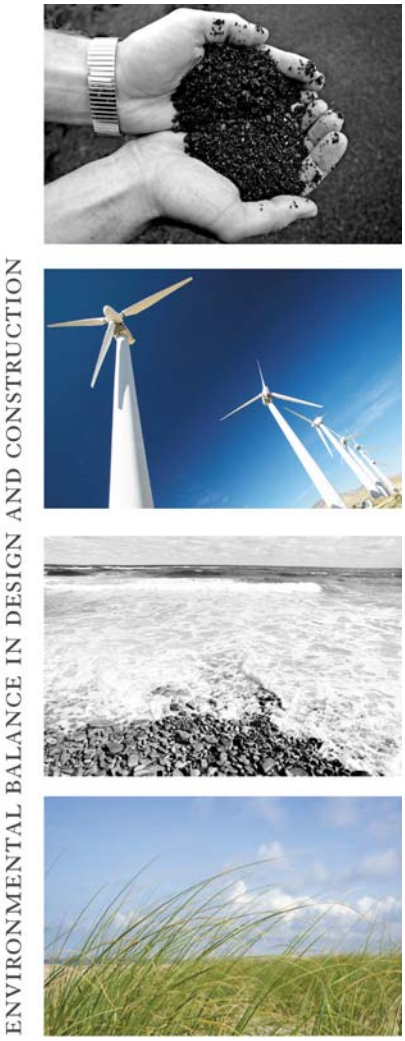

THORNTONS RECYCLING

ENVIRONMENTAL IMPACT STATEMENT FOR PROPOSED DEVELOPMENT AT MILLENNIUM BUSINESS PARK

VOLUME 2 – MAIN EIS

CHAPTER 12 – SURFACEWATER QUALITY AND DRAINAGE

JANUARY 2017

FEHILY TIMONEY & COMPANY

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12 SURFACEWATER QUALITY & DRAINAGE

12.1 Introduction

This chapter has been prepared to describe the existing hydrological environment of the proposed materials processing & transfer facility and to examine the aspects of the hydrological environment that could be affected by the activities associated with it.

This chapter also appraises the potential impact of the proposed development on the water quality of the local environment. The drainage of the associated development areas, which will include a hardstanding area and a number of buildings, are considered, taking account of mitigation measures to reduce or eliminate any potential impacts.

12.1.1 Study Area

It is proposed to construct a materials processing and transfer facility at Millennium Business Park, in the townlands of Grange and Cappoge, in north County Dublin. The hydrological study area is shown in the figures associated with this section.

12.2 Methodology

The following sources of information were considered in this appraisal:

- The design layout of the proposed development.
- Published literature as described in Section 12.2.1 below.
- A desk-based assessment of the surface water hydrology and surface water quality in the catchments relevant to the proposed development, including an assessment of the watercourses which will be intercepted by the layout of the proposed development and those which will receive surface water run-off from the proposed development.
- A field assessment of the existing hydrological environment, to both verify desk based assessment and record all significant hydrological features.

12.2.1 Relevant Guidance

The following guidelines were considered in the development of this chapter to identify relevant objectives relating to surface water:

- Environmental Protection Agency (EPA) guidance with respect to the preparation of an EIS (EPA 2002 and 2003) and draft revised guidance (2015)

In addition to considering the relevant documents above the methodology for the baseline appraisal has been devised with due consideration of the following guidelines:

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a Framework for Community Action in the Field of Water Policy
- Flood Mapping Website http://www.floodmaps.ie
- OPW preliminary flood risk assessment (PFRA) indicative mapping website www.cfram.ie
- Eastern Catchment Flood Risk Assessment and Management Study (Eastern CFRAMS) and Flood Extent Mapping.

- Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies, March 2005
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses, 2016
- The Planning System and Flood Risk Management - Guidelines for Planning Authorities - Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)
- Environmental Good Practice on Site (C692) - Construction Industry Research and Information Association (UK)
- Best Practice Guide BPGCS005 Oil Storage Guidelines (
- Control of Water Pollution from Linear Construction Sites (C648) - Construction Industry Research and Information Association (UK)
- Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) - Construction Industry Research and Information Association (UK)
- Sustainable Construction Procurement. A Guide to Delivering Environmentally Responsible Projects (C571) - Construction Industry Research and Information Association (UK)
- UK Pollution Prevention Guidelines (PPG):
    - PPG1: Understanding your environmental responsibilities – good environmental practice
    - PPG2: Above ground oil storage tanks
    - PPG3: Pollution Prevention Guidelines
    - PPG4: The disposal of sewage where no mains drainage is available
    - PPG5: Works in, near or liable to affect watercourses
    - PPG6: Working at construction and demolition sites
    - PPG8: Safe storage and disposal of used oil
    - PPG21: Pollution incident response planning
    - PPG22: Incident Response - Dealing with Spills
    - PPG26: Drums and intermediate bulk containers
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes - National Roads Authority, 2005
- TII Publications (Standards) Documentation, June 2016.)
- Eastern River Basin District, River Basin Management Plan 2009-2015
- Water Framework Directive (2000/60/EC)
- Biological River Water Quality Data (Environmental Protection Agency (EPA)
- Forestry and Water Quality Guidelines (Forest Service and Department of Marine and Natural Resources 2000)

The relevant development plan to the proposed processing and transfer facility at Millennium Business Park, in Grange, north County Dublin is Fingal Development Plan 2011 – 2017. The development plan contains a number of specific objectives relating to surface water and water quality. The proposed development comes under the Blanchardstown North jurisdiction. The specific objectives for Blanchardstown include the following:

- ***Objective BLANCHARDSTOWN 9***

  Protect and preserve the flood plain of the Tolka River as an important element in the drainage infrastructure and the green infrastructure of the area.

The relevant objectives for surface water in the Fingal Development Plan 2011 – 2017 are as follows:

- ***Objective SW01***

  Protect and enhance the County's floodplains, wetlands and coastal areas subject to flooding as vital green infrastructure which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future.

- ***Objective SW02***

Allow no new development within floodplains other than development which satisfies the justification test, as outlined in the Planning System and Flood Risk Management Guidelines 2009 for Planning Authorities, within well-established towns.

- ***Objective SW03***

Identify existing surface water drainage systems vulnerable to flooding and develop proposals to alleviate flooding in the areas served by these systems.

- ***Objective SW04***

Require the use of sustainable urban drainage systems (SuDS) to minimise and limit the extent of hard surfacing and paving and require the use of sustainable drainage techniques for new development or for extensions to existing developments.

- ***Objective SW05***

Discourage the use of hard non-porous surfacing and pavements within the boundaries of rural housing sites.

- ***Objective SW06***

Implement the Planning System and Flood Risk Management-Guidelines for Planning Authorities (DoEHLG/OPW 2009).

- ***Objective SW07***

Implement the recommendations of the Fingal East Meath Flood Risk Assessment and Management Study (FEMFRAMS) when completed.

- ***Objective SW09***

Require the provision of regional stormwater control facilities for all Local Area Plan lands and Strategic Development Zones with a view to also incorporating these control facilities in currently developed catchments prone to flooding.

- ***Objective SW11***

Ensure that where flood protection or alleviation works takes place that the natural and cultural heritage and rivers, streams and watercourses are protected and enhanced to the greatest extent possible.

- ***Objective SW13***

Provide for the schemes listed in Table SW01.

The surface water schemes listed in Table SW01 of the Fingal Development Plan 2011 – 2017 are as follows:

1. Replacement of Mulhuddart Bridge as part of the Tolka Flood Relief Scheme

2. Implementation of Fingal East Meath Flood Risk Assessment and Management Study (FEM-FRAMS)

3. Implementation of Liffey CFRAMS

4. Coastal Flood Protection Scheme

5. Flood Warning System

6. Donabate Surface Water System

7. Garristown Surface Water System

The only scheme relevant to the above site is the 'Flood Warning System' and this is discussed further in Section 12.3.3.

The objectives for water quality are as follows:

- ***Objective WQ01***

Maintain, improve and enhance the environmental and ecological quality of our surface waters and groundwaters by implementing the Programme of Measures contained in the Eastern River Basin District (ERBD) River Basin Management Plan 2009-2015.

