OUTLINE SURFACE WATER MANAGEMENT PLAN

FOR

RIVER POODLE FLOOD ALLEVIATION SCHEME

Technical Report Prepared For

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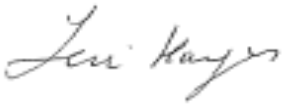
Signature		
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1.0 INTRODUCTION

1.1. Background

A planning application has been submitted to An Bord Pleanála for the proposed River Poddle Flood Alleviation Scheme (ABP Ref. 306725-20). Joint applicants South Dublin County Council and Dublin City Council propose the Scheme to provide flood protection, flood storage and flood prevention measures at locations along a 6km stretch of the Poddle River from Tymon North, Tallaght to St. Teresa's Gardens and Donore Avenue, and at the National Stadium, South Circular Road, Merchant's Quay, Dublin. It combines main flood storage at Tymon Park and additional flood storage at Ravensdale Park, linear defences along the River where they are required to provide flood protection, new flap valves and culvert screens, and sealing manholes to prevent surcharging during a flood event.

An Bord Pleanála issued a request for further information (RFI) in respect of the planning application, dated 17 July 2020. Further information is sought in relation to Scheme Design with a specific request for an Outline Surface Water Management Plan. This document has been prepared to respond to the Board's request as follows:

RFI no. 4. You are requested to provide an outline surface water management plan. This should be of sufficient detail to demonstrate that there are sufficient lands within the works areas to provide for settlement ponds and to assess environmental impacts. The comments in section 9.6.2.2 of the EIAR relating to storage and discharge of wastewater should be clarified in this respect.

It is important to clarify that the project does not consider settlement ponds in its development. The control of sediments will be carried out by a proprietary settlement tanks/ systems.

1.2. Purpose of this document

AWN Consulting were commissioned by Nicholas O'Dwyer to produce the Outline Surface Water Management Plan (SWMP) for the planned construction works for the proposed River Poddle Flood Alleviation Scheme.

The purpose of the plan is to set out clear guidelines on the management of surface water during construction works to prevent impact on receiving drainage and waterbodies.

This report was prepared by Marcelo Allende (BEng), and Teri Hayes (BSc MSc PGeol EurGeol). Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. He is a member of the International Association of Hydrogeologists (Irish Group). Teri is an environmental consultant specialising in water management with over 25 years of experience in water resource management and impact assessment. She has a Masters in Hydrogeology and is a former President of the Irish Group of the Association of Hydrogeologists (IAH) and has provided advisory services on water related environmental and planning issues to both public and private sector bodies. She is qualified as a competent person as recognised by the EPA in relation to contaminated land assessment (IGI Register of competent persons www.igi.ie). Her specialist area of expertise is water resource management eco-hydrogeology, hydrological and hydrogeological assessment and environmental impact assessment.

2.0 OBJECTIVE OF THE OUTLINE SURFACE WATER MANAGEMENT PLAN (SWMP)

The following Outline Surface Water Management Plan (SWMP) provides the water management measures to be implemented by the contractor to ensure that work is carried out with minimal impact on the water environment.

This report describes briefly the existing hydrological and hydrogeological setting of the site, and then sets out the proposed measures required for surface water management during the construction phase.

Contamination of the receiving surface water environment during the construction phase has the potential to cause environmental damage mainly through the movement of silt either directly or indirectly into receiving waters. Other possible construction impacts include accidental release of oils and diesel or discharge of alkaline water during cementing works. The main aim of the surface water management plan is to ensure protection of the local receiving water and compliance with current guidance documents. This is to be achieved through the following measures:

- Understanding of the local receiving water environment, pollutant linkage pathways and the legislative requirements;
- Implementation of measures to protect the receiving water environment;
- Set out a monitoring schedule, check list and training programme.

3.0 THE EXISTING ENVIRONMENT

The River Poddle is a highly urbanised catchment. The majority of the flows into the River Poddle is originated from the public stormwater drainage system. 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 c. 16.4km^2. The Poddle is an ungauged catchment so no historic flow data or rating curves are available.

The Poddle is a 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 and Tymon Park;
- Diversion of flows from Balrothery weir (Dodder) to Poddle just upstream of Lakelands weir (now removed);
- 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 the 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 into the River Liffey.

Refer to Figure 3.1 for details in relation with the River Poddle catchment.

