater infrastructure which includes pipe sewer networks, foul pumping station and wastewater treatment plants within the study area. The wastewater assets in particular adjacent to the proposed Scheme are:

- 300mm and 675mm pipe crossing River Poddle near the area downstream of Tymon Lake;
- 525mm pipe installed along Limekiln Road;
- 225mm pipe installed along Whitehall Close;
- 225mm pipe installed along Glendale Park; and
- 300mm pipe installed along Fortified Road.

15.4.2.2 Water Supply

This section reviews the existing water infrastructure which includes pipe networks, pumping stations and treatment plants within the study area and the assets specifically adjacent to the proposed works are:

- 101.6 UpVC watermain installed along Limekiln Road
- 6" UPVc watermain in the green area near Templeville Road
- 6" UPVc watermain in the green area adjacent to the Wainsfort overflow weir
- 101.6 Cast- Iron watermain installed along Fortified Road
- 101.6 Asbestos watermain installed along Ravensdale Drive
- 9"Asbestos watermain installed along Ravensdale Park Road
- 200mm Ductile Iron watermain installed along Poddle Park Road
- 100mm Ductile Iron watermain installed at the end of Mount Argus Close

15.4.2.3 Surface Water Network

This section reviews the existing surface water infrastructure which includes pipe networks, stormwater pumping stations and stormwater attenuation area within the study area and the assets specifically adjacent to the proposed works are:

- 600mm pipe installed adjacent to ESB substation in Tymon North;
- A 525mm and a 450mm outfall at the area downstream of Tymon Lake;
- 300mm pipe and a 600mm at the north east area of Tymon Park;
- 225mm outfall at the green area near Templeville Road;

- 600m pipe crossing River Poddle near the Wainsfort overflow weir;
- 225m outfall from Glendale Park;
- 225mm pipe installed along Wainsfort Manor Crescent;
- 450mm outfall from Glenanne Road;
- 920mm pipe installed along Fortfield Road;
- 225mm pipe installed along Ravensdale Park;
- 225mm pipe crossing River Poddle at the area downstream of Poddle park footbridge;
- 300mm pipe installed along St. Martin's Drive;
- 225mm outfall at the end of Mount Argus Close.
- 600mm outfall at the end of Mount Argus Square.

15.4.2.4 Electricity Supply

This section reviews the existing ESB infrastructure, including underground and overhead infrastructure, substations, within the study area. The following is a brief description of the ESB infrastructure in the study area:

- 38kV HV underground cable installed along River Poddle route adjacent to Tymon Castle
- 38kV HV underground cable adjacent to the ESB substation in Tymon North
- Two MVLV underground three phase cables crossing River Poddle adjacent to the ESB substation
- One MVLV underground three phase cable crossing the River Poddle at the north east area of Tymon Park
- One MVLV underground three phase cable in the green area near Templeville Road
- One MVLV underground three phase cable in the green area adjacent to the Wainsfort overflow weir
- Two 38kV HV underground cable installed along the left bank of River Poddle adjacent to Fortfield Road
- One 110kV HV underground cable installed along Ravensdale Park Road
- One 38kV HV underground cable crossing River Poddle at the area downstream of Poddle park footbridge
- One MVLV underground three phase cable installed at the end of Mount Argus Close

15.4.2.5 Gas Networks

This section reviews the existing Gas Network Ireland infrastructure, including distribution and transmission infrastructure, within the study area. The following is a brief description of the Gas networks infrastructure in the study area:

- A 63 PE-80 700mbar medium pressure distribution gasline installed in the area upstream of the ESB substation in Tymon North
- A 90 PE -80 25mbar low pressure distribution gasline installed along Fortfield Road
- A 180 PE -80 25mbar low pressure distribution gasline installed along Ravensdale Park Road
- A 90 PE -80 25mbar low pressure distribution gasline installed along Ravensdale Drive

- A 180PE 4bar medium pressure distribution gasline crossing River Poddle adjacent to Saint Martin's Drive at the upstream area of the existing footbridge.
- A 90 PE -80 25mbar low pressure distribution gasline installed along Saint Martin's Drive.
- A 63 PE-80 700mbar medium pressure distribution gasline installed at the end of Mount Argus Close

15.4.2.6 Telecommunications

This section reviews the existing telecommunications infrastructure, including Virgin Media, BT, Eir Tree Network infrastructure, within the study area. The following is a brief description of the telecoms networks infrastructure in the study area:

- Lines present along Limekiln Road adjacent to Tymon Park site boundary
- Lines crossing the river channel adjacent to the proposed ICW in Tymon Park
- Lines installed close to proposed site entrance at Whitehall Park
- Lines installed adjacent to site boundary along Wainsfort Manor Green, Wainsfort Manor Drive and Wainsfort Manor Crescent
- Lines installed adjacent to proposed works at St Anne's Terrace
- Lines on Kimmage road Lower adjacent to Ravensdale Park and along Ravensdale Drive
- Lines along Poddle Park Road adjacent to works at St. Martin's Drive
- Lines installed in Mount Argos Square and Mount Argos Close adjacent to the proposed works at Mount Argos Close

15.4.3 Waste Management

A desktop study has been undertaken to review the licensed waste facilities in proximity of the proposed Scheme. As discussed in detail in **Chapter 9 Soils, Geology and Hydrogeology**, facilities in Ireland carrying out waste activities are required to obtain authorisation in accordance with the Waste Management Act 1996, as amended. Depending on the type of waste activities carried out at the facility these may be exempt or require either a waste licence, waste facility permit (WFP) or a certificate of registration (COR).

The EPA database and the National Waste Collection Permit Office (NWCPO) <u>http://facilityregister.nwcpo.ie/</u> were reviewed for licensed waste facilities in proximity to the proposed works.

Table 15-1 presents the licensed waste facilities in proximity to the Scheme and the type of waste they accept.

Facility Name	Permit No.	Location	Waste Accepted
Crossmore Transport Ltd	WFP-DS- 14- 0010-01	Unit 2B Sunbury Industrial Estate Ballymount Drive Dublin 12	End of life tyres
Kennedy Landscape Supplies Limited	WFP-DS- 10- 0007-03	Ballymana Lane Kiltipper Road Tallaght Dublin 24	Plant tissue waste
Mark O'Reilly Recycling	WFP-DS- 10- 0002-04	Colfix (Dublin) Limited Bluebell Industrial Estate Dublin 12	Copper, bronze, brass, aluminium, lead, iron and steel, mixed metals, cables, batteries and accumulators
Roadstone Limited	WFP-DS- 11- 0005-03	Belgard Quarry Fortunestown Tallaght Dublin 24	Concrete, bricks, tiles and ceramics, mixture of concrete, bricks, tiles and ceramics, wood, glass, plastic bituminous mixtures containing coal tar, bituminous mixtures, iron and steel, glass
Callan Recycling Limited	WFP-DS- 16- 0001-04	Unit 51 Fourth Avenue, Cookstown Industrial Estate, Tallaght, Dublin 24	Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03
Pulp Recycling Limited	WFP-DS- 12- 0001-05	Unit 3 Riverside Whitestown Business Park Tallaght Dublin 24	Plastic packaging, paper and cardboard, plastics
Kavanagh Recycling & Recovery Limited	WFP-DS- 14- 0003-03	Unit 69 Cookstown Industrial Estate Tallaght Dublin 24 D24 N702	Discarded equipment containing hazardous components -16 other than those mentioned in 16 02 09 to 16 02 12 16 02 14, discarded equipment other than those mentioned in 16 02 09 to 16 02 13 16 02 16, components removed from discarded equipment other than those mentioned in 16 02 15 16 06 05, other batteries and accumulators