- ***Objective WQ02***

Protect and develop, in a sustainable manner, the existing groundwater sources and aquifers in the County and control development in a manner consistent with the proper management of these resources in conformity with the ERBD River Basin Management Plan 2009-2015 and the Groundwater Protection Scheme.

- ***Objective WQ03***

Implement the recommendations of the Groundwater Protection Scheme.

- ***Objective WQ04***

Protect existing riverine wetland and coastal habitats and where possible create new habitats to maintain naturally functioning ecosystems whilst ensuring they do not impact negatively on the conservation objectives of any Natura 2000 sites.

- ***Objective WQ05***

Establish riparian corridors free from new development along all significant watercourses in the County. Ensure a 10 to 15-metre-wide riparian buffer strip measured from top of bank either side of all watercourses, except in respect of the Liffey, Tolka, Pinkeen, Mayne, Sluice, Ward, Broadmeadow, Corduff, Matt and Delvin where a 30m wide riparian buffer strip from top of bank to either side of all watercourses outside urban centres is required.

- ***Objective WQ06***

Minimise the impact on surface water of discharges from septic tanks, proprietary effluent treatment systems and percolation areas by ensuring that they are located and constructed in accordance with the recommendations and guidelines of the EPA and Fingal County Council.

12.2.2 Consultation

The scope for this appraisal has been informed by pre-application consultation with a range of consultees, as summarised in Chapter 5 of this EIS.

The comments expressed by Irish Water in written scoping responses as part of the EIA process, as outlined in Chapter 5, were considered in the preparation of this chapter. Irish Water requested that the following were considered as part of this assessment:

- Consideration of development impact on the capacity and/or upgrade requirement of an existing supply
- Consideration of surface water discharges to sewers
- Any physical impacts on Irish Water assets
- Consideration of assimilative capacity of receiving waters
- Impact on contribution catchments of water sources
- Mitigation measures relating to any of the above

12.2.3 Desk Study

The desk study involved an examination of the hydrological aspects of the following sources of information:

- Current and historic Ordnance Survey Ireland mapping, and ortho-photography.
- OPW Indicative Flood Maps.
- Catchment Flood Risk Assessment and Management (CFRAM) studies Maps.
- Study of existing surface water/drainage features in the vicinity.
- Study of the proposed layout.
- Liaison with geotechnical specialists for details on soil conditions on the site.
- Review of designated areas within 10km of the proposed development.
- Study of planning documents for adjacent developments.
- History of flooding and status of drainage in the vicinity of the proposed development.
- Review of consultation with interested bodies and relevant Local Authorities.
- Study of development plans.

12.2.4 Field Assessment

A site walkover survey took place on the 22nd June 2016 to establish the pattern of existing drainage on the site for the proposed facility and to record any significant hydrological features. The site walkover involved an initial review of available information gathered in the desk study phase followed by a site visit which was undertaken by 2 no. FT staff.

12.2.5 Evaluation Criteria

During each phase of the proposed development for the materials processing and transfer facility (construction, operation and maintenance), a number of activities will take place on site, some of which will have the potential to cause impacts on the hydrological regime and the quality of waters draining from the site for the proposed facility.

12.3 Existing Environment

12.3.1 Site in Context

The proposed site entrance is located on the Cappagh Road, approximately 2km due east of the M50/N2 junction. The site occupies land within the Millennium Business Park t as well as the footprint of an adjacent site with 2 no. disused buildings thereon. There are some trees on the site and some tree felling will be required as part of the construction of the proposed development. There is an existing entrance from the Cappagh Road. The site location is shown in Figure 1.1.

While the existing site is not directly serviced with water supply, there are existing water supply connections along the eastern boundary of the site that will supply the site via the water main for the Millennium Business Park.

12.3.2 General Description of the Catchments

The proposed development lies within Hydrometric Area HA 09 known as the Liffey and Dublin Bay, which is under the responsibility of the Eastern River Basin District (ERBD). The site drains into the following waterbody catchment within the Tolka River Catchment:

- EA_Tolka167_Tolka1_Lower (IE_EA_09_1868)

The land proposed for the development site drains to the Bachelors Stream tributary of the e Tolka River, however there are no watercourses running through the site. Bachelors Stream runs parallel to the N2 roadway, as far as Glasnevin where it joins the Tolka River. The waterbody catchments in the vicinity of the development site are presented in Figure 12-1. The nearest environmentally protected area South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) is greater than 10 km by hydrological links from the site. The environmentally protected areas are discussed further in Chapter 10 Flora and Fauna.

12.3.3 Existing Flooding in the Area

The national flood hazard mapping website, www.floodmaps.ie , does not indicate any lands identified by the OPW as 'benefitting lands'[1]. in the vicinity of the site. The location of historic flood events which were recorded by the OPW in the vicinity of the site for the proposed development are shown in Figure 12-2. There are no recorded flood events within 2.5 km, with hydrological links to the site.

Provisional Flood Risk Assessment (PFRA) mapping prepared by the OPW, which can be seen at www.cfram.ie shows that there are no areas of the site which are subject to fluvial flooding as there are no watercourses in close proximity to the site location. The site drains via overland flow, culverts and road drainage systems to Bachelors Stream. Fluvial flooding is identified in PFRA mapping in the vicinity of Finglas, approximately 2.8 km downstream of the proposed development. It is intended that the proposed development will incorporate measures to ensure that there is no increase in runoff from the site which may result in any increase in flooding downstream.

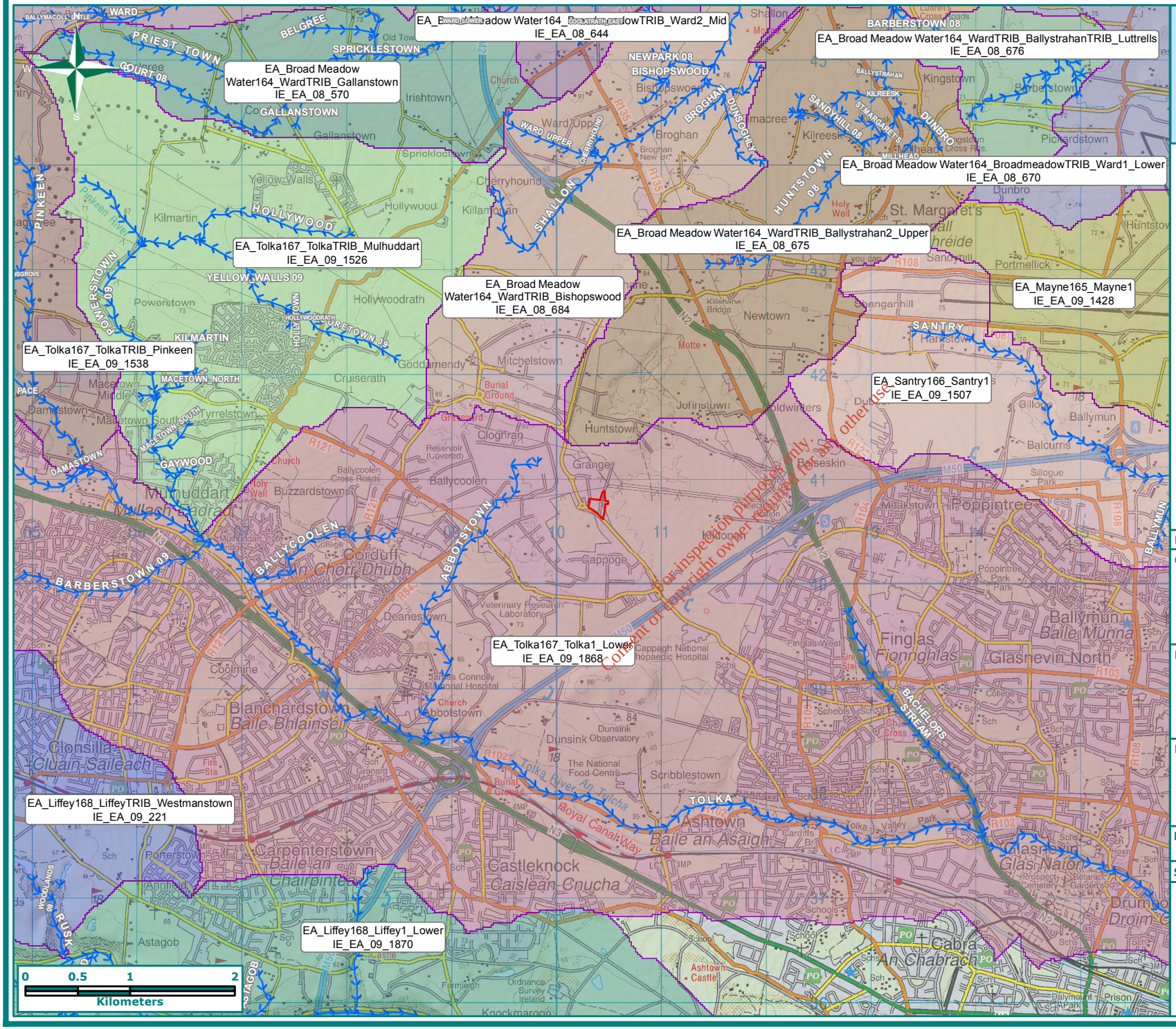
Areas that could be subject to pluvial flooding are also shown on the PFRA mapping. The process for developing the pluvial flood extent maps was based on 'dropping' various depths and intensities of rainfall over a range of durations, and modelling how that rainfall would flow over the land and, in particular, pond in low-lying areas. There are no indications of pluvial flooding within the site boundary on the PFRA mapping.