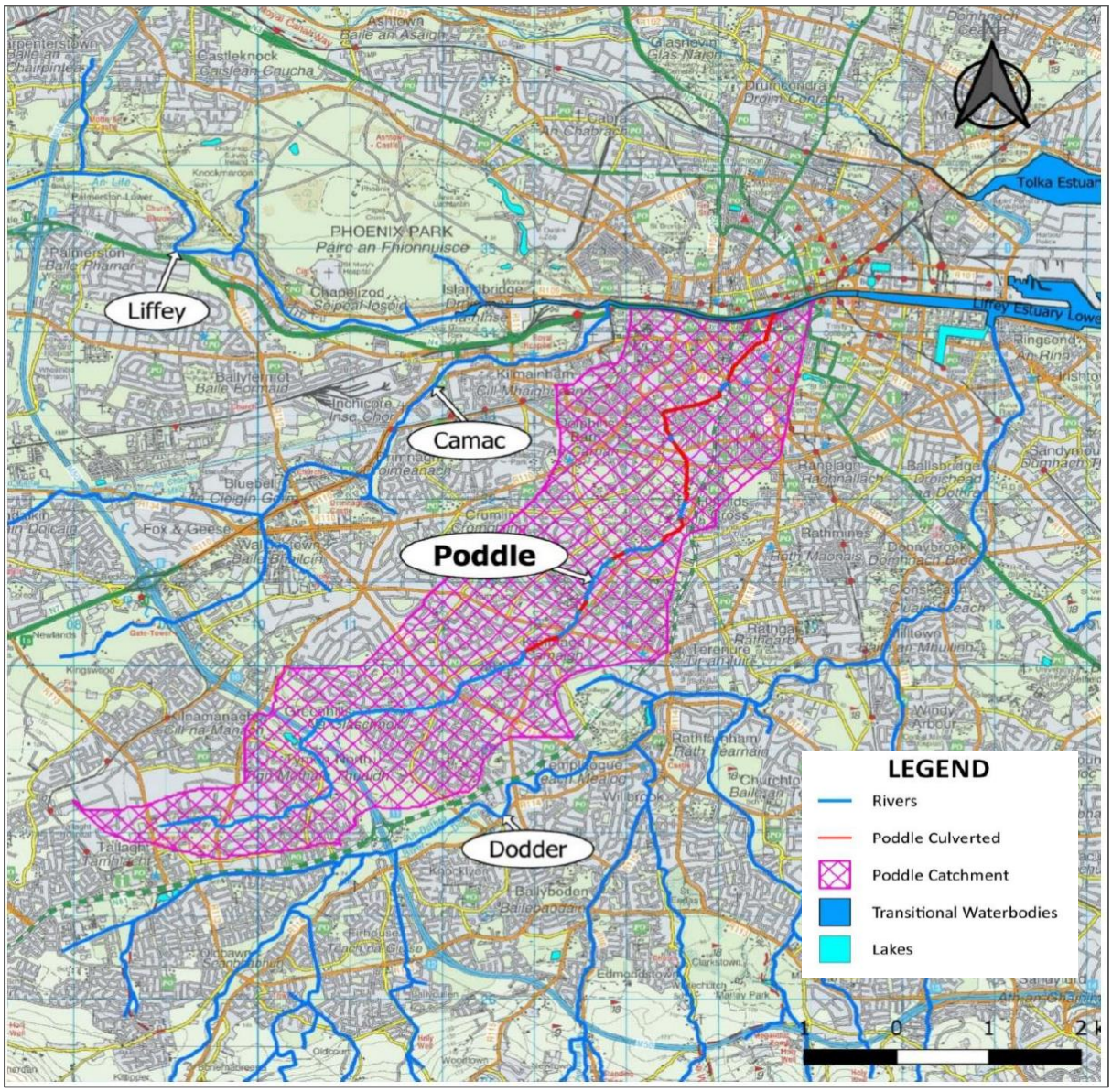

Figure 3.1 River Poddle Catchment Area (*Source: River Poddle Alleviation Scheme EIAR, Nicholas O'Dwyer, 2019*)

The River Poddle Flood Alleviation Scheme considers a series of works along the course from Tymon North to Saint Theresa's Gardens/ National Stadium. The proposed development site is not located within or adjacent to any European sites. According to the Natura Impact Statement carried out by NM Ecology (2020), there would not be a risk of direct impacts on any Natura sites. There would be indirect links with distant Natura sites within a zone of influence of 5km, and downstream along associated watercourses. The relative locations of Natura (European designated) sites are shown in Figure 3.2 below.