Table	15-1:	Licensed	Waste	Facilities	in	proximity	to	the	Scheme
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Facility Name	Permit No.	Location	Waste Accepted		
Rehab	WFP-DS-	Unit 77 Broomhill	waste containing silicones		
Ltd.	0008-05	24	waste ink		
			waste printing toner		
			waste printing toner		
			paper and cardboard packaging		
			plastic packaging wooden packaging		
			transformers and capacitors containing PCBs, discarded equipment containing or contaminated by PCBs, discarded equipment containing chlorofluorocarbons, HCFC, HFC, lead batteries, Ni-Cd batteries		
			mercury-containing batteries		
		a	alkaline batteries		
			other batteries and accumulators		
			paper and cardboard,		
			fluorescent tubes and other mercury- containing waste		
			discarded equipment containing chlorofluorocarbons		
			batteries and accumulators included unsorted batteries and accumulators containing these batteries,		
			discarded electrical and electronic equipment		
			plastics		
			metals		
			other fractions not otherwise specified		
Thorntons Recycling	WFP-DC- 11- 0023-02	Unit 6 S3B Henry Road Park West Business Park Dublin 12	Paper, cardboard, textiles, plastics		

There are no licensed landfills operating within the Scheme area. The closest landfill site is at Ballynagran, Coolbeg, Co. Wicklow some 50km from the study area. Many of the landfills in the Dublin area are now closed to commercial waste and operate as civic Bring Centres for recycling.

15.5 Potential Impacts

15.5.1 Construction phase

15.5.1.1 Local settlement & Land Uses

The construction phase of the proposed Scheme will be 24 months in total, however, localised works will be shorter in duration. The impacts on local settlement during construction have been covered with in other sections of this EIAR under the following chapters: Chapter 6 Population and Human Health, Chapter 12 Noise and Vibration, Chapter 13 Air Quality and Climate, and Chapter 14 Traffic and Transport.

The Scheme will impact on the boundaries and boundary walls of 45 no. residential properties, 31 no. in Whitehall Close/ Grovesnor Court / Whitehall Park/Whitehall Rd, Glendale Park, Wainsfort Manor and 12 no. in Fortfield Road, 1 no. in St Martin's Drive and 1 no. in Mount Argus Close, 1 no. building Providers in Ravensdale Drive, and 1 no. Sports Club in Templeogue, Tymon North Public Park, Tymon Park and Ravensdale Park. The Scheme will also impact the road network in mainly residential areas during manhole works/.

- In Whitehall Close/ Grovesnor Court the works will be at the rear of the residential properties in the public green space which will consist of construction of new river channel, infill of the existing channel and building and grading works for earth embankments with a new SDCC access gate being made at the end of Whitehall Close. Works to the rear of Whitehall Park and Grovesnor Court will be the construction of reinforced concrete walls from the public space with a number of trees removed to facilitate construction. Access to these works will be from Templeville Road and *via* Wainsfort Manor Drive.
- In Whitehall Road, Glendale Park and Templeogue Badminton Club the works will be to the rear of the properties with construction and some tree felling to be carried out in the river channel to build concrete defence walls up against existing property walls.
- In Wainsfort Drive and Wainsfort Manor Crescent disruption will be from the construction of the works described in the last paragraph and there will be a temporary site compound located on the green space for the duration of the works along with the necessary flow of construction traffic to and from the area.
- In Fortfield Avenue the construction works are to the rear of the 11 properties in private lands and will involve the felling of trees the removal of existing rear garden walls and their replacement with reinforced concrete walls. The works will be carried out from the riverside and construction traffic will access area *via* landowner access through Kimmage Road West and from Fortfield Avenue adjacent to the An Post sorting office.
- In St. Martin's Drive, the disruption will be in the green area adjacent to the channel and car parking area with tree felling and reinforced concrete wall being erected. There will restrictions on car parkingduring construction and construction traffic will access the works *via* the estate roads. A secure storage / works area will also be provided at this location.

- In Mount Argus Close works will be for the construction a reinforced concrete wall and safety railings adjacent to private property. The pedestrian bridge will be temporarily closed during stages of this construction and construction traffic will access the works *via* the estate roads.
- In Tymon North Park disruption will be at the ESB sub-station to the west of the park adjacent to the lakes with construction of an earthen embankment. The footpath on the right of the river channel between the road bridge and the lakes will be closed to public during construction works. Construction works will also be carried out in the wooded area east of playground near Tymon Castle ruins and the footpath along this stretch will be closed to the public with temporary path made available. Construction traffic will access works area *via* the park entrance and park roads.
- In Tymon Park disruption will be in access to Tymon Lakes from Limekiln Road Car Park, the footpaths in the vicinity of the lake, the site compound located north of the lake and the ICW area to the west of the lake including construction roads along existing footpaths for the movement of plant and materials. The pedestrian access gate at Limekiln Road adjacent to Riverview ETNS will be maintained open to public including the pedestrian Bridge to Osprey Avenue. The access to the lake and ICW areas and footpaths within the site area defined will be closed for the duration of the works (4 months) and the site compound will be in place for 24 months. Access for the construction traffic will be *via* Limekiln Road through the site compound.
- In Ravensdale Park disruption will occur during the construction of the reinforced concrete walls and pedestrian bridge and some tree felling. Access to the park *via* Ravensdale Park, Ravensdale Drive and Kimmage Road Lower will be restricted during construction works and footbridges from Kimmage Road West and Ravensdale Drive will be closed for the duration of works. Construction traffic will access site *via* Ravensdale Park with a temporary works compound during the construction work.
- Disruption to road network at Poddle Park, St. Teresa's Gardens and Donore Avenue will occur during the and manhole sealing. These works will involve some road opening and reinstatement with some road closures and traffic diversions and or stop/go temporary traffic systems.

15.5.1.2 Road and Transport Network

The proposed Flood Alleviation Scheme works may require traffic diversions during the construction phase to facilitate the works. In Poddle Park, St Teresa's Gardens and Donore Avenue. Traffic management is required for proposed works on the manholes. In Fortfield Avenue and Ravensdale Park there will likely be traffic disruptions during construction due to proximity to Kimmage Cross Roads and along Limekiln Road for the construction entrance at Tymon Park during peak hours. Construction impacts on the roads and transportation network are detailed in **Chapter 14 Traffic and Transport.**

15.5.1.3 Utilities

During the construction of the Scheme there will be a number of conflicts with existing utilities. These impacts may require the relaying and/or realignment of the utilities local

to the proposed works. Relaying the utilities is anticipated to be required where the existing utilities are located immediately adjacent to the proposed defence and ICW works.

In Tymon Park two surface water pipes from Limekiln avenue outfall to the river Poddle at the proposed location of the ICW. These pipe outfalls will be altered to outfall directly into the ICW area.

All surface water outfalls along the length of the Poddle channel will have flap valves installed. Surface water drains at the rear of properties in Whitehall Close, Whitehall Park, Whitehall Road, Wainsfort, and Fortfield Avenue where defence walls and embankments are being constructed will have these outfalls included in the new defences.

The embankment works in Tymon North adjacent to the ESB sub-station clash with cables running directly underneath. These cables will diverted to allow construction of the embankment.

15.5.1.4 Natural Resources

The construction of proposed Flood Alleviation Scheme will require natural resources in the form of engineering fill, water, electricity and fuel for construction vehicles and plant machinery.

15.5.1.5 Waste Management

The wastes expected to arise as a result of construction would be mostly earth from excavations. The project will aim to reuse as much excavated material as possible in the Flood Alleviation Scheme. Any earth material that is removed from the sites will be done in strict accordance with the relevant waste management legislation. For all works, any waste generated during the construction phase will be adequately segregated and stored prior to transfer to an authorised facility for recovery/recycling/disposal.