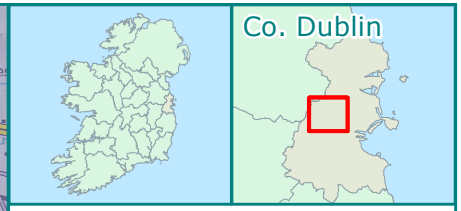
[1] A dataset prepared by the Office of Public Works identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage.

Areas outside the site which are susceptible to pluvial flooding are shown on PFRA mapping to the east of the site at Huntstown Quarry and in low-lying undeveloped land in the vicinity.

A more detailed pluvial study was published in September 2015, Dublin Pluvial Study (FloodResilienCity) and this study predicted that 1 in 100 year return period (Flood Zone A) pluvial flooding would occur on site at depths of up to 0.5 m in places with a possible flow path from the east of the bale storage building carrying minor run-off from overland flow from the hillocks adjacent, as shown in the mapping included in Appendix 21 of Volume 3 of this EIS. A flood risk assessment is included in this chapter in Section 12.5 and the pluvial flooding identified is discussed further in that section. A pluvial flood warning system has been proposed in the Dublin Pluvial Study for the areas affected.

The River Tolka was modelled as part of the Greater Dublin Strategic Drainage Strategic Drainage Study in 2003, however the results of this study are not directly relevant to the proposed development and they are not discussed further. The site for the proposed development is outside of the Fingal East Meath Catchment Flood Risk Assessment and Management study (FEMCFRAMs) study area.





Legend

- Proposed Site Boundary
- River Catchment Boundaries
- Rivers

Date	13/10/2016
Client Name	Thorntons Recycling
Project Title	EIS for Proposed Development at Millennium Park
Figure Title	Waterbody Catchments
Figure No.	12.1
Rev.	A
Scale	1:50,000 @ A4

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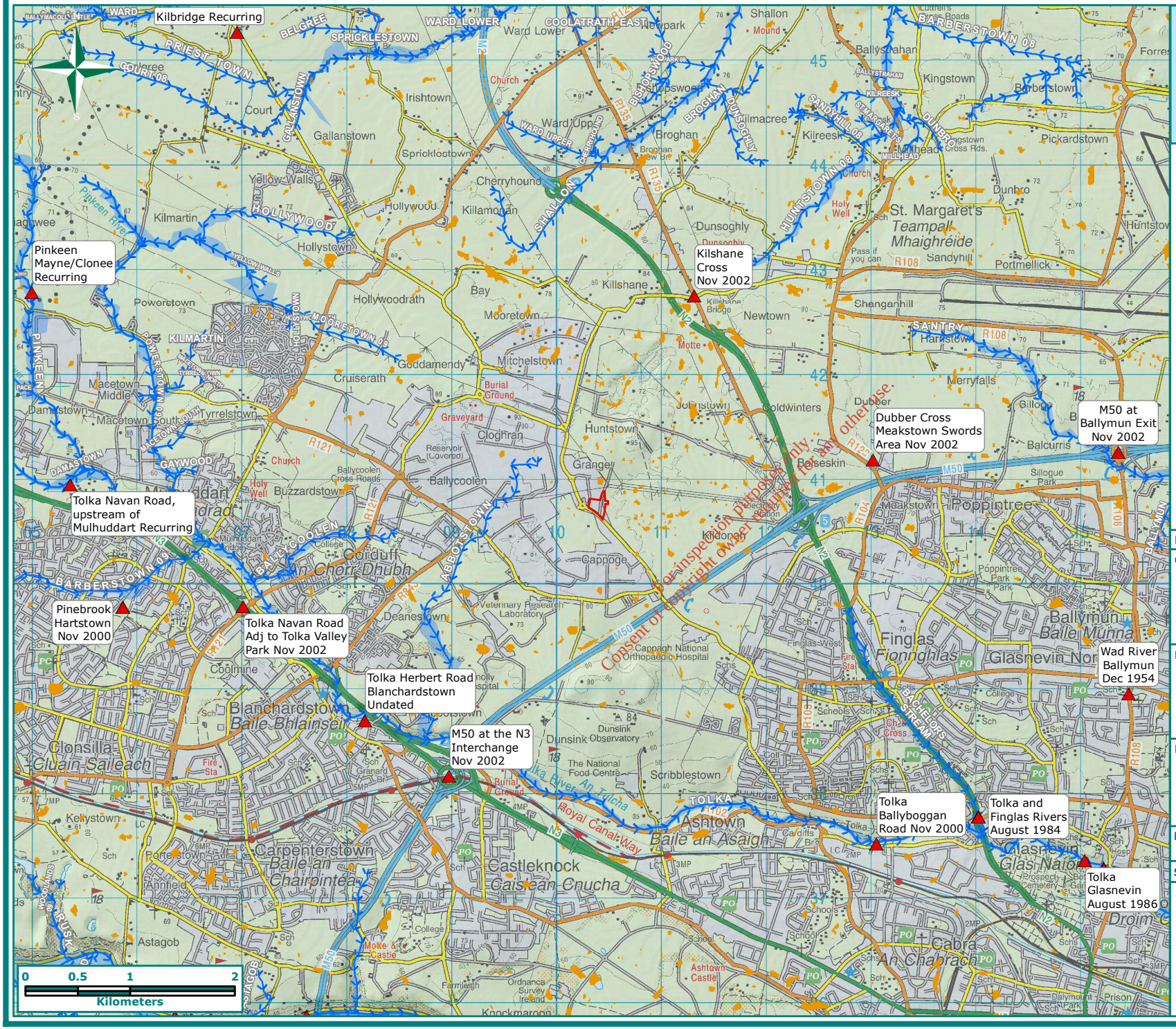

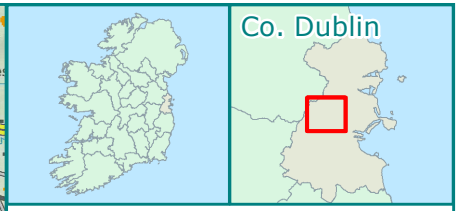

Legend

- Proposed Site Boundary
- OPW Historic Flood Points
- PFRA/CFRAMS: 1% AEP Fluvial Flood Extent
- PFRA/CFRAMS: 1% AEP Pluvial Flood Extent
- PFRA/CFRAMS: 0.5% AEP Coastal Flood Extent
- Rivers

Date	13/10/2016
Client Name	Thorntons Recycling
Project Title	EIS for Proposed Development at Millennium Park
Figure Title	OPW Flood Information
Figure No.	12.2
Rev.	A
Scale	1:50,000 @ A4

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12.3.4 Internal Site Drainage

The site currently falls very gently from south to north with a c. 0.5 - 1m gradient across the site. Incident runoff is likely to percolate through to groundwater and flow towards the eastern site boundary in the direction of the adjacent Huntstown quarry. No drainage system currently exists on site. The eastern portion of the site contains a gravel hardstanding with a similar gradient as the wider site. The remainder of the site is greenfield and is considered to be of high permeability.

12.3.5 Existing Water Quality

An outline of the background behind the Water Framework Directive (WFD) is presented below together with an assessment of the historic and existing water quality of watercourses nearby the proposed site.