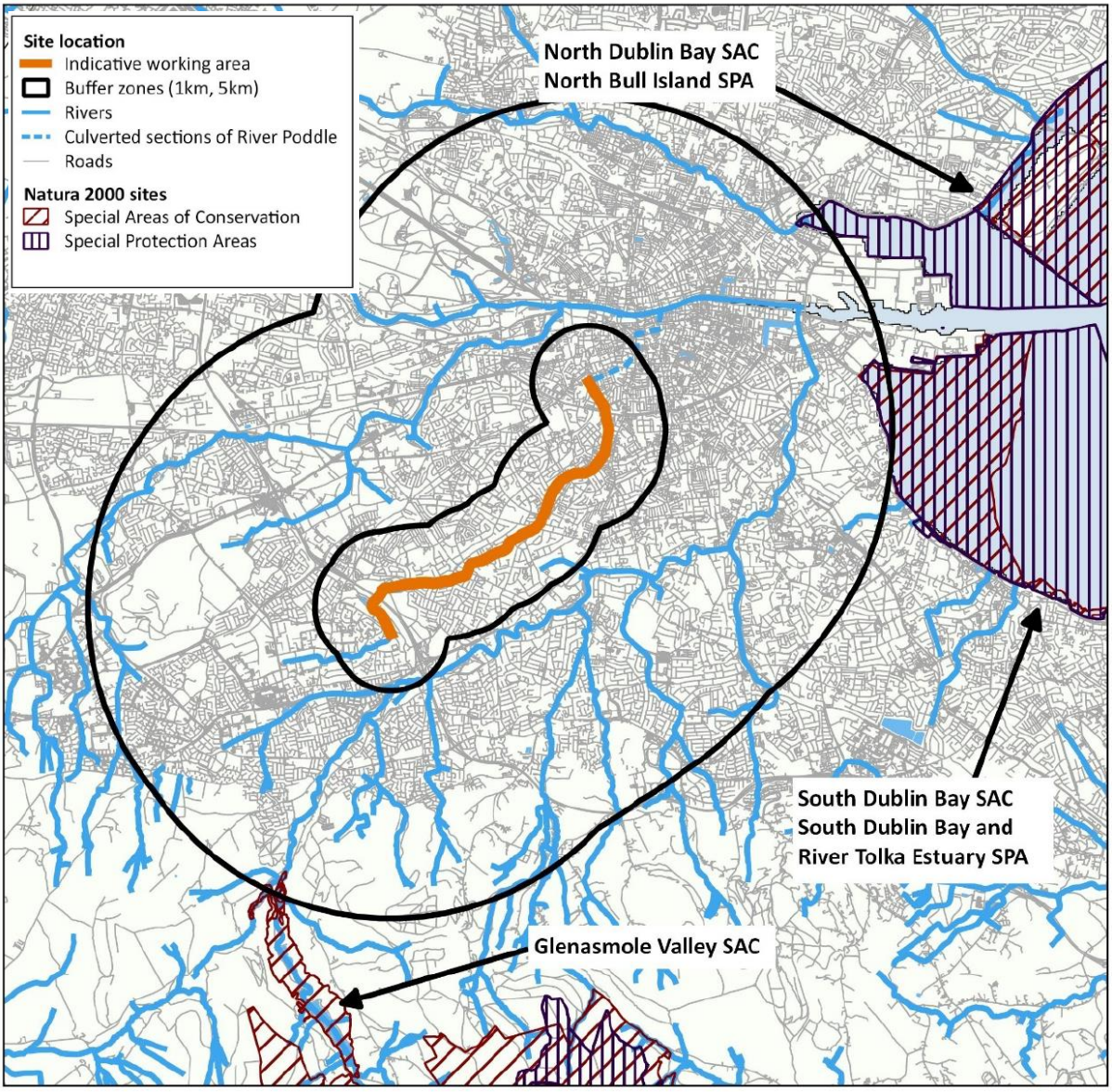

Figure 3.2 *Site location in relation to the European sites closest to the proposed development (source: River Poddle Alleviation Scheme Natura Impact Statement, NM Ecology, 2020)*

The proposed development site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and River Dodder sub-catchment (WFD name: Dodder_SC_010, Id 09_16) (EPA, 2020). The River Poddle outfalls into the Liffey Estuary lower transitional waterbody which in turn discharges into Dublin Bay coastal waterbody which includes Special Area of Conservation (SAC)/proposed Natural Heritage Area (pNHA).

The EPA (2020) on-line mapping presents the available water quality status information for water bodies in Ireland. The River Poddle has an '*Unassigned*' Water Framework Directive (WFD) status (2013-2018) and a WFD risk score of *'At risk of not achieving good status'*. This unassigned status is related to the lack of collected quality data by the EPA since 2007.

According the latest EPA water quality report, the River Poddle was moderately polluted at Kimmage in 2007. 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.

Further water quality sampling was completed by SDCC in May 2020 at 4 locations along the River Poddle during two sampling events. The purpose of this sampling was to get baseline information for the design of the Integrated Constructed Wetland (ICW) and to determine what improvements are achieved as the ICW matures and develops.

Sampling Date: 25/05/2020						
Parameter	Unit	SI 77/2019 Threshold Value (*)	Locations			
			15m D/S Tymon Park Ponds	End of Tymon Park - Limekiln Road	20m D/S Templeville Road Bridge	The Priory - Kimmage Road
Ammonia as N	mg/l	0.065	0.03	0.03	0.05	0.1
COD	mg/l	-	25	19	17	10
Dissolved Oxygen	% sat	80% - 120%	64	101	91	86
Nitrate as N	mg/l	-	<0.10	0.16	0.28	0.39
Nitrite as N	mg/l	-	<0.005	0.009	0.012	0.029
pH	-	6.0-9.0	7.8	8	8	7.9
Phosphorus	mg/l	0.035	0.01	0.02	0.05	0.08
Suspended Solids	mg/l	-	10	<5	<5	<5

Sampling Date: 27/05/2020						
Parameter	Unit	SI 77/2019 Threshold Value (*)	Locations			
			15m D/S Tymon Park Ponds	End of Tymon Park - Limekiln Road	20m D/S Templeville Road Bridge	The Priory - Kimmage Road
Ammonia as N	mg/l	0.065	<0.01	0.01	0.04	0.07
COD	mg/l	-	29	19	17	13
Dissolved Oxygen	% sat	80% - 120%	64	102	91	85
Nitrate as N	mg/l	-	<0.10	0.12	0.21	0.37
Nitrite as N	mg/l	-	<0.005	0.008	0.011	0.027
pH	-	6.0-9.0	7.7	8	8	7.9
Phosphorus	mg/l	0.035	0.01	0.04	0.04	0.12
Suspended Solids	mg/l	-	11	<5	<5	<5

Notes
(*): Threshold value to achieve 'Good' Status for 'mean' conditions defined in S.I. 77/2019
XX *Concentration over threshold value*

Table 3.1 *Surface Water Quality Results obtained in May 2020 (Source: NOD)*

As it can be seen in the table above, some exceedances of the threshold values defined to achieve 'Good' status for 'Mean' hydraulic conditions were observed for Ammonia, Dissolved Oxygen and Phosphorus.