During the construction phase both solid and liquid waste will be produced at the site. All domestic effluent generated on site will discharge to temporary sewage containment facilities prior to transport and treatment off-site by an authorised contractor. Waste oils and solvents will be stored in a temporary bunded area prior to transport off-site by a licensed contractor.

15.5.2 Operational Phase

15.5.2.1 Local settlement & Land Uses

Generally, the operational impact of the Scheme will be positive due to the standard of protection to be provided against flooding. There will be no operational impacts on the residential properties with some restriction in crossing Ravensdale Park off the footpaths due to the defence wall but not through the path network.

Once operational the Scheme will require maintenance activities. These activities will include clearing of the trash screens to prevent blockages, inspection of the defences, clearing the channel and repair works

15.5.2.2 Road and Transport Network

Operational impacts of the roads and transport networks are detailed in **Chapter 14 Traffic and Transport**.

15.5.2.3 Utilities

There will be no operational impact on utilities and services from operation of the Scheme.

15.5.2.4 Natural Resources

There will be no operational impact on natural resources.

15.5.2.5 Waste Management

There will be no operational impact in respect of waste management.

15.6 Mitigation Measures

15.6.1 Construction Phase

15.6.1.1 Local settlement & Land Uses

The impact of the Scheme during the construction stage has been carefully considered in the design of the defences and for construction of the project. Vehicular and pedestrian access to all properties will be maintained throughout the construction of the Scheme.

In Tymon Park, the proposed works are limited to the area in the vicinity of the Lake and ICW. This will require the closure of the walkways closest to the Lake and parallel to Limekiln Road, but the existing footpath / cycle track running through the remainder of the Park will be open throughout the construction period. Works areas will be set off from the footpaths / cycle tracks to ensure safety of Park users.

In Ravensdale Park the access to the southern section of the Park along Kimmage Road West will remain open, but the remainder of the Park will be closed to the public for health and safety reasons. Footbridges from Kimmage Road West and Ravensdale Drive will be closed for the duration of works.

Information and signage will be provided at the car parks and access points from residential areas adjacent to the Parks.

To mitigate the impact of construction of the Scheme on the existing walkways around Tymon Lake in the Park due to the flow control structure and construction of the flood defence embankment, the walkway and river crossing will be realigned to the top of the proposed embankment and connecting pathways re-aligned to join with the new path. Likewise, a new path will be made adjacent to the ICW.

To mitigate the impact of the wall in Ravensdale Park an open seating area will be constructed and to accommodate the new pedestrian bridge access to Ravensdale Drive and the connecting footpath will be realigned in the Park.

15.6.1.2 Road and Transport Network

Mitigation measures for impacts on roads and transport networks are discussed in **Chapter 14 Traffic and Transport**.

15.6.1.3 Utilities

Standard industry practice for construction works will ensure the safety of the workers and maintain the integrity and operational functions of any service, above or underground.

Prior to construction, drainage networks, electrical cabling, gas pipelines, and telecommunications infrastructure will be recorded and incorporated into the detailed design of the Scheme to avoid any clashes where possible. All diversions will be designed and constructed in accordance with the requirements and under the supervision of the relevant utility provider. Businesses and residents will be notified in advance of any service disruptions. Contractors will be provided with the locations of all services.

15.6.1.4 Natural Resources

No mitigation measures will be required during the construction of the Scheme in respect of natural resources.

15.6.1.5 Waste Management

Standard mitigation measures for dealing with waste arising will be employed, including the implementation of a CEMP and a project specific Waste Management Plan. Further details of mitigation of construction waste can be found in the **Outline CEMP** (**EIAR Volume 4, Appendix 5-1**), and **Chapter 9 Soils, Geology and Hydrogeology**.

15.6.2 Operational Phase

15.6.2.1 Local settlement & Land Uses

No mitigation is required.

15.6.2.2 Road and Transport Network

No mitigation is required.

15.6.2.3 Utilities

No mitigation is required.

15.6.2.4 Natural Resources

No mitigation is required.

15.6.2.5 Waste Management

No mitigation is required.

15.7 Residual Impacts

After the application of mitigation measures prescribed in this Chapter, it is anticipated that residual impacts on Local Settlement, Utilities, Natural Resources and Waste Management will be slight.

16 INTERACTIONS

16.1 Introduction

Each of the various environmental aspects has been separately discussed in the previous Chapters. However, all aspects of the environment are interrelated to some extent and this Chapter deals with significant interactions and interdependencies between these environmental aspects.

16.2 Interactions Matrix

The possible interactions for the proposed River Poddle Flood Alleviation Scheme are shown in the interactions summary table at the end of this chapter (see **Table 16-1**). The interactions summary table and the preceding chapters show how causing one element of the environment to change can interact with or have knock-on effects on other environmental aspects. Although a number of potential interactions have been identified, many of these are insignificant either because the scale is small or because the proposed mitigation measures as identified in this EIAR will prevent significant interactions from occurring.

16.3 Population & Human Health Interactions

Human Beings interact to a greater or lesser extent with most aspects of the environment discussed in the previous chapters of the EIAR. In particular Traffic & Transport, Noise & Vibration, and Air Quality & Climate, Material Assets, Cultural Heritage, Landscape and Visual can all have an impact on Human Beings. Impacts on these aspects have been considered in **Chapter 6** in relation to the resultant impacts on the overall amenity of the area for people living, visiting and working in the environs of the proposed development.

There will be long-term positive impacts arising from the operational scheme which relates to its primary purpose as flood protection. Properties will benefit from flood protection, and the health and wellbeing of the local population will be enhanced through the public realm improvements that are proposed to mitigate the negative effects of the scheme.

In terms of construction **Noise and Vibration**, during periods where several items of plant are in operation simultaneously and when there is piling, there is the potential for noise and vibration impacts on individual properties. This will result in potential short-term negative impacts between human beings and noise and vibration which is not significant. There will be no significant noise or vibration impact on the local environment during the operational phase of the development. This will result in an overall neutral interaction between human beings and noise and vibration during this phase of the development.

In terms of **Air Quality**, with the effective implementation of a Dust Minimisation Plan, the proposed development is expected to have a negligible impact on Air Quality. Appropriate mitigation measures, as outlined in **Chapter 13 Air Quality & Climate** will ensure no significant construction dust or exhaust emissions impacts will occur at nearby receptors. This will result in a neutral interaction between Human Beings and Air Quality.

In terms of Construction **Traffic**, long delays to traffic are unlikely to occur as a result of the construction traffic and lane closures predicted from the proposed development (see **Chapter 14 Traffic and Transport**). Given the predicted low levels of construction trip generation from the development, road users or pedestrians are unlikely to be impacted during the construction or operational phases. As a result of the location of the

development in an urban environment, it is not predicted to result in a significant negative interaction between Human Beings and Traffic.

Landscape and Visual effects range from Not Significant to Moderate/Significant, adverse effects, thereby giving a negative interaction between the landscape environment and visual amenity and human beings. The construction stage of the development has the potential to lead to negative interactions between human beings, landscape and visual though the temporary presence of construction plant and material during the construction phase. In some of the works areas, the proposed Scheme will introduce significant landscape changes which effects will be reduced by the landscape mitigation plans proposed as part of the Scheme including replacement tree planting. Mitigation measures have been proposed in **Chapter 10 Landscape and Visual** with landscape mitigation to minimise the predicted impacts and interactions with the above environmental aspects.

There is potential for a temporary disrupton to service utilities and public access to parks and urban green spaces during the construction phase, with expected interaction between Material Assets and Human Beings. Appropriate mitigation measures as outlined in **Chapter 15 Material Assets** will ensure the risk of the above is minimised and insignificant.

Overall, the proposed development will lead to a positive interaction with Human Beings. During its operational life, the proposed development will ensure a significantly reduced flood risk for residential and commercial properties, community facilities and amenities in SDCC and DCC council areas.