Water Framework Directive

Background

The WFD (2000/60/EC) was adopted by the (then entitled) European Community in 2000. This Directive was transposed into Irish law from December 2003 by, *inter alia*, the European Communities (Water Policy) Regulations 2003, (S.I. No 722 of 2003) and subsequent amendments.

The WFD established a new, strengthened system for the protection and improvement of water quality and water-dependent ecosystems. It has influenced the management of water resources and has affected conservation, fisheries flood defence, planning and development. It has endeavoured to ensure that all impacts on water resources – physical modification, diffuse and point source pollution, abstraction or otherwise – are controlled.

The overriding purpose of the WFD when adopted was to achieve at least "good status" in all European waters by 2015 and to ensure that no further deterioration occurred in these waters. European waters are classified as groundwaters, rivers, lakes, transitional and costal water. The WFD has been implemented in Ireland by dividing the island of Ireland into eight river basin districts. These districts are natural geographical areas that occur in the landscape. The proposed site is located within the Eastern River Basin District.

A second cycle of river basin management plan development is currently underway to cover the period from 2015 to 2021, which will see the merging of each of the previously created river basin district, including the Eastern district, into one national river basis district.

Water Framework Directive Waterbody Status

The European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009), as amended in 2012 (S.I. No. 327 of 2012) and 2015 (S.I. No. 386 of 2015) give effect to the criteria and standards used for classifying surface waters in accordance with the WFD. There are five categories of surface water status: 'High', 'Good', 'Moderate', 'Poor' and 'Bad'. The categorisation of water quality by the Water Framework Directive is a driver behind the specific water quality objectives of the Fingal County Development Plan 2011 – 2017 as previously identified.

A surface waterbody must achieve both good ecological status and good chemical status before it can be considered to be of good status. The chemical status of a waterbody is assessed based on certain chemical pollutants. The ecological status is assessed based on Biotic Indices or Quality (Q) Values. The EPA Biological Quality Rating System for Rivers (Q Rating System) and its relationship with the WFD Status is shown in Table 12-1.

Table 12-1: EPA Q Rating System and WFD Status

Q-Value	Water Quality	WFD Status
Q5	Pristine	High
Q4-5	Very good	
Q4	Good	Good
Q3-4	Slightly Polluted	Moderate
Q3	Moderately Polluted	Poor
Q2-3	Moderate to Poor	
Q2	Poor	Bad
Q1-2	Poor to bad	
Q1	Bad	

In accordance with the regulations, water classified as 'High' or 'Good' must not be allowed to deteriorate. Water classified as less than good must have been restored to at least good status by 2015. The regulations also state that, for the purpose of classification, a status of less than good is assigned in the case of a waterbody where the environmental objectives for an associated protected area requiring special protection by virtue of obligations arising from specific national legislation for the protection of water, or for the conservation of habitats and species directly dependent on water, are not met.

Water Framework Directive Risk Assessments

A baseline risk assessment was completed of the water bodies within each River Basin District in 2005. This assessment involved using information on water pollution indicators, point and diffuse pollution sources, water abstraction and existing commercial activities. The risk assessment indicated whether the waterbody would meet the criteria for "good status" or would be considered "at risk" of not meeting the standards by 2015. This assessment was presented in a characterisation report submitted to the European Union in March 2005. The assessment provided the baseline information to prepare the River Basin Management Plan and Programme of Measures necessary to comply with the WFD standards. The assessment of many of the indicators was updated in 2008.

Current WFD Status and Risk Assessment

A risk assessment was carried out in 2005 on each waterbody catchment, as defined under the WFD. Some of these assessments were updated in 2008. The results of the assessments are available on the WFD website (www.wfdireland.ie). The river waterbody IE_EA_Tolka (reference IE_EA_09_1868) is currently of 'Bad' status. The waterbody is designated as 'At Risk' due to risks from point sources and diffuse sources. It is an objective to restore the status of this waterbody to 'Good' by 2027.

Specific status elements results relating to the above waterbody are presented in Table 12-2.

Table 12-2: Status element results for the Lower Tolka river waterbody

	Lower Tolka
Macroinvertebrate status	Bad
General physico-chemical status	Moderate
Fish status	Poor
Overall ecological status	Bad

Water Framework Directive Monitoring Data

A water quality monitoring programme was established by the EPA under the WFD to determine the status of the waterbodies, as discussed above. Chemical and biological/ecological quality of surface waters are monitored at numerous locations throughout the country.

The Lower Tolka River is monitored for the WFD. The locations of the monitoring stations on this river are shown in Figure 12-3. Recent biological monitoring results from these stations are discussed below.

Biological Water Quality Data

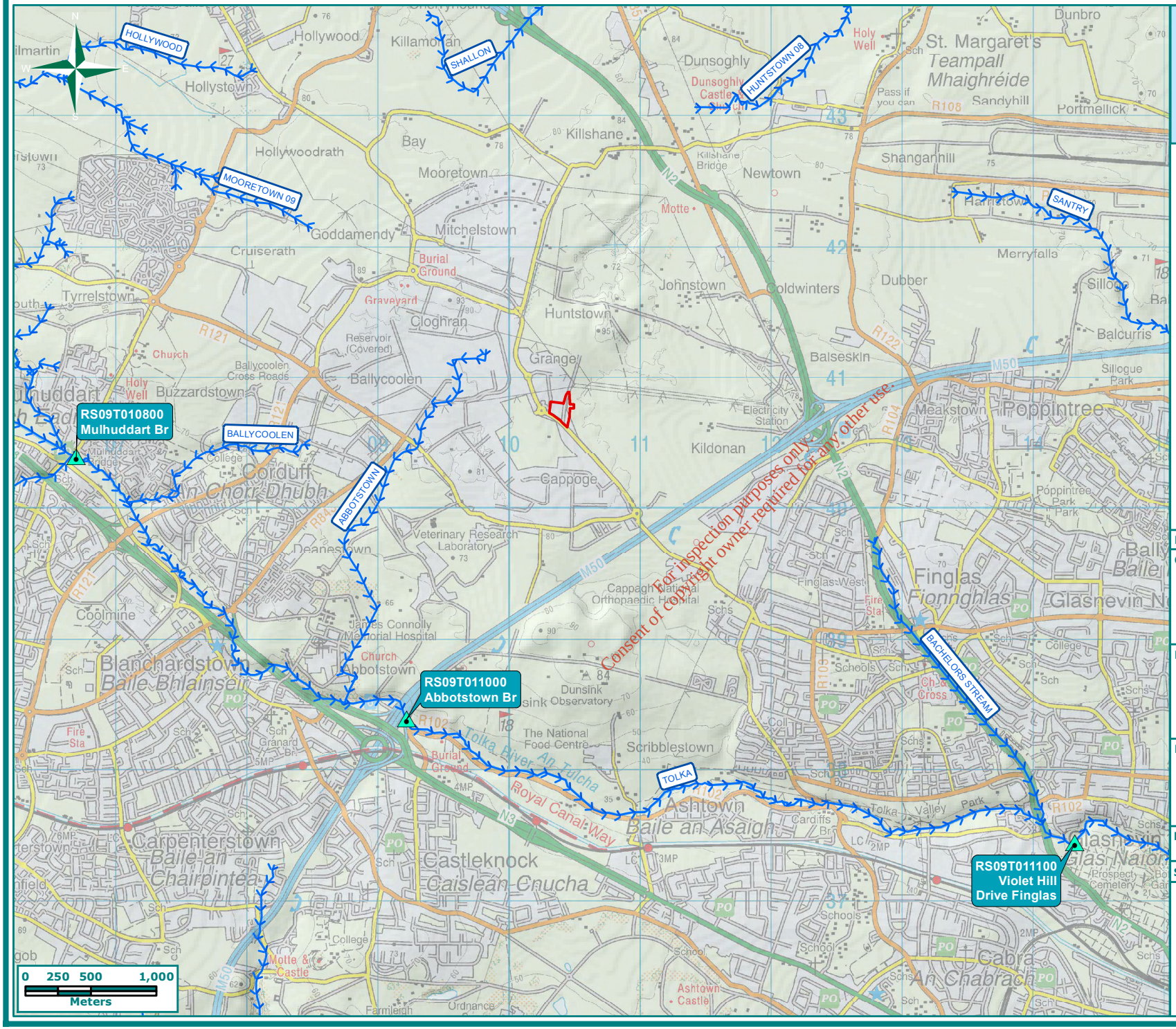
The EPA scheme of Biotic Indices or Quality (Q) Values was developed to determine the status of organic pollution in Irish rivers by assessing the occurrence of macroinvertebrate taxa of varying sensitivity to pollution. The Q values recorded at the three monitoring stations on the Lower Tolka River closest to the site are outlined in Table 12-3.