The River Poddle discharges into the Liffey Estuary Lower which has a WFD status (2013-2018) of *'Good'*, and Dublin Bay has a WFD status of *'Good'*. The Liffey Estuary Lower waterbody has a WFD risk score of *'At risk of not achieving good status'* while the Dublin Bay waterbody has a WFD risk score of '*Not at risk'.* The most recent surface water quality data for the Liffey Estuary Lower and Dublin Bay (2019-2020) indicate that they are *'Unpolluted'*. Under the 2015 'Trophic Status Assessment Scheme' classification of the EPA, *'Unpolluted'* means there have been no breaches of the EPA's threshold values for nutrient enrichment, accelerated plant growth, or disturbance of the level of dissolved oxygen normally present.

Mapping from the Geological Society of Ireland (GSI, 2020) indicates the bedrock underlying the site is part of the Lucan Formation (code CDLUCN) and made up of dark limestone and shale (Calp). The lithological description comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. The beds are predominantly fine-grained

distal turbidites in the north Dublin Basin. The formation is intermittently exposed on the coast between Rush and Drumanagh Head. The formation ranges from 300m to 800m in thickness.

Presently, from the GSI (2020) National Bedrock Aquifer Map, the bedrock aquifer beneath the subject site as a *'Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones'*. The proposed development along the River Poddle is within the 'Dublin' groundwater body and is classified as *'Poorly productive bedrock'*. The most recent WFD groundwater status for this water body (2013-2018) is *'Good'* with a current WFD risk score of *'Not at risk'*.

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. According with the GSI (2020) guidance, along the River Poddle the bedrock aquifer has primarily a *'Low'* to '*Moderate'* vulnerability which indicates a general overburden depth potential of >5m. However, the Kimmage area presents a *'High'* to *'Extreme'* vulnerability which suggests an overburden depth <5m in this zone. The aquifer vulnerability class in the region of the site is presented as Insert 3.3 below.

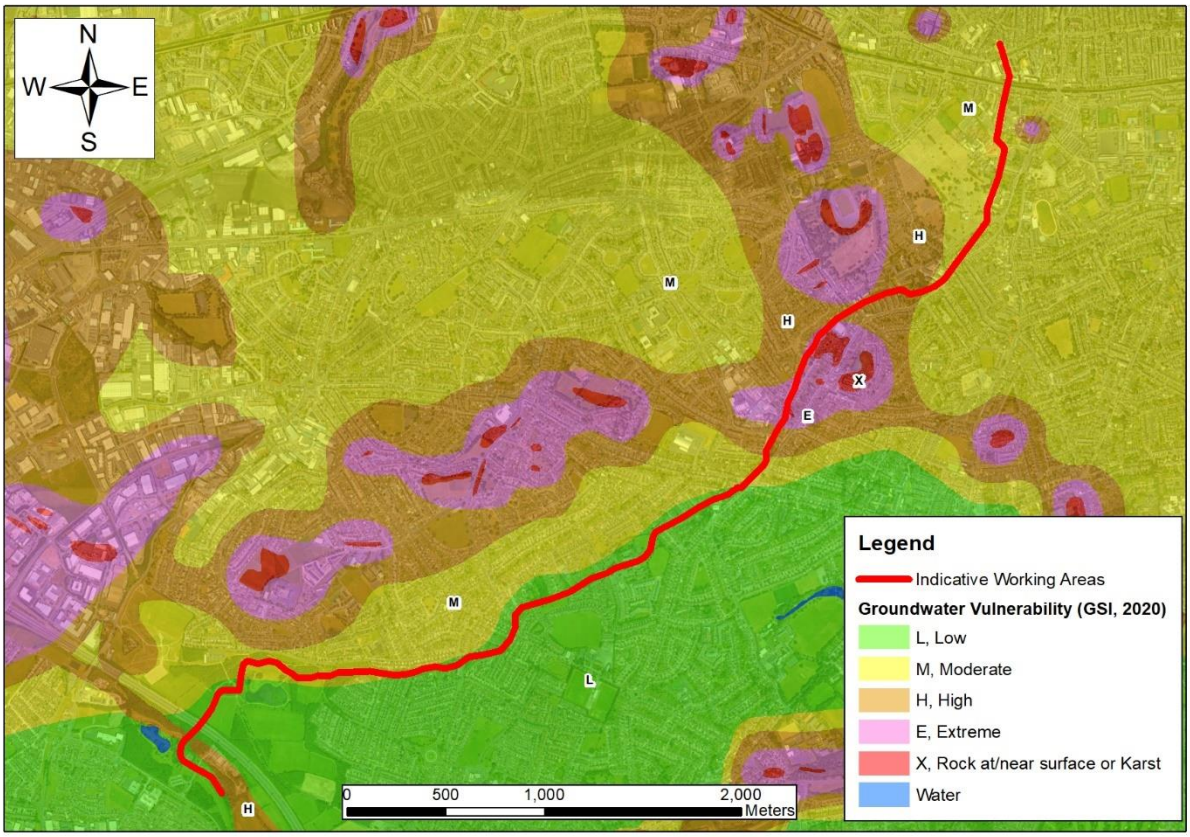

Figure 3.2 *Aquifer Vulnerability (Source: GSI, 2020)*

As described in the River Poddle Alleviation Scheme EIAR, there have been a number of historic events which caused flooding on the River Poddle, as follows:

- 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;

- 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 48-hour 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.