16.4 Biodiversity Interactions

In general, changes in the environment related to Water, Soil, Landscape, Noise and Vibration, and Air can interact negatively on the Biodiversity of an area and these impacts have been considered in the foregoing chapters and specific mitigation measures to minimise the above interactions are outlined.

In terms of Biodiversity, the potential impacts from the proposed development are minimal, being of negligible or local impact on habitats and species (see **Chapter 7 Biodiversity**). There will be some loss of habitat for locally important flowering rush in Tymon Park, and for bats which are a protected species, due to removal of trees. There is potential for inundation of nesting sites for breeding waterfowl during infrequent flood events. However, it is considered that this would be offset through the provision of biodiversity enhancements within the landscape mitigation plans for the works sites and replacement tree planting as required.

Chapter 7 of the EIAR outlines mitigation measures to be implemented to negate or minimise the risks of the above negative interactions identified. It has been concluded that if these mitigation measures are fully implemented, the above interactions will be negated or significantly minimised.

Apart from its physical presence and once the mitigation measures as detailed in the EIAR are implemented, no on-going negative impacts on Biodiversity are anticipated from the operation of the flood alleviation scheme.

16.5 Hydrology & Hydromorphology Interactions

The interactions involving surface water with biodiversity are described above. The implementation of mitigation measures as detailed **Chapter 8 Hydrology & Hydromorphology** will ensure that there are minimal impacts from the construction or operational phases of the development on surface waters in the area and therefore minimal or negligible interactions will occur with biodiversity.

16.6 Soils, Geology and Hydrogeology Interactions

With regard to dust or contaminated run-off during excavations, there is the potential for adverse effects on air and water quality leading to negative interactions between Geology and Air and Water.

For this development, the excavation at works areas will expose areas to the air environment. Landscape restoration will introduce new soils, plants and public realm elements to the works areas. The effect is considered to be a positive direct minor impact on the soils and geology aspect of the environment, with positive interactions with Landscape.

For all of the above interactions, mitigation measures have been detailed in the preceding chapters which will negate or significantly reduce the Geology and Hydrogeology interactions associated with the development.

16.7 Landscape and Visual Interactions

The interactions between Landscape and Visual, Human Beings and Biodiversity are described above. As with any infrastructure development, the permanent presence of infrastructure can alter the landscape environment of an area, thereby giving the potential for locally negative landscape changes and visual amenity effects to the local population during the construction phase. Avoidance and mitigation measures have been employed in **Chapter 10** to alleviate the predicted impacts and interactions with the above environmental aspects.

16.8 Archaeology, Cultural and Built Heritage Interactions

The potential exists for previously unrecorded findings of Cultural Heritage and Archaeological value to be discovered during the construction phase of the development. Therefore, there is potential for negative impacts between Cultural Heritage and Archaeology, Landscape and Visual (archaeological landscape) in the Construction Phase. If the mitigation and monitoring measures as detailed in **Chapter 11** are adhered to, the above interactions will be mitigated and/or negated.

16.9 Noise and Vibration Interactions

The interactions involving Noise and Vibration with Human Beings during the construction phase are described above.

16.10 Air Quality Interactions

A Dust Minimisation Plan will be formulated for the construction phase of this development, as construction activities in general have the potential to generate dust emissions leading to potential negative Air Quality interaction with Ecology, and Human Beings. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors, including levels of rainfall, wind speeds and wind direction. Whilst construction activities are likely to produce some level of dust during earth moving and excavation in the construction phase of the project, these activities will mainly be confined to particles of dust less than 10 μ m. Particles of dust greater than 10 μ m are considered a nuisance but do not have the potential to cause significant health impacts. The potential for impacts from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the source and any impacts from dust deposition will typically be within several hundred metres of the construction area. Mitigation measures to be contained in the Dust Minimisation Plan are outlined in **Chapter 13 Air Quality and Climate** of the EIAR. Once the mitigation measures as outlined are implemented, no significant interactions between Air Quality and other environmental aspects are anticipated.

16.11 Traffic & Transport Interactions

The interactions involving Traffic with Human Beings, Air, and Noise and Vibration have been described above. The material assets of the local road infrastructure will be affected by construction of the proposed Scheme. Mitigation measures are recommended to minimise the impacts on material assets, as outlined in **Chapter 14 Traffic and Transport**.

16.12 Material Assets Interactions

The interactions involving Material Assets with Human Beings, Traffic, Soils, Geology and Hydrology, Landscape and Visual have already been described above.

Interaction With	Population & Human Health	Biodiversity	Hydrology & Hydromorphology	Soils, Geology & Hydrogeology	Landscape & Visual	Archaeology, Architecture & Cultural Heritage	Noise & Vibration	Air Quality & Climate	Traffic & Transport	Material Assets
Population & Human Health					x		X	x	x	x
Biodiversity			x	x	x					
Hydrology & Hydromorphology		x								

Table 16-1: Summary of Impact Interactions

Interaction With	Population & Human Health	Biodiversity	Hydrology & Hydromorphology	Soils, Geology & Hydrogeology	Landscape & Visual	Archaeology, Architecture & Cultural Heritage	Noise & Vibration	Air Quality & Climate	Traffic & Transport	Material Assets
Soils, Geology & Hydrogeology			x		x			x		
Landscape & Visual	x	x								
Archaeology, Architecture & Cultural Heritage					x					
Noise & Vibration	x									
Air Quality & Climate	x	x		x						
Traffic & Transport	x						x	x		x
Material Assets	x			x					x	

17 SCHEDULE OF MITIGATION MEASURES

17.1 Introduction

This chapter presents a schedule of the key mitigation measures identified within **Chapters 6 to 15** of this EIAR. Mitigation measures have been proposed, where required, in order to avoid, reduce and where practicable remedy significant adverse effects.

Mitigation measures have been incorporated into the design of the proposed Scheme and will be applied during the construction and operation of the proposed development. All mitigation measures are based on the proposed scheme as described in **Chapter 5**, **"Description of the Proposed Works"**. A summary of measures is presented in the tables below with reference made to the page numbers of the chapters where mitigation measures is discussed. The mitigation measures for both the construction and operational phases are detailed as appropriate. Individual chapters of the EIAR should be referred to for context and detail of the specific mitigation measures.

The appointed Contractor for the Scheme will be required to prepare and agree a detailed Construction Environmental Management Plan (CEMP), in line with ISO 14001 to address all construction activities to be carried out as part of this development prior to construction works commencing on site. The CEMP will include all measures as identified in the EIAR, NIS and associated environmental reports and will include all conditions attached to any planning approval granted for the Project. It will be a contractual obligation that the appointed Contractor implements <u>all</u> site management measures and all planning requirements and conditions.

17.2 Schedule of Mitigation Measures

 Table 17-1: Population & Human Health Mitigation Measures (Chapter 6, Page 6-8)

No.	Description
6.1	Impacts associated with construction – such as noise, dust, the passage of heavy works vehicles <i>etc.</i> , will be short-term effects that will end once the project is operational. The appropriate management of construction activities and traffic will mitigate against significant impacts, as set out in various sections of the EIAR.
6.2	Techniques to minimise the generation of dust before during and after the works and to protect receptors from dust and noise during construction and construction traffic have been dealt with in the following sections.

 Table 17-2: Biodiversity Mitigation Measures (Chapter 7, Pages 7-35 - 7-38)

No.	Description
7.1	The contractor will employ an Ecological Clerk of Works (ECoW) to oversee the implementation of the mitigation measures outlined below. The ECoW will be required to provide reports and written correspondence to the Employers' Representative as requested, in order to demonstrate compliance with the measures outlined in this report.