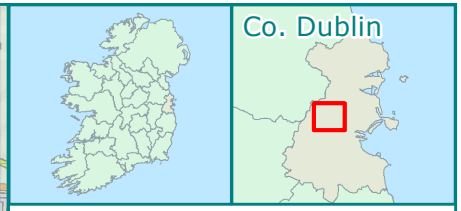
Table 12-3: EPA measured Q-values on the Lower Tolka River

Station ID	Location	Biological Quality Rating, Q rating								
		1996	1998	2002	2005	2007	2008	2010	2013	2015
09T010800	Mulhuddart Br	2-3	3	3	3	2-3	-	2-3	2	2
09T011000	(Abbotstown Br)	3	2-3	2-3	3	2	2-3	-	3	-
09T011100	Violet Hill Drive Finglas	3	2-3	2-3	2/0	3	-	3	3	-

A Q-value rating of 2 represents 'Bad' water quality status under the WFD, while a Q-value rating of 2-3 or 3 represents 'Poor' water quality status under the WFD.

The Lower Tolka River is considered to be mostly of 'Poor' ecological quality. The nearest station to the site, Station ID 09T011000, is the furthest downstream station and is located approximately 2.5 km to the south west of the site. The EPA Q-value at this station was recorded as 3 in 2013.





Legend

- Proposed Site Boundary
- Rivers

EPA Monitoring Stations

- Operational

Date	13/10/2016
Client Name	Thorntons Recycling
Project Title	EIS for Proposed Development at Millennium Park
Figure Title	EPA Water Quality Monitoring Stations
Figure No.	12.3
Rev.	A
Scale	1:40,000 @ A4

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Physico-Chemical Water Quality Data

Physico-chemical water quality results for the Lower Tolka River were obtained from the EPA for analysis. Results of the monitoring carried out in 2014 and 2015 at the three monitoring stations closest to the site are outlined in Table 12-4 and Table 12-5. Presented results are the average of all monitoring events which took place during 2014 and 2015.

The European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988) and the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 (S.I. No. 294 of 1989) are used as standards for surface water quality. These standards are presented in Table 12-4 and Table 12-5 so that a comparison can be made with the surface water quality monitoring results obtained.

Table 12-4: 2014 surface water monitoring results and standards

Parameter	Unit	Mulhuddart Br	Abbotstown Br	Violet Hill Drive Finglas	Surface Water Regulations[1]			Salmonid Regulations[2]
					A1*	A2**	A3***	
Total Alkalinity as CaCO3	mg/l	261	239	210	-	-	-	-
BOD	mg/l	2.1	1.6	1.6	5	5	7	≤5
Ammoniacal Nitrogen as N	mg/l	**0.17**	0.06	0.09	0.16	1.17	3.11	0.77
Conductivity @20C	µS/cm	608	583	593	1000	1000	1000	-
Sulphate	mg/l	50	46	66	200	200	200	-
Chloride	mg/l	34	37	37	250	250	250	-
Ortho-Phosphate as PO4	mg/l	0.08	0.07	0.05	0.5	0.5	0.7	-
TON as N	mg/l	1.32	1.34	1.79	50	50	50	-
pH	pH units	8.1	8.1	8.2	5.5-8.5	5.5-9.0	5.5-9.0	≥6 and ≤9

Notes:
[1] S.I. No. 294/1989: European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989.
[2] S.I. No. 293/1988: European Communities (Quality of Salmonid Waters) Regulations, 1988.
* Category A1: Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.
** Category A2: Normal physical treatment, chemical treatment and disinfection, e.g. prechlorination, coagulation, flocculation.
*** Category A3: Intensive physical and chemical treatment, extended treatment and disinfection, e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, adsorption (activated carbon), disinfection (ozone, final chlorination).

Table 12-5: 2015 surface water monitoring results and standards

Parameter	Unit	Mulhuddart Br	Abbotstown Br	Violet Hill Drive Finglas	Surface Water Regulations[1]			Salmonid Regulations[2]
					A1*	A2**	A3***	
Total Alkalinity as CaCO3	mg/l	278	273	241	-	-	-	-
BOD	mg/l	0.8	0.8	1.1	5	5	7	≤5
Ammoniacal Nitrogen as N	mg/l	0.12	0.05	0.06	0.16	1.17	3.11	0.77
Conductivity @20C	µS/cm	635	664	620	1000	1000	1000	-
Sulphate	mg/l	45	36	60	200	200	200	-
Chloride	mg/l	29	24	35	250	250	250	-
Ortho-Phosphate as PO4	mg/l	0.09	0.07	0.04	0.5	0.5	0.7	-
TON as N	mg/l	1.39	1.59	1.74	50	50	50	-
pH	pH units	8.1	8.1	8.2	5.5-8.5	5.5-9.0	5.5-9.0	≥6 and ≤9

Notes:
[1] S.I. No. 294/1989: European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989.
[2] S.I. No. 293/1988: European Communities (Quality of Salmonid Waters) Regulations, 1988.
* Category A1: Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.
** Category A2: Normal physical treatment, chemical treatment and disinfection, e.g. prechlorination, coagulation, flocculation.
*** Category A3: Intensive physical and chemical treatment, extended treatment and disinfection, e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, adsorption (activated carbon), disinfection (ozone, final chlorination).

It is evident from the results presented in Table 12-4 and Table 12-5 that the surface water quality at the three monitoring stations closest to the site is good. One exceedance of the A1 surface water quality standard value for Ammoniacal Nitrogen (as N) was recorded at the Mulhuddart Bridge monitoring station in 2014. However, this was not a significant exceedance.

Neither surface water regulation nor salmonid regulation standards were exceeded for any of the other surface water parameters which were analysed in 2014 and 2015.

12.4 Potential Impacts

12.4.1 Do Nothing Impact

If the proposed development does not proceed, the site will remain as a mix of greenfield land and a partial permeable gravelled surface for the foreseeable future. The site currently drains to ground and overland off site to the adjacent Huntstown Quarry to the east of the site. It will be shown in Section 12.6 that the proposed drainage for the site will in effect increase the Time of Concentration of surface water flows from the site into the catchment, thus introducing an overall improvement in the risk of flooding contributing to Batchelors Stream, downstream of the site. The surface water flowing off the site is proposed to be treated and attenuated thus avoiding any adverse impacts on hydrology and water quality in the connecting drainage system at Millennium Business Park. A more detailed description of the drainage proposals follows in Section 12.6.

12.4.2 Potential Impacts on Water Quality & Hydrology during the Construction Phase – Direct & Indirect

During the construction phase, the development has the potential to lead to impacts on hydrology and water quality unless appropriate mitigation is applied. The construction phase will comprise of the following activities:

- Construction of a new entrance on the Cappagh Road;
- Some minor tree felling;
- Import of fill material to raise ground to designed levels;
- Excavation for the foundations of buildings;
- Construction of drainage including connection to existing storm and foul sewers;
- Connection of utilities (electricity, water, communications) to the site;
- Construction of facility processing building, bale storage building, administration building, weighbridge with office, car parking, truck parking, hardstanding yard area, electricity substation and all other ancillary works

Construction materials, including concrete, will be delivered to the site and excavated material may be removed from the site during the construction period. The potential direct and indirect impacts relating to surface water runoff and water quality, as a result of these activities are outlined below:

- Wet concrete operations could lead to contamination of surface water;
- Earth and mud carried on the wheels of vehicles leaving the site could be carried onto the public road;
- Tree felling will result in disturbance to the existing ground and a release of silt to surface waters running off the site;
- Suspended solids generated through excavations could potentially lead to siltation of surface water subsequent physical effects on flora and fauna in aquatic habitats downstream of the site;
- Refueling activities could result in fuel spillages which may be conveyed via overland flow, culverts and road drainage systems to Bachelors Stream, downstream of the site or alternatively drain to groundwater, increasing pollutant levels and adversely impacting on water quality;
- There is the potential for fuel spillages/leaks from fuel storage tanks which may be stored on site for plant machinery. Such spillages/leaks would adversely impact water quality as outlined above;
- Inappropriate site management of any temporary stockpiles onsite could lead to loss of suspended solids to surface waters and a subsequent adverse impact on surface water quality;
- The existing drainage infrastructure may become contaminated during construction should there be a break out of silt into the proposed new drainage system at the site which ultimately connects into the existing system at Millennium Park;

- Pluvial flooding could occur during the construction of the proposed development which could cause ponding on the site and excess water in excavations or trenches.