A CFRAM study developed in 2014, estimated the river flood extents associated with 10%, 1% and 0.1% AEP (1 in 10 year, 1 in 100 year and 1 in 1,000 year events, respectively).

4.0 CHARACTERISTICS OF THE DEVELOPMENT

The proposed River Poddle Flood Alleviation Scheme is designed for the 1% Annual Exceedance Probability (AEP) flood event (also known as the “100-year flood”) with 60% blockage in the major culverts and 40% blockage in all other culverts, with an allowance for freeboard in accordance with the OPW guidance. The scheme combines flood defences along the river channel with main flood storage in Tymon Park and additional flood storage at Whitehall Park and Ravensdale Park. The proposed works are described generally as follows:

- Raised earthen flood embankments along the upper reach of the River in Tymon North (west of the M50) and Tymon Park (east of the M50) 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 flow control structure at Tymon Lake will control flows downstream in a flood event.

- An integrated constructed wetland 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 and Perrystown; 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.

- Rehabilitating or replacing manholes in the public roads in the junction of Ravensdale Park and Poddle Park, Kimmage; and in the vicinity of Saint

Teresa's Gardens and Donore Road, and at the rear of the National Stadium, South Circular Road in Merchant's Quay.

- 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 in Tymon Park, Tallaght; and landscape mitigation and restoration at Tymon Park, Tallaght; Whitehall Park, Templeogue, and Ravensdale Park and St. Martin's Drive, Kimmage including public realm improvements, 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 in Tymon Park (west and east of the M50), Tallaght; and channel diversions at Tymon Park, Tallaght and Whitehall Park, Templeogue to enable the works along the River channel to be carried out.

The proposed working areas are presented in the Figure 4.1 below.