No.	Description
7.2	The contractor will be required to employ an Environmental Manager and ECoW to assist with preparing a detailed CEMP and its implementation, and to advise on all works in close proximity to the river.
7.3	All work within 50m of the river corridor will be planned in accordance with the contractor's ECoW and recorded in a method statement. The ECoW will give a toolbox talk in advance of works, and all working areas will be marked out clearly in advance of work.
7.4	Pollution prevention measures will be adhered to as follows:
	 Silt-management measures will be implemented for all groundworks in order to prevent the release of suspended solids into the watercourse; The main site compound at Tymon Park will include a bunded area for the storage of pollutants, with additional areas for the stockpiling of materials, and drainage control for the washing area; Hazardous materials (e.g. fuel, cement, etc.) will be stored at least 50m from the river; Vehicles will be refuelled over drip trays;
	 Split kits will be kept in the site compound and all mobile venicles; and Any concrete required for construction work will be ordered ready-mixed. Vehicles will be cleaned off site.
7.5	All in-stream works will comply with current best practice, notable the Inland Fisheries Ireland <i>Guidelines on protection of fisheries during construction works in and adjacent to waters</i> (IFI, 2016) and Transport Infrastructure Ireland's <i>Guidelines for the crossing of watercourses during the construction of national road schemes</i> (TII 2008).
7.6	Impacts on habitat will be compensated by re-instating disturbed areas with an equivalent habitat type, <i>e.g.</i> species-rich dry meadow or a treeline. The majority of new tree and shrub planting will be of native species, complemented by some common ornamental species, <i>e.g.</i> beech, chestnut, walnut, cherries and limes.
7.8	Species-rich dry meadow will be re-instated on the surface of new embankments in Tymon Park, and in the footprint of the temporary construction compound.
7.9	New specimen trees will be planted in Tymon Park, Ravensdale and St Martins Drive, accounting for twice the number of trees that will be removed.
7.10	To ensure the protection of the recorded rare plant species, the following mitigation measures will be adhered to:
	 At the outset of construction works, the contractor's ECoW will survey the affected areas in order to map all individual plants of flowering rush and broad-leaved helleborine. The survey should be carried out during the growing season for these species (May to September, inclusive) The ECoW will review the proposed working areas with the contractor, in order to determine whether the rare plants will be disturbed Where possible, plants will be left in-situ and protected during construction works. Robust measures will be taken to protect the plants, including the use of temporary foreces or other cimilar measures.
	 Where such impacts are unavoidable, the plants will be translocated to a similar habitat nearby (<i>e.g.</i> shallow flowing water for flowering rush, or broadleaf woodland for broad- leaved helleborine). The ECoW should liaise with a landscape contractor regarding suitable techniques for translocation, in order to maximise chances of survival. The

No.	Description
	ECoW will also consider options for the collection and dispersal of seed if any plants are in flower
7.11	To control the spread of Nuttall's waterweed, a third schedule invasive species, the following mitigation measures will be adhered to:
	 Prior to the commencement of construction, the contractor's ECoW will survey the affected section of channel to map the distribution of Nuttall's waterweed. If any waterweed is observed in the footprint of works, the ECoW will prepare an Invasive Species Management Plan, which will set out the contractor's strategy to ensure compliance with the law during construction works. The plan should include measures to avoid the accidental spread of waterweed plants during construction works, and to manually remove (and dispose of) any plants within or adjacent to the proposed working area. A derogation licence will be required from the Department of Culture, Heritage and the Gaeltacht.
7.12	Tree and shrub removal will be ideally carried out between September and February (inclusive). If this is not possible, an ecologist will survey relevant vegetation in advance in order to determine whether any protected fauna are present. If any are encountered, the vegetation clearance will be delayed until the protected fauna have moved away from the area, <i>e.g.</i> when chicks have fledged and a nest has been abandoned.
7.13	Tree protection zones will be marked out for all retained trees and hedgerows in the vicinity of working areas.
7.14	In recognition of the risk to nesting birds in Tymon Lake (which will be used for flood storage), two floating nest platforms will be installed on the Lake. It is intended that the nesting platforms will be approximately 1m x 1m in size and surfaced with sods of grass or reeds. They will be constructed on stable, floating platforms, but anchored to the ground to prevent them from drifting. Advice will be sought from specialists in the design of the rafts in order to maximise the likelihood of their success.
7.15	The optional provision of artificial nesting sites for sand martins and kingfisher as a measure for ecological enhancement is recommended. The following sites would be suitable:
	 The western edge of Tymon Lake, on the steep section of bank between the two streams The southern bank of the river downstream of Tymon Lake, immediately opposite the ICW The north bank of the realigned section of watercourse at Whitehall Park.
7.16	Artificial nesting banks can be created from concrete and clay / polyethylene pipes, or purchased as pre-fabricated wooden boxes. Nesting sites should be located on or beside the river bank, with a minimum height of 1.5m above water level, and a length of at least 5m.
7.17	All working areas will be surveyed in the year following construction in order to assess the re-establishment of vegetation. If any areas are found not to be revegetating or are found to be susceptible to localised bank erosion, additional landscaping work will be carried out. If any replanted trees or shrubs fail to establish, they will be replaced with a suitable alternative.

No.	Description
7.18	If Nuttall's waterweed or any other invasive species is found to have spread during construction works, the contractor will be required to eradicate any new growth.
7.19	Populations of rare flora will be monitored for the first three years after construction. If any populations are observed to be declining or in poor health, an ecologist will liaise with a landscape contractor regarding suitable methods to assist the plants.
7.20	The status of nesting birds in Tymon Lake will be assessed for three years following construction, including during any periods of high rainfall in the nesting season. If nests are being affected by inundation on an annual basis, then additional measures will be implemented, such as the provision of additional nesting rafts or modifications to the rafts.

Table 17-3: Hydrology and Hydromorphology Mitigation Measures (Chapter 8, Pages 8-16 – 8-20)

No.	Description
8.1	In general, all works on the riverbank will be subject to a specific method statement agreed in advance with the statutory authorities. The method statement will incorporate the following points:
	• To avoid excessive silt runoff, site clearance is not to be undertaken during wet conditions, when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours;
	 To avoid contamination of the river water during an extreme flood event, no works likely to generate soiled water are to be carried out when rainfall of more than 3 mm/hour is forecast within the next five days in the River Poddle catchment; At the riverbank works locations, eroded sediments are to be retained with silt fences;
	• Soil cleared from the site and all materials associated with the building process are to be stored outside the flood zone in designated storage areas;
	• Works adjacent to the riverbank will have catch-nets and silt traps to prevent debris from falling into the river;
	 Raw or uncured waste concrete is not to be disposed of within 30m of the river; Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils <i>etc.</i>, is to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment;
	• Fuelling and lubrication of equipment is not to be carried out close to the riverbank or lake shore;
	• Any spillage of fuels, lubricants of hydraulic oils is to be immediately contained and the contaminated soil removed from the site and properly disposed of;
	 Waste oils and hydraulic fluids is to be collected in leak-proof containers and removed from the site for disposal or re-cycling;
	 Hydrocarbon/grit interceptors of suitable size are to be placed on the runoff discharge from the car park at the abstraction point and must be maintained by a person or persons designated to carry out this maintenance;
8.2	Best practice mitigation measures will be employed for this Scheme as contained in the following guidance documents and best practice UK CIRIA guidance which includes but not limited to the following:

No.	Description
	 C532 Control of water pollution from construction sites: guidance for consultants and contractors; C648 Control of water pollution from linear construction projects; SP156 Control of water pollution from construction sites – guide to good practice NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005); the Eastern Regional Fisheries Board guidance document 'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites' (Murphy, 2004); and the Southern Regional Fisheries Board guidance document 'Maintenance and protection of the inland fisheries resource during road construction and improvement works' (Kilfeather, 2007).
8.3	 For in-river works the following mitigation measures are recommended: Measures to minimise the suspension and mobilisation of sediment downstream of the working area should consider silt barriers and cofferdamming to create dry working areas; Works should allow the river to recover for at least 14 hours on a daily basis meaning that the period of in river work should be about 10 hours maximum; A dry working area should be created for pouring of concrete; In areas of the river where there are alien species, all plant and machinery should be thoroughly washed before moving to another section of the river; All vehicles should be regularly checked for oil leaks, and ruptured hose pipes.
0.4	the river during construction should follow the NRA's 'Guidelines for the Crossing of Watercourses during Construction of National Road Schemes (NRA, 2005).
8.4	Best practice methods should be employed at all stages during the construction. It is recommended that the contractor's compound is situated as far as is practicable from the river.
8.5	Fuel, lubricants, hydraulic oil, repair equipment used on the construction site should be carefully handled to avoid spillage.
8.6	All tanks, barrels or containers containing hazardous materials (oils, lubricants, sealants <i>etc.</i>) must be stored in a sufficiently sized bunded area.
8.7	Spill kits will be made available in site compound and in site machinery. In the event that a spillage does occur, adsorbent material should be placed on the material to adsorb it. The contaminated adsorbent should be correctly disposed of as a hazardous waste and brought to a licenced waste handing site by a licenced waste contractor. The site manager must retain a copy of any waste transport and disposal documentation. In the event of a larger spillage of oil/hydraulic oil then South Dublin County Council and/or Dublin City Council Environment Sections should be contacted immediately. The Emergency Procedures for the site should have a procedure for dealing with large spillages.
8.8	All empty diesel/oil/hydraulic oil containers should be drained to a single labelled container. The empty oil containers should be stored in a dedicated labelled totally sealed skip. Waste skips should be collected by a licenced waste carrier and brought to a licenced facility for disposal. All disposal records must be retained at the site offices.
No.	Description
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8.9	The waste from the chemical toilets should be collected by a licenced waste carrier and brought to a licenced treatment facility.
8.10	A supply of oil booms and soak pads must be maintained within the contractor's area.
8.11	A robust programme of maintenance will ensure that culvert screens and channels are kept clear of debris to ensure the flood alleviation scheme functions correctly during a storm event. This includes carrying out repair works on existing walls and instituting a robust maintenance programme to ensure that debris that has accumulated in the channel is removed and vegetation cleared in order to prevent blockages in the future. These measures will be undertaken by each Council (South Dublin County Council and Dublin City Council) as part of a regular maintenance programme. The existing culverts and screens at Wainsfort Manor, Lakelands and Gandon Close have CCTV cameras and level alarms and are currently checked and cleared by the responsible local authority in advance of forecast rainfalls.
8.12	In addition to the above maintenance an asset register of the flood defences for the River Poddle will be prepared for SDCC/DCC to be incorporated into the Development Plans for both authorities to ensure that defences that are erected will not be removed as part of any future development either by a local resident or as part of a planning submission.
8.13	The embankment structures will be kept clear of tree planting to maintain structural integrity and the flow control structure and embankment at Tymon Lake will undergo periodic checks by an All Panel Reservoir Engineer to ensure that the structural condition of the embankment is in order and there is no change or obstruction to the operation of the emergency overflow spillway that would inhibit the secure overflow of embankment for events greater than 1% AEP.

 Table 17-4: Soils, Geology & Hydrogeology Mitigation Measures (Chapter 9, Pages 9-5 – 9-7)

No.	Description
9.1	Any soil imported to site will be subject to assessment to identify any invasive alien species present by a suitably qualified Ecologist. Any soils stored on site will be seeded and periodically topped. Such stores will be subject to on-going monitoring.
9.2	If invasive plant species are present at any of the sites, machinery and equipment including footwear and tools will be cleaned appropriately (as per species requirements) between infested sites.
9.3	An estimated 5,000m ³ of material is to be excavated and reused elsewhere on site or locally. The excess material from the excavation works will be used as bulk fill, embankments or landscaping where possible. It is estimated that 50% of the material will be required for the embankments and landscaping and the remainder will be taken off site for disposal at an agreed licensed area. All material removed from site will be disposed of in accordance with relevant waste management legislation. Where material cannot be reused on site, it will be exported to co-ordinate deliveries of imported fill with a load of unsuitable material requiring removal from site in order to minimise traffic movements.

No.	Description			
9.4	The top layer of soil (approximately 200m depth) contains valuable ecological material that will be saved separately from subsoils and will be used to reinstate the parks and green areas and allow for natural restoration and establishment of plants. Stockpiles of this material are to be stored in banks no more than 1m high.			
9.5	All materials excavated from the works areas will be stockpiled as close to the area where they are to be re used in landscape restoration in order to minimise on-site haulage and double handling. Areas for material storage have been assigned in consideration of sensitive habitats and ecological features and use of the parks and green spaces in the Scheme. Stockpiles of other material will be formed no more than 2m in height and will be sealed using the back of an excavator bucket or tracked upon by a tracked excavator to ensure the stockpile does not become saturated and therefore difficult to handle when being reinstated into the works. All stockpiles will be clearly defined, fenced and signed to ensure no cross contamination of other materials to be stockpiled.			
9.6	 The contractor shall be obliged to ensure no deleterious discharges are released from the sites to the River Poddle during excavation de-watering, testing or washing activities. Throughout the period of works the contractor shall also take account of relevant legislation and best practice guidance including but not limited to the following: C532 Control of water pollution from construction sites: guidance for consultants and contractors; C648 Control of water pollution from linear construction projects; SP156 Control of water pollution from construction sites – guide to good practice. 			
9.7	The contractor's construction method statements shall also indicate how management, monitoring, interception, removal and/or treatment of silt run-off will prevent contamination of ground or surface waters by mobilisation of soil particles.			
9.8	The contractor's methodology statement should be reviewed and approved by a suitably qualified geotechnical engineer prior to site operations.			
9.9	Excavations will be backfilled as soon as possible to prevent any infiltration of potentially polluting compounds to the subsurface and the aquifer.			
9.10	Prior to the storage of any potentially polluting material on site, the site manager will be responsible for ensuring that a material safety data sheet for each product is available for inspection. A copy of all relevant material safety data sheets will be available at storage locations as well as the site office.			
9.11	The majority of new material brought to site will be used immediately or will be stored within the site boundary. Other materials such as asphalt or concrete will be brought directly to the construction site when required and immediately placed.			
9.12	All potentially polluting materials will be stored in bunded areas, the capacity of which will be 110% of the total volume of liquid to be stored. Any machinery refuelling that takes place on site will be carried out by competent personnel at a single designated location within the site boundaries, close to the site entrance.			

No.	Description
9.13	Spill kits will be stored at the machinery refuelling area. The spill kits will comprise suitable absorbent material, refuse bags, <i>etc</i> . to allow for the appropriate clean-up and storage of contaminated material in the event of a spillage or leak occurring.
9.14	The washing of any plant equipment will be carried out in designated areas to prevent potentially polluting material from contaminating aquifers and soils/subsoils.
9.15	There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.
9.16	Any potentially contaminated groundwater that may be pumped from excavations will be tested and discharged appropriately.
9.17	All machinery will be inspected at the start of each work shift for signs of leaking hydrocarbons. Parking areas will be inspected on a daily basis for evidence of hydrocarbons leaking from machinery.
9.18	All materials required for the maintenance of the sites will be stored according to good practice and in areas either off-site or in bunded areas with impermeable floors. A programme of inspection and maintenance of the site drainage will ensure that any damage, blockages, <i>etc.</i> are identified and remedied.