12.4.3 Potential Impacts on Hydrology & Water Quality during the Operational and Maintenance Phase – Direct & Indirect

The primary potential impact from the proposed development is an increase in runoff from the site, which may have a direct, adverse effect on flooding downstream of the site. It is proposed to construct hardstanding areas and buildings over the majority of site, leaving small areas open to landscaping, which will result in an increase in run-off from the site. This increase in the rate of surface water runoff will be attenuated in the proposed attenuation facility, to be installed as part of the surface water drainage system.

The magnitude of the impact does not take into account the proposed mitigation measures.

The following additional potential impacts are identified for the operational phase of the proposed development:

- An uncontrolled release of leachate run-off from the waste material stored within the waste processing building may enter a surfacewater drain causing adverse effects to the water quality
- Solid waste material may be washed into the foul water drainage system causing a blockage in existing drainage
- There is a risk of a fuel or oil spillage from the plant or HGVs to the surfacewater drainage network of the site, which could adversely affect the surfacewater quality
- A blockage in the surfacewater drainage system may generate a risk of surface water flooding at the site

12.4.4 Cumulative Potential Impacts on Hydrology & Water Quality

The location of existing developments in the vicinity of the proposed development was examined for potential cumulative impacts on hydrology and water quality. The existing developments examined were, the existing waste management facilities and quarrying operations in the immediate vicinity of the proposed development and general industrial and commercial operations within the wider vicinity of the development location. Specific developments include:

- The Kilsaran Concrete batching plant directly bordering the northern boundary of the development site
- The Keegan Quarries concrete batching plant located c.50 m north of the development site boundary
- The Starrus Eco Holdings Ltd. (Greenstar) waste transfer and processing facility (W0183-01) located c. 100m north of the development site boundary
- The Nurendale Ltd. (Panda Recycling) materials recovery facility (W0261-02) located c. 150 m south of the proposed development site
- The Roadstone Huntstown inert soils recovery facility (W0277-01) located c. 650 m north of the site boundary
- The Roadstone Huntstown active quarrying operation located c. 100 east of the site boundary

These neighbouring developments are established businesses, most of which, are licenced facilities with monitoring practices in place. The potential cumulative impact on hydrology and water quality is therefore considered to be negligible.

It is not expected that adjacent developments will have any significant potential cumulative hydrological impact with the proposed development for a materials processing and transfer facility at Millennium Business Park, in particular given the proposed drainage design which will treat and limit surface water flows from the proposed development, as discussed further in Section 12.6.

12.5 Flood Risk Identification and Assessment

As discussed in Section 12.3.3, a more detailed pluvial study was published in September 2015, Dublin Pluvial Study (FloodResilienCity) and this study predicted that 1 in 100 year return period (Flood Zone A) pluvial flooding could occur on site at depths of up to 0.5 m in places, as shown in the mapping included in Appendix 21 of Volume 3 of this EIS.

The proposed development can be classified as 'Less Vulnerable Development' (warehousing, commercial, industrial and waste treatment), as outlined in Table 3.1 of the guidelines produced by the Department of Environment, Heritage and Local Government (DoEHLG) – 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (November 2009). According to Table 3.2 of the same guidelines, a Justification Test is required where this type of development is in a 'Flood Zone A' area. A Justification Test was carried out for this development and it is included in Appendix 22 of Volume 3 of this EIS. The conclusion of the Justification Test is that the development is appropriate in this area so long as the Finished Floor Level (FFL) of any buildings is greater than 0.5 m above existing ground levels within the site, where buildings are coincident with the pluvial flood depths identified in the detailed Dublin Pluvial Study (Proposed FFL for the waste processing building is set at 82.5 mOD which is greater than 0.5 m above existing levels to the north of the building). Car and truck parking areas will avoid the areas with predicted pluvial depths greater than 0.25 m in the identified pluvial Flood Zone A areas. The electricity substation will be located outside the identified pluvial Flood Zone A or Flood Zone B (predicted pluvial flooding with a return period of 1 in 1000 years) areas. All other open areas will be allowed to flood in an extreme pluvial event, with some minor contributions from adjacent overland flow to the east being drained away via the storm sewer system. It should be noted that attenuation is provided in the storm sewer system before the outfall to the existing Millennium Business Park drainage system. Any foul sewers running through such areas will have sealed manhole covers.

As discussed in Chapter 11 Soils, Geology and Hydrogeology, no groundwater was encountered during the 2007 site investigation. Further, published geological reports indicate that groundwater is generally within 10m of the surface across the eastern region of Ireland and has an annual fluctuation of less than 5m. It is unlikely that there will be a risk of flooding from groundwater sources. Raising the ground levels on the site is not expected therefore to have an impact on flooding elsewhere.

A pluvial flood warning system is proposed as part of the Dublin Pluvial Study (FloodResilienCity). The proposed site will be informed of any expected pluvial incidents when this warning system is in place. It is expected however that pluvial flooding will not occur to any significant extent on the site following the construction of the development given that the FFL of the waste processing building will be raised above the predicted pluvial flood level and the storm water sewer system will be in place on the site. The siting of strategic infrastructure has avoided these areas on site. Local ponding may occur during an extreme event for a short period over the hardstanding areas on the site.

12.6 Proposed Drainage of the development

The proposed drainage for the development has been informed by the potential impacts, discussed in Section 12.4 and it has also been informed by the flood risk assessment undertaken in Section 12.5. In addition to draining the development, the drainage design has the capacity to introduce hydrological links from the proposed development to the receiving environment, during the construction and operation of the development. An appropriate drainage design will be the primary mitigation measure for the development which will incorporate a reduction in the rate of surface water run-off from the proposed development. The proposed drainage for the development is shown in Drawing No. LW15-046-02-P-004 in Appendix 23 of Volume 3 of this EIS and it is described below. The mitigation measures that follow in Section 12.7 refer to the drainage design and also include other best practice measures to mitigate any potential impacts from the development. Each county has specific concerns in relation to the control of surface water from new developments and the drainage design has taken account of these concerns. In preparing the preliminary design for the proposed drainage for the development at Millennium Business Park, the objectives of the Fingal Development Plan were considered, as outlined in Section 12.2.1.

The approach for the design of the drainage for the proposed development will utilise Sustainable Drainage Systems (SuDS). This will provide a "total" solution to rainwater management at the site. The SuDS Technique to be used on this site is to allow water to be conveyed more slowly to the connection at the existing drainage system which services Millennium Business Park, via permeable paving which will provide attenuation of surface waters and incorporating rain water harvesting for the roofs of the larger buildings servicing the facility. These SuDS systems are designed to prevent pollution of surface waters, avoid a concentration of flows in the receiving system and to slow down runoff from the site, therefore helping to prevent downstream flooding and improve water quality. This is known as the 'Treatment Train' approach.

Foul and surface water discharge from the site will be via a site drainage system connected to existing sewers in the Millennium Business Park, where existing foul and storm sewers are in place along the access road through the Business park.

12.6.1 Surfacewater Drainage system

A stormwater runoff system will be constructed at the facility in order to manage runoff from the roofs and from the hardstanding areas on the site. This runoff will be passed through a hydrobrake and stored, when necessary, in a proposed sub-surface attenuation facility. This will ensure that runoff is discharged from the site at a flow rate not greater than that of the greenfield runoff rate without surcharging the drainage system on the site. It should be noted that the eastern portion of the site is surfaced with gravel and as such has a partial existing hard surfacing. Surface water runoff will also pass through a Class 1 hydrocarbon retention interceptor before being discharged from the site into the Millennium Business Park drainage system.