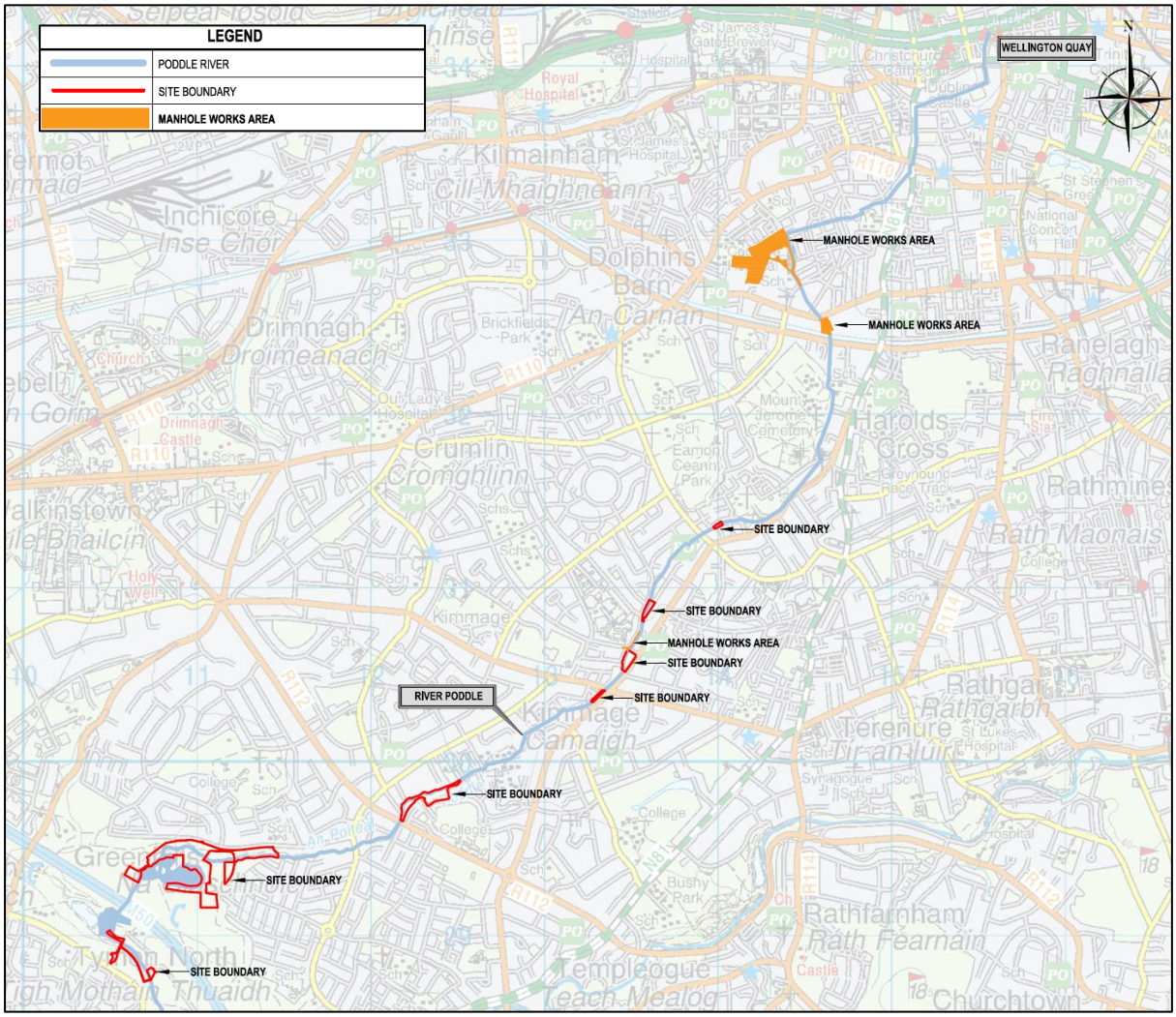

Figure 4.1 *Site Works Areas (Source: River Poddle Alleviation Scheme. Planning Drawings, Nicholas O'Dwyer February 2020)*

At the detailed design stage, a series of maps will be prepared for each work area to show locations of the works boundaries, construction activities, sensitive receptor controls and environmental protection and control measures. These maps will be based on the submitted Planning Documents (Planning Drawings, associated documents, etc).

The maps will be updated as necessary during the Construction of the Project and refined further by the Contractor to reflect any changes to construction activities, protection and control measures, and the results of monitoring.

These maps will be used by the Contractor as a tool for inductions, tool-box sessions and training and for general display in site offices.

5.0 OUTLINE OF THE SWMP AND LEGISLATIVE REQUIREMENTS

This document aims to set out the proposed procedures and operations to be utilised on the proposed construction site to protect water quality. The mitigation and control

measures set out in the Surface Water Management Plan (SWMP) will be employed on site during the construction phase.

The main areas of water related concerns covered by this document are:

- Pre-Construction and Construction Phase drainage control;
- Earthworks (i.e. infrastructure & drainage) and surface water quality protection;
- Temporary stockpiles water management and controls;
- Settlement tanks/ systems
- Stream / watercourse and drain crossings / upgrades;
- Fuel usage, storage and management;
- Working at or near existing streams / watercourses; and,
- Wastewater and on-site sanitation.

It is important to clarify that the project does not consider settlement ponds in its development.

The SWMP is considered a live document and will be modified over time as detailed contractor methods of work are developed. If the development is permitted an updated version of this document will be issued to all parties involved in the construction process when appropriate changes are deemed necessary.

Relevant Legislation

It is proposed that all surface water control measures relating to the proposed development will be constructed using best practice and in conformance with the requirements of the relevant regulatory authorities.

The key legislation which will be adhered to are defined as follows:

- Water Framework Directive (2000/60/EC);
- Local Government (Water Pollution) Act, 1977–1990;
- Water Quality (Dangerous Substances) Regulations, 2000;
- Arterial Drainage Act, 1945;
- S.I. No. 41 of 1999 Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 272 of 2009 and amendments (2015 and 2019) European Communities Environmental Objectives (Surface Waters) Regulations;
- S.I. No. 9 of 2010 and amendment 2016) European Communities Environmental Objectives (Groundwater) Regulations;
- Wildlife Act, 1976 (as amended 2000). National Parks and Wildlife Service;
- Flora Protection Order, 1999. National Parks and Wildlife Service;
- Fisheries (Consolidation) Act, 1959 (as amended 1999). Regional Fisheries Boards;
- EU Birds Directive (79/409/EEC) National Parks and Wildlife Service;
- EU Habitats Directive (92/43/EEC) National Parks and Wildlife Service;
- EU Freshwater Fish Directive (78/659/EEC) Local Authority;
- EU Surface Water Directive (75/440/EEC) EPA;
- European Communities (Water Policy) Regulations, 2003 Environmental Protection Agency and Local Authorities;
- Local Government (Water Pollution) Acts, 1977 and 1990;
- Local Government (Planning and Development) Act 2000.

The key drainage and water quality guidance documentation relevant to this site are defined set out as follows:

- Guidelines on protection of fisheries during construction works in and adjacent to waters Inland Fisheries Ireland (2016);
- Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council;
- Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).
- Construction Industry Research and Information Association (CIRIA):
    - CIRIA Report C502 Environmental Good Practice on Site;
    - CIRIA Report C532 Control of Water Pollution from Construction Sites;
    - CIRIA Report C648 Control of Pollution from Linear Construction Project; Technical Guidance;
    - CIRIA Handbook C650 Environmental good practice on site;
    - CIRIA Handbook C651 Environmental good practice on site checklist;
    - CIRIA Report C609 - SUDS – hydraulic, structural & water quality advice; and,
    - CIRIA Report C697 – The SUDS Manual

As Dublin Bay (the final receptor of the River Poddle waters) is designated an SAC, it comes under the protection of the Habitats Directive 92/43/EEC which is implemented in Irish legislation as S.I. No 233/1998 – European Communities (Birds & Natural Habitats) Regulations 2011.