Table 17-5: Landscape and Visual Mitigation Measures (Chapter 10, Pages 10-46 to 10-48)

No.	Description
10.1	 Landscape Effects Mitigation Measures - General Landscape Effects range from Not Significant to Moderate/Significant, adverse effects. Landscape Mitigation plans are proposed for Ravensdale Park, as well as parts of Tymon Park. A tree planting plan is also included for St. Martin's Drive. Mitigation and avoidance measure were incorporated into the project design, and some of the measures taken and incorporated into the design are as follows: One of the project aims is to minimise tree removal. Consideration of alternative construction methods in all locations where walls proposed to minimise vegetation loss, and to ensure retention of trees. Where this is deemed necessary as a result of the proposed works, replacement tree planting is proposed as required by the relevant Council's trees policies. Replacement tree planting is proposed where trees are to be removed. Information on the number of trees and tree groups to be removed is provided in Section 3 of the Tree Survey Report.
10.2	 Landscape Effects Mitigation Measures -Ravensdale Park Consideration of alternative design solutions in Ravensdale Park including retention of the current river alignment, and retention of path alignment from Kimmage Lower entrance to minimise disruption to trees.

No.	Description				
	• Earlier design proposals would have necessitated extensive tree removal and the design was modified to greatly reduce tree removal with the result that very few trees will be removed. The river channel is not realigned, wall height was reduced through the design process, and high walls surrounding the park were modified, resulting in a lower wall height to the west of the park and a lower wall which doubles as a seating area, in the centre of the park adjacent to the path. It should be noted that a wall impounding the proposed attenuation area was <u>the least impacting solution</u> on the park.				
	• It should be noted that 'soft' landscape measures which were considered, involved creating earth bunds which required a larger footprint, and ultimately would have resulted in extensive tree removal. The proposals for the park can be seen in the Landscape Mitigation Plan (19110-1-111) in Volume 3)				
	• Regarding trees along Ravensdale Drive, the design was amended to avoid these trees. The existing retaining wall to the riverbank is retained and the new wall built in front of it. The "toe" of the retaining wall is beneath the channel rather than behind the wall. Construction access is generally from the streamside.				
	• As stated in Chapter 5, Section 5.4 of the EIAR, replacement planting may not occur in the affected locations due to space constraints but will be planted as closely as possible in nearby green spaces to benefit the local communities. The locations for replacement tree and woodland planting will be agreed with SDCC and DCC at detailed design stage.				
10.3	Landscape Effects Mitigation Measures - St. Martin's Drive				
	• St. Martin's Drive: A tree planting plan (Drawing 19110-1-120 in Appendix 3) is proposed to reduce the effects of tree removal. Proposed replacement planting includes fast growing species and includes tree specification which ranging from 14-16 cm girth to 25-30cm girth.				
	• Tymon Park: The design process for this area included consideration of alternative pathways in Tymon Park to maintain connectivity as a result of the re-grading of certain areas. Tree removal in Tymon Park was minimised. Proposed grass embankments and path re-grading are tied into the contours where possible. Embankments to be seeded with species rich grassland where necessary. Trees which are to be removed will be replaced.				
	• An Integrated Constructed Wetland (ICW) is proposed as an enhancement measure for Tymon Park. This is located northeast of Tymon Lake and includes marginal planting and is expected to enhance the area and assist in improving water quality.				
10.4	Visual Effects Mitigation Measures – General				
	A number of mitigation measures were included in the scheme design and in the Landscape Mitigation Plans. Many of the landscape mitigation measures above are also relevant to visual effects - including those relative to tree removal and the change of character of an area.				
	• Consideration of alternative construction methods in all locations where walls proposed to minimise vegetation loss, and to ensure retention of trees to reduce adverse visual effect.				

No.	Description				
	• Replacement tree planting is proposed where trees are to be removed. Information on the number of trees and tree groups to be removed is provided in Section 3 of the Tree Survey Report. Refer to section 10.7.1 above for comments regarding exact location of replacement trees. Ravensdale Park				
	• Consideration of alternative design solutions in Ravensdale Park including retention of the current river alignment, and retention of path alignment from Kimmage Lower entrance to minimise disruption to trees.				
	• Earlier design proposals would have necessitated extensive tree removal and would have resulted in considerable adverse visual effects in the park. Wall height and location was reduced through the design process, and high walls surrounding the park were modified. It should be noted that a wall impounding the proposed attenuation area was the <u>least impacting solution</u> on the park.				
	• Regarding trees along Ravensdale Drive, the design was amended to avoid these trees. The existing retaining wall to the riverbank is retained and the new wall built in front of it. The "toe" of the retaining wall is beneath the channel rather than behind the wall. Construction access is generally from the streamside.				
	• Walls vary in height, but are predominantly low enough to and allow for views into and out of the park, though these are restricted in some areas. The retaining wall to the west of the park reaches a to a maximum of 1.5 metres in the northwest corner, but reduces to the south of the park to a height of 1.1 metres. The wall in the centre of the park ranges from 1.35m metres in the north, to 0.7 metres. at the southern end. All heights are below 1.65 metres which is the average adult eye height. The proposals for the park can be seen in the Landscape Mitigation Plan (Drawing 19110-1-111 in Volume 3).				
10.5	Visual Effects Mitigation Measures - St. Martin's Drive:				
	• A tree planting plan is proposed to reduce the effects of tree removal, which would remove all trees to the south of the green space at St Martin's Drive, resulting in a change of character and visual quality.				
	• Tymon Park: The design process for this area included minimising tree removal. Proposed grass embankments and path re-grading are tied into the contours where possible. Embankments to be seeded with species rich grassland where necessary. Trees which are to be removed will be replaced.				
10.6	An Integrated Constructed Wetland (ICW) is proposed as an enhancement measure for Tymon Park. This is located northeast of Tymon Lake and includes marginal planting and is expected to enhance the visual amenity of the area.				
10.7	Throughout the scheme, consideration was given to alternative wall materials and wall design including to allow visual permeability and passive surveillance				

Table 17-6: Archaeological, Architectural and Cultural Heritage Mitigation Measures (Chapter 11,
Page 11-26 - 11-27)

No.	Unique ID	Description	Proposed mitigation
11.1	DU022-007	Zone of notification for castle – tower house	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.2	DU018- 043003	Weir	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.3	DU018- 043004, DU022-003, and DU018- 043002	Zone of notification for the City watercourse	Where it is proposed to divert the watercourse, a wade survey should be carried out along the existing stretch of the Poddle prior to commencement of construction activities. This should be carried out under licence from the National Monuments Service of the DoCHG. Archaeological monitoring of any excavation works along the course of the city watercourse should be carried out during construction. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.4	DU022-078	Zone of notification for a windmill	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

No.	Unique ID	Description	Proposed mitigation
11.5	DU018- 047001	Zone of notification for the site of Donore Castle	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.6	DU018-020	Zone of archaeological potential for Dublin City	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.7	CH 01 and CH 06	Ravensdale Mills and its mill pond	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.8	CH 03	Cutlers Mill	Archaeological testing in the first instance. This should be carried out by an archaeologist under licence from the DoCHG. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
11.9	CH 04	Cutlers mill race	Archaeological testing in the first instance. This should be carried out by an archaeologist under licence from the DoCHG. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

No.	Unique ID	Description	Proposed mitigation
11.10	n/a	Greenfield areas	Archaeological monitoring of any excavation works. If any features of archaeological potential are discovered during the course of the works, further archaeological mitigation may be required, such as preservation in-situ or by record, along with archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

 Table 17-7: Noise and Vibration Mitigation Measures (Chapter 12, Page 12-20 – 12-21)