Clean stormwater runoff from the roof of the waste processing building will be collected in 2 no. surface mounted rainwater harvesting tanks located along the northern edge of the waste processing building, which will be used to supply hose reels in the handling area of the facility. This harvested rainwater will be used for wash-down activities at the facility. The calculations for the sizing of the storage tanks are provided in Appendix 23 of Volume 3 of this EIS and a combined capacity of up to 30,000 gallons (136 m^3) is provided in these tanks.

The site is assessed as having an impermeable area of 2.039 ha. Calculations for the required volume in the attenuation facility assume that the rainwater harvesting tank is full and overflows into the surface water drainage system, and that all impermeable areas drain into the proposed surface water drainage system. Certain areas of the site are to be landscaped and are assumed to be permeable land, i.e. they do not contribute to the storm water drainage system.

The attenuation facility has been sized to accommodate the 1 in 100-year rainfall event, as there is no scope for allowing overflow of the facility during a 1 in 30-year rainfall event. The hydrobrake has been sized to allow flows to leave the site at greenfield runoff rates as is recommended in the Greater Dublin Strategic Drainage Study (GDSDS). A 10% additional allowance on rainfall has been made to account for climate change. The attenuation facility was sized using MicroDrainage software. The inputs to the design are included with the results from MicroDrainage in Appendix 24 of Volume 3 of this EIS. The attenuation facility requires a storage capacity of 830 m^3.

It is recommended that the attenuation is provided using permeable paving with a dual function of providing drainage over an area of the site and providing a tanked attenuation system for the whole site, as shown in Figure 12.4. This system allows for the complete capture of the water using an impermeable, flexible membrane placed on top of the subgrade level and up the sides of the permeable sub-base to effectively form a storage tank. This system is particularly suitable for contaminated sites, as it prevents pollutants from being washed further down into the subgrade where they may eventually be washed into the groundwater.

In this case it is further recommended that the permeable sub-base is partially replaced by a suitable replacement system such as the Aquacell system by Wavin or equivalent, as shown in Figure 12.5. Table 5 of the Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements, by Interpave, The Precast Concrete Paving and Kerb Association, January 2010, Edition 6, provided the recommended depth of sub-base thickness for a 1 in 100-year storage capacity with an allowance of 20% for Climate Change as 210 mm (For a M5-60 of 16.9 mm and Ratio r of 0.3 Source: MicroDrainage). This assumes that the permeable sub-base has a voids ratio of 30%. A permeable sub-base layer of 210 mm thickness will be used to provide filtration above two layers of the cellular units (with each unit 0.4 m in height). The permeable sub-base layer is assumed to have a voids ratio of 30%. The cellular units have an effective void space of 95%. It is proposed to install the attenuation facility over an area of 1008 m^2 to the west of the site and in front of the administration building. The combined layers over the area provided will give an effective storage volume of 830 m^3. The calculations are provided in Appendix 24 of Volume 3 of this EIS.

The outlet pipe will be constructed through the cellular layer at a suitable location to discharge the water via a hydrobrake system to connect with the existing drainage in the Millennium Business Park. The hydrobrake will restrict flows so that water is temporarily stored within the pavement and discharge slowed. Extensive research summarised in CIRIA C609 has demonstrated that permeable pavements will significantly reduce pollution.

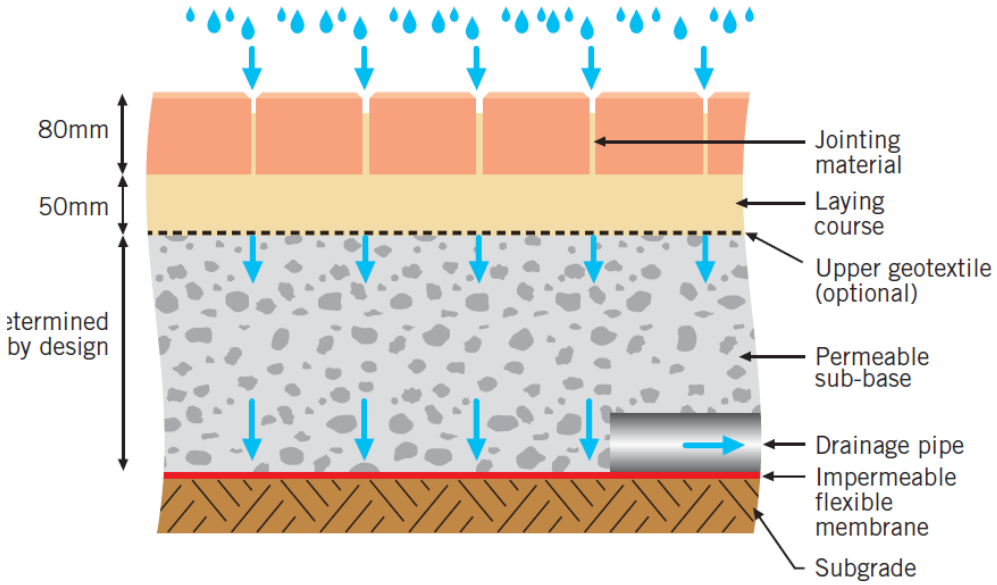

Figure 12-4: Cross-section through permeable paving – tanked system [2]

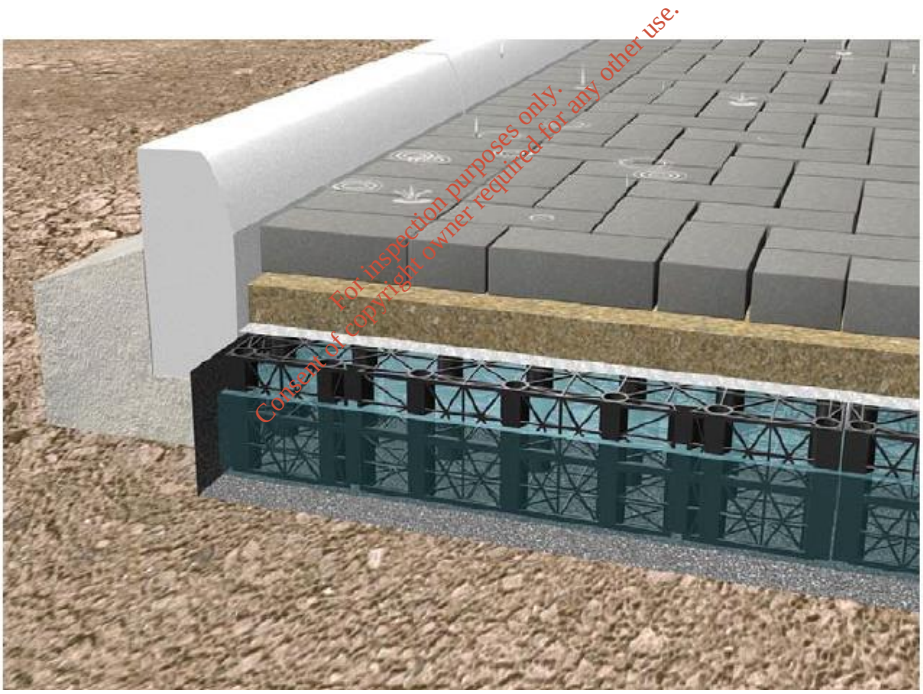

Figure 12-5: Combined Permeable and Cellular Sub-base[3]

[2] Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements, by Interpave, The Precast Concrete Paving and Kerb Association, January 2010, Edition 6

[3] Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements, by Interpave, The Precast Concrete Paving and Kerb Association, January 2010, Edition 6

12.6.2 Foulwater Drainage system

The site foulwater system will collect runoff from the areas where waste is to be processed and stored within the waste processing building and the bale storage building, as well as from sanitary and kitchen facilities within the administration building. Water from wash down activities, as well as any leached effluent from the waste itself and from the vehicles in the waste storage areas will be captured within the foul collection system which will be connected to the Millennium Business Park foul drainage system.

The individual areas of the waste processing building will be washed down at different intervals depending on the level of contamination of the waste being stored or processed within the areas. For the purposes of quantifying foulwater discharge, the maximum foulwater flow resulting from building washdown will occur during a concentrated cleaning event. Assuming a 4-hour cleaning event using a standard industrial power washer, with a flow rate of 1,000l/hour (Karcher High Pressure HD10 or similar), results in 4 cu.m of foulwater discharge. The foul water system is designed taking the assumption that at peak hours there may be two people washing down the buildings resulting in 8 cu.m of foulwater discharge.