6.0 MITIGATION MEASURES

The following measures will be implemented to mitigate against the potential impacts during the construction phase as outlined in the River Poddle Flood Alleviation Scheme EIAR chapters 8 and 9 and in the Outline Construction and Environmental Plan (CEMP).

In general, all works on the riverbank will be subject to a specific method statement agreed in advance with the statutory authority. The method statement will be specific to each construction area but 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 or rainfall of more than 3mm/hour is forecast within the next five days in the River Poddle catchment.
- At the riverbank works locations, silt fencing will be installed along the river bank to retain eroded sediments. Catch nets may be used where relevant.
- 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. The flood zone will be delineated on the works areas. As far as reasonably practicable, no soil storing will be allowed within 30 m of the open water where sufficent working areas are available within the site boundaries, which is in line with Inland Fisheris Ireland guidelines.
- Raw or uncured waste concrete is not to be disposed of within 30m of the river. No washing out of concrete tankers will be allowed on any of the construction areas.

- 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. All staff to be trained in management of chemicals and spill response.
- As far as reasonably practicable, fuelling and lubrication of equipment is not to be carried out within 100 m to the open water where sufficent working areas are available within the site boundaries. Fueling should only be undertaken in designated areas with spill control measures in place. All fuel storage should be wihin containers with 110 % containment and located on hardstand. This measures are in line with the Inland Fisheris Ireland guidelines.
- Weedkillers not be used within 100m of the open water.
- Any spillage of fuels, lubricants of hydraulic oils is to be immediately contained and the contaminated soil removed from the site and properly disposed off.
- Waste oils and hydraulic fluids is to be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- The washing of any plant equipment will be carried out in designated areas to prevent potentially polluting material from contaminating aquifers and soils/subsoils.
- Excavations will be backfilled as soon as possible to prevent any infiltration of potentially polluting compounds to the subsurface and the aquifer.
- 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.

For in-river works additional mitigation measures are required. Specific method statements are required for approval by the relevant regulator as the measures required will depend on the construction method proposed and the nature of the open water conditions.

- Measures to minimise the suspension and mobilisation of sediment downstream of the working area will consider silt barriers and cofferdamming to create dry working areas.
- Where feasible, works will 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 will be created for pouring of concrete.
- A Siltbuster concrete washwater will be used where there is insufficient space on site to achieve the required clearance distances between the works and river channel.
- In areas of the river where there are alien species, all plant and machinery will be thoroughly washed before moving to another section of the River.
- All vehicles will be regularly checked for oil leaks, and ruptured hose pipes.

All in-stream works will comply with current best practice, notably 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).

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 on water quality, these mitigation measures will also protect the aquatic species in the river.

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;
- 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 the main contractor will hold 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 shall be documented in an Environmental Operating Plan for the scheme.

The measures contained in this document and the scheme specific Construction Environmental Management Plan (CEMP) are communicated and set up prior to the work commencing. The Plan will also incorporate waste management, separation, disposal and documentation for wastes generated on-site, and in the contractor's compound. All contractors working on site will 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 and SWMP shall be carried out during the construction programme.

With regard to the Integrated Constructed Wetland (ICW) at Tymon Park, a temporary river water management system will need to be established during the earthworks. To reduce the impact of construction works on the river flow the ICW will first be constructed outside of the river channel and erecting temporary bunds along the existing river route to contain and maintain river flows.

In relation to the works at Whitehall Park, these will include channel re-aligment, floodplains, tie-ins locations, in-channel Large Wood Structures, a wetland/ blackwater feature and a planting regime. Construction will be conducted ‘offline’ from river flows, thereby minimising the risk of pollution to the waterbody downstream. If is necessary, the completed design channel could remain ‘offline’ for sufficient time to allow the channel banks to stabilise through the establishment of native vegetation. Once the vegetation had sufficiently established, the new channel will be connected to the flow, first at the downstream tie-in and then the upstream. This will be conducted in a staged

manner, such that a proportion of the flow is initially diverted into the new channel, allowing for a preliminary assessment of the stability of the design before it becomes fully active.

Prior to construction, a CAT Scan will be undertaken to accurately determine the location of onsite utilities, to ensure that no utilities are impacted by the works.

The construction will consider a degree of 'field fitting' in order to achieve some variation in physical diversity throughout the new channel, in case it is neccesary due to some unexpected issue that arises. It is recommended that a member of the design/ geomorphology team be present on site at regular intervals during the construction period to supervise the works.

In relation to planting, installation of seeded coir pallets is recommended to take place during winter months (ideally January/ February) to allow sufficient time for roots to establish/ take hold before any prolonged dry periods.

The stone baffles and stone weir and are to be installed at the inlet point and outlet points respectively. Weir and stone baffles are to be constructed from material acquired from site where suitable and available, otherwise locally sourced natural stone can be used.

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. Temporary silt fencing is required erected around working areas adjacent to the river to prevent earth-moving equipment or silt laden run-off 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. Topsoil will be stripped from the footprint of the embankment before the construction starts. This will help to key the embankment to its foundation and to reduce settlement. Where the topsoil is stripped and the subsoil removed, a drainage system will be installed to collect run-off water from the excavated/denuded areas. The water will drain to a temporary settlement tank/ system. The overflows for the settlement system will be to land rather than the River or the Lake where feasible or tested to assess suitability for discharge to open water.