No.	Description
12.1	The contractor will be required to implement the control measures recommended in BS 5228 and apply the appropriate measures where applicable.
12.2	Working hours during site construction operations will be restricted to daytime hours from 07:30 hours to 16:30 hours (Monday to Friday) and, as may be required, from 08.00 hours to 13.00 hours (Saturdays). Evening and night-time work is not expected to take place although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of SDCC and DCC.
12.3	An on-site speed limit will be enforced for all traffic. Drivers of vehicles will be advised of the speed limits through the erection of signs <i>i.e.</i> a typically recommended on site speed limit is 10 km/hr.
12.4	Where practicable, the use of quiet working methods and the most suitable plant will be selected for each activity having due regard to the need for noise control.
12.5	Best practicable means will be employed to minimise noise emissions and will comply with the general recommendations of BS 5228, 1997. To this end operators will use " <i>noise reduced"</i> plant and/or will modify their construction methods so that noisy plant is unnecessary.
12.6	By positioning potentially noisy plant as far as possible from noise sensitive receivers the transmission of sound can be minimised. Earth mounds and/or stockpiles of material or perimeter hoarding on site can be used as a physical barrier between the source and the receiver.
12.7	Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately in order to minimise noise breakout from the site while still maintaining their effectiveness.
12.8	All plant will be maintained in good working order. Where practicable, machines will be operated at low speeds and will be shut down when not in use.
12.9	Compressors will be of the "noise reduced" variety and fitted with properly lined and sealed acoustic covers.
12.10	In all cases engine and/or machinery covers will be closed whenever the machines or engines are in use.
12.11	All pneumatic percussive tools will be fitted with mufflers or silencers as recommended by the equipment manufactures. Where practicable, all mechanical static plant will be enclosed by acoustic sheds or screens.

Employees working on the site will be informed about the requirement to minimise noise 12.13 and will undergo training on the following aspects: The proper use and maintenance of tools and equipment. ٠ The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receptors. Avoidance of unnecessary noise when carrying out manual operations and when ٠ operating plant and equipment. The use and maintenance of sound reduction equipment fitted to power pressure tools and machines. Cognisance will also be taken of the Environmental good practice site guide 2005 12.14 compiled by CIRIA and the UK Environment Agency. This guide provides useful and practical information regarding the control of noise at construction sites. Where excessive noise levels are recorded, further mitigation measures will be employed 12.15 which may include temporary wooden hoarding / acoustic screening to be installed to a height of no less than 2m around areas of construction where loud noise levels occur. The contractor will ensure that the TII Guidelines which identify limits for protection 12.16 against cosmetic damage as a function of vibration frequency are not exceeded through the use of the selected low vibration piling method. Responsible Person -The Contractor will appoint a responsible and trained person who 12.17 will be present on site and who will be willing to answer and act upon complaints and queries from the local public. Night-time Working - If there are items of plant (e.g. dewatering pumps and similar) in 12.18 use during night-time hours they will be chosen, sited and enclosed such that levels at the nearest properties do not exceed the measured background noise levels. Where deemed necessary due to excessive impact or complaints received, noise 12.19 monitoring will be undertaken during construction works to determine noise levels at noise sensitive receivers. On the basis of the findings of such noise monitoring, appropriate noise mitigation measures will be implemented to reduce noise impacts. The contractor will conduct continuous monitoring of vibration levels during any piling 12.20 that may have the potential to result in a vibration impact at nearby properties.

Table 17-8: Air Quality and Climate Mitigation Measures (Chapter 13, Page 13-12 – 13-15)

No.	Description
13.1	The site manager has the overall responsibility for ensuring that operations comply with the requirements of any planning authorisation.
13.2	The site will have at its disposal a suitable water bowser and associated water supply to allow for dampening down of areas of the site works when windblown dust arises. The occurrence of potential wind-blown dust is very much weather dependent but suitable facilities will be available to minimise windblown dust from the site surfaces.
13.3	Construction activities will take place Monday to Friday, between 07:30 and 16:30, and as may be required on Saturdays from 08.00 hours to 13.00 hours. Evening and night-time work is not expected to take place, although it is possible that limited 24 hours working may be required to take place on occasion. This will only take place with the prior agreement of SDCC and DCC.

13.4	Regular attention shall be paid to cleaning dust material from all roadways, hard surfaced areas and working areas of the construction site. Dust from clean-up will be re- incorporated into stockpiles within the construction compound and adjacent to working areas. This will be done at appropriate intervals during the day and at the end of each working period.
13.5	Roadways and other areas within the construction compound where vehicles are regularly moving shall be kept clean, by sweeping or by wetting.
13.6	 When loading vehicles within the construction compound and overall construction site, the following procedures will be adhered to: No overloading of vehicles or containers resulting in either peaks of cargo or overspill onto the working areas or roadways. Keep fall heights of the material into the transport vehicles to a minimum.
13.7	Strictly applied, suitable on-site speed limits shall be set, displayed and observed for the movement of all vehicles (10 mph)
13.8	Mandatory use of the wheel wash provided.
13.9	Stockpiling shall be co-ordinated in such a way as to minimise the potential for double handling of material and carefully planned to ensure minimum exposure to winds, thereby reducing dust emission to air.
13.10	Stockpile areas will be clearly and physically delineated to deter vehicles from running over extracted material at the stock edge.
13.11	Stockpiles shall be managed to ensure that the profile of material will be no higher than 2m which will minimise wind whipping.
13.12	During embankment construction and any stockpiling, embankments and stockpiles shall be profiled and compacted by flattening out peaks and ridges and when partially worked, shall be re-contoured to prevent ridges or overhanging falls.
13.13	Whenever possible, embankments and stockpiles shall not be broken into when the wind is likely to lift newly exposed dry dust. When this is unavoidable, effective dust control methods shall be implemented.
13.14	Prior to carrying out any stockpile handling operations, the dust suppression equipment will be checked to ensure that it is working properly.
13.15	A high standard of housekeeping will be maintained on site.
13.16	Contingency plans shall be made to provide dust control in the event of equipment malfunction, whether by loan, hire or other arrangements.
13.17	Systems for monitoring processes, responding to and reporting pollution incidents shall be devised. This information shall be kept in a logbook, together with information regarding equipment failure, periods of significant dust emissions off-site and the inspection of roadways, together with any remedial action taken.
13.18	Any complaints received from neighbouring properties will be logged and appropriate actions taken to reduce the potential for further complaint.
13.19	The Dust Management Plan (as per Table 13-4 , Section 13.6.3 , Chapter 13) will be implemented by the contractors at all times and special importance will be placed on these actions on high wind days.

Table 17-9: Traffic and Transport Mitigation Measures (Chapter 14, Pages 14-20 to 14-22)

No.	Description
14.1	A Traffic Management Plan (TMP) will be agreed between the Contractor and the Clients Representative.
14.2	Minimise construction, maintenance and ancillary vehicle movements to site during peak times such as rush hour.
14.3	Ensure daily construction programs will be planned to minimise the number of disruptions to surrounding roads by staggering HGV movements to avoid site queues.
14.4	Provide wheel and vehicle body washing facilities, use water bowsers, dust suppression or similar apparatus and street sweepers in order to keep construction routes free from vehicle deposits and debris.
14.5	Provide appropriate information and signage along the construction routes and on approach roads to the site.
14.6	Mitigation measures may also be proposed following consultation with the local roads authority and public transport operators. It is recommended that the roads authority and public transport operators are consulted in order to address any concerns they may have regarding accidents and road safety along the proposed route.

Table 17-10: Material Assets Mitigation Measures (Chapter 15, Pages 15-11 to 15-12)

No.	Description
15.1	Information and signage will be provided at the car parks and access points from residential areas adjacent to the Parks to inform residents and Park users of closures or alternative access routes during the works at Tymon Park and Ravensdale Park.
15.2	All utilities and services will be recorded and incorporated to the detailed design for the Scheme, and the contractors will be informed of the locations of all services. Diversions will be undertaken under the supervision of the relevant utility provider. Advance notice will be given to local residents and businesses of any disruptions to services.
15.3	A CEMP and a project specific Waste Management Plan will be implemented for the project.