Sandbags will be used in denuded areas to attenuate runoff and reduce soil erosion. Stockpiles of soil will be situated a minimum of 30 m from the edge of openwater. Sandbags and or silt fencing will be placed around stockpiles to prevent sediment laden runoff to the river.

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

Wash down areas for vehicles and site equipment will be located away from the riparian zone. Where used, concrete pumps will be emptied and washed out on site to prevent permanent damage from concrete setting within the workings of the pump. A Siltbuster concrete washwater will be used as a pH treatment unit where there is insufficient space on site to achieve the required clearance distances between the works and river channel. The wash water should be directed to the settlement tank/ system.

The pouring of the concrete for any instream works or near openwater e.g. the wing walls of the flow control structure will be undertaken in dry weather and the concrete will be allowed to cure for 48 hours minimum. Wash water from the concrete pumps or surplus concrete left in the truck will not be discharged on site.

Control of Other Pollutants

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.

Best practice methods will be employed at all stages during the construction. Fuel, lubricants, hydraulic oil, repair equipment used on the construction site will be carefully handled to avoid spillage. All tanks, barrels or containers containing hazardous materials (oils, lubricants, sealants etc.) must be stored in a bunded area within the site boundary, the capacity of which will be 110% of the total volume of liquid to be stored. Spill kits will be made available in site compound and in site machinery. In the event that a spillage does occur, adsorbent material will be placed on the material to adsorb it. The contaminated adsorbent will 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 will be contacted immediately. The Emergency Procedures for the site will have a procedure for dealing with large spillages.

All empty diesel/oil/hydraulic oil containers will be drained to a single labelled container. The empty oil containers will be stored in a dedicated labelled totally sealed skip. Waste skips will 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 will 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.

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.

7.0 MONITORING

Scheduled monitoring of environmental performance and compliance with planning consents and legislation and regulations will be required throughout the construction phase of the Project. This will enable the overall effectiveness of the environmental controls to be determined and allows areas of non-compliance to be identified so corrective actions can be taken. Environmental monitoring will take place prior to construction to assess the baseline, during construction to assess the impact of the construction on the environment and after construction to assess the impact of the

completed Project. Environmental monitoring will be required at various stages of construction for each environmental aspect as developed in specific environmental sub-plans and the Project. The overall monitoring schedule, including environmental aspects, frequency and monitoring requirements will be developed by the appointed Contractor and approved by the regulator The monitoring schedule will be a working document and will be amended and updated to reflect works being undertaken and receiving water conditions and management review changes.

The overall monitoring schedule, including environmental aspects, frequency and monitoring requirements will be finalised by the appointed Contractor and approved by the Relevant Authority prior to works commencing on site.

It is recommended that the following inspection and monitoring is undertaken at points upgradient and downgradient of each works area:

- A daily visual inspection should be undertaken and recorded in the inspection checklist provided in Section 8.

- Carry out water sampling with a frequency that will depend on the works being undertaken but typically should be collected weekly. Relevant parameters should include: Suspended Solids, Dissolved Oxygen and pH.

8.0 CHECKLIST

The checklist below should be used to carry out the daily visual inspection recommended above.

Inspection Checklist					
Name of Supervisor:					
Construction Project:Location				Contractor:	
Date of Inspection:			Time Start: Finish:		
Weather Conditions :					
Description of current phase of construction:					
Construction Element	Maintenance Required			Comments on the effectiveness of sediment control measure	
	Yes	No	N/A		
Discharge drain clear?					
Monitoring being undertaken					
Silt pond/ silt fences in good condition					
Integrity of soil heaps					
Gully protection in place					
Mobile Treatment Tanks:					
De-sludging required?					
Other:					
Additional Comments:					
Inspector				Supervisor	
Signed				Signed	
Date				Date	

9.0 REVIEW

The Contractor appointed representative will review the daily inspection forms on a weekly basis to confirm that the checks and subsequent required works are being carried out and additional inspections are included as construction progresses.

Regular meetings will be held on site by key personnel to discuss the results of the daily, weekly and monthly site monitoring.

Should inspections indicate that any environmental protection and controls measures are not functioning as intended, the Contractor will instigate a review of the CEMP or relevant sub-plan, as required. As mentioned previously, specific environmental objectives indicators and targets will be further developed prior to the project construction works commencing.

10.0 TRAINING

Training will include at minimum:

- Induction training including environmental requirements for all operatives and subcontractors;
- More detailed training for staff or subcontractors with specific responsibilities e.g. Waste Rep;
- Toolbox talks, depending on the type of works being undertaken and the environmental impacts that may result from these activities e.g. training on water pollution prevention before works near watercourses. Training to be given will include:
    - Protected species/habitats
    - Environmental incidents
    - Invasive plants
    - Water pollution prevention
    - Waste management
    - Spill control & spill kits
    - Dust and Air Quality
    - Storage and use of petrol diesel and oils

Contact specific information will be displayed on notice boards and briefed to all staff.

11.0 KEY CONTACTS

A list of personnel that will be contacted in the requirement for further information or to be notified of a breakdown in the mitigation measures will be prepared and communicated within the SWMP.