In terms of sanitary foulwater flow from the administration building, and assuming a maximum of 12 persons working at the facility, wastewater loading is calculated using the '*EPA Wastewater Treatment Manual, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels'* for an industrial office and/or factory with canteen at:

- Flow - 60 l/day per person
- BOD – 30 g/day per person

This results in 0.72 cu.m per day of sanitary foulwater.

Therefore, the total maximum daily foulwater flow from the site is estimated at 8.72 cu.m. While this represents the maximum flow, it is anticipated that there will typically be a flow of between 2-3 cu.m per day as intermittent washdown occurs and/or leachate drains to the collection network within the waste processing building.

Leachate concentration will vary depending on extent of washdown etc., but an indication of emission limit values likely to be imposed by the EPA industrial emission (IE) licence are presented in the following table, which are the parameters and emission limit values applied at the EPA licenced facility at the Starrus Eco Holdings Ltd. (Greenstar) waste facility (W0183-01) located c. 100m north of the development site boundary, which discharges to the same foulwater collection network as that proposed.

Table 12-6: Indicative Foulwater Emission Limit Values (ELVs) (as per W0183-01)

Parameter	Emission Limit Value		
	Grab Sample (mg/l)	Daily Mean Concentration (mg/l)	Daily Mean Loading (kg/day)
BOD	6,000	5,000	50
COD	12,000	10,000	100
Ammoniacal Nitrogen	100	70	0.7
Suspended solids	2,500	2,000	20
Sulphate as (SO4)	1,000	1,000	10
pH	6-10	6-10	-
Temperature	42 °C	42 °C	-
Detergents	100	100	1.0
Fats, Oils & Greases	100	100	1.0
Phosphates (as P)	100	100	1.0

12.7 Mitigation Measures for Hydrology and Water Quality

During the design process for the proposed development, cognisance was taken of the potential for contamination of surface water on the site. To reduce the potential impacts on surface water, a SuDS drainage system was developed to mitigate any contamination of surface water and any increase in surface water run-off as a result of the proposed increase in hard surfaces for the development. Mitigation was therefore incorporated into the design of the proposed development. The drainage system for the proposed development is described in detail in Section 12.6 and shown on Drawing LW15-046-02-P-004 in Appendix 24. The drainage from the proposed new development will be attenuated to greenfield rates and the discharge will drain into the existing drainage system at Millennium Business Park. The proposed drainage network has been designed to minimise the impact of the proposed development on the drainage network in the area.

12.7.1 Proposed Mitigation Measures during the Construction Phase

- A dry wheel wash will be provided at the construction entrance to mitigate any mud being carried out on the public road by construction traffic;
- Any temporary storage of fill or excavated material will be covered and surrounded by silt fencing to prevent any silt laden surface water running off the site or percolating to ground;
- Tree felling will be undertaken in accordance with forestry guidelines which will limit the disturbance to soils;
- Excavations for the foundations of buildings will be dewatered where necessary to bowsers and transferred to suitably licenced facilities. It is not anticipated that a significant amount of dewatering will be required given that no groundwater was encountered during the 2007 site investigation and published geological reports indicate that groundwater is generally within 10m of the surface;
- The connections to the existing drainage systems (foul and stormwater) will be installed at the commencement of construction on site along with the attenuation facility for the stormwater drainage;
- Excavation of trenches and the installation of pipework for the stormwater drainage system of the proposed development is recommended to progress from the attenuation facility to ensure that an operable drainage system is in place as construction progresses on the site;
- The attenuation facility will be examined following the construction period and the cellular storage may need to be flushed clean prior to commissioning. If flushing is required, it will be pumped to a bowser and taken off site;
- Excavation of trenches will be in short sections to prevent the trenches acting as a conduit for surface water flows;
- The developer will liaise with service providers during construction to avoid any clashes with the installation of facilities that might result in damage to and subsequent leakage of pipework;
- All concrete works on site will be supervised and methods will be employed to ensure that wet concrete operations are contained to avoid any contamination of surface water;
- Refuelling of plant during construction will only be carried out at a designated refuelling area. This designated area will be fully equipped for a spill response and a specially trained and dedicated environmental and emergency spill response team will be appointed before commencement on site. Only emergency breakdown maintenance will be carried out on site. Drip trays and spill kits will be kept available on site, to ensure that any spills from the vehicle are contained and removed off site;
- Any other diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bunded area will have a volume of at least 110 % of the volume of such materials stored;

- Portaloos and/ or containerised toilets and welfare units will be used to provide toilet facilities for site personnel during construction. Sanitary waste will be removed from site via a licenced waste disposal contractor;
- All personnel working on site will be trained in pollution incident control response. Emergency Silt Control and Spillage Response Procedures contained within the Site Drainage Management Plan of the Outline Construction Environmental Management Plan (CEMP) (Appendix 1 of Volume 3 of this EIS) will ensure that appropriate information will be available on site outlining the spillage response procedure and a contingency plan to contain silt.

  Adequate security will be provided to prevent spillage as a result of vandalism. A regular review of weather forecasts of heavy rainfall is required and a contingency plan will be prepared for before and after such events. In particular, if the pluvial flood warning system, proposed as part of the Dublin Pluvial Study (FloodResilienCity) is in place, the developers will be informed of any expected pluvial incidents;
- A suitably qualified person will be appointed by the developer to ensure the effective operation and maintenance of drainage and implementation of other mitigation measures during the construction process.

All of the mitigation measures detailed above will ensure that surface water leaving the site will not be contaminated or silt laden either draining to ground or draining into the existing drainage system in the Millennium Business Park.

12.7.2 Proposed Mitigation Measures for the Operational and Maintenance Phase

The following mitigation measures will be implemented during the operational phase, in addition to the installation of the surfacewater drainage system, in order to minimise potential impacts on hydrology and water quality during the operational phase of the development.

- A Class 1 full retention hydrocarbon interceptor and silt trap will be incorporated into the drainage system to treat surface water runoff prior to discharge to the Millennium Business Park drainage system.
- In order to prevent an increase in runoff from the site during the operational phase of the project, an attenuation structure will be constructed at the site which will ensure that surface water flows to the existing drainage system during extreme events will not increase beyond those of the greenfield runoff rate. Flows will pass through a hydrobrake to limit the flow from the storm drainage system to that of the greenfield runoff rate, as detailed in Section 12.6.
- The attenuation structure will comply with SuDS and will be a combination of permeable paving with an Aquacell or equivalent replacement area under a layer of permeable sub-base material, as described in Section 12.6. This will allow for the treatment of surface water flows and provide a polishing of the surface water before it enters the existing stormwater system at Millennium Business Park.
- All outfalls to the foul drainage system on site will be via trash screens and filters, to ensure that solid waste from the facility does not migrate towards the wider Business Park foulwater drainage system. Detailed design of the foul drainage of the facility will take this into consideration.
- An inspection and maintenance plan will be devised for the on-site drainage system to ensure that all drains continue to operate freely and remain clear of blockages.
- A spillage containment plan will be in place at the site. Spill kits will be available and the operatives will be trained in spillage response procedures. This will ensure that any uncontrolled release of leachate run-off from the waste material stored within the waste processing building will be contained and will be prevented from entering the drainage systems.

A pluvial flood warning system is proposed as part of the Dublin Pluvial Study (FloodResilienCity). The proposed site will be informed of any expected pluvial incidents when this warning system is in place. It is expected however that pluvial flooding will not occur to any significant extent on the site following the construction of the development given that the FFL of the processing building will be raised above the predicted pluvial flood level and the storm water sewer system will be in place on the site. The siting of strategic infrastructure has avoided these areas on site. Local ponding may occur during an extreme event for a short period over the hardstanding areas on the site.

12.8 Monitoring and Maintenance

An inspection and maintenance plan will be devised for the on-site drainage system to ensure that all drains continue to operate freely and remain clear of blockages. This will include:

- High level alarm to be provided on the petrol interceptor to indicate when it needs to be emptied.
- Regular maintenance of the petrol interceptor in accordance with manufacturer's instructions.
- Inspection of the attenuation facility to check for build-up of silt.
- Inspection for any blockages in the manholes, including the Hydrobrake chamber.

Surface and foulwater quality monitoring will be undertaken in accordance with the requirements of the facility EPA licence, for a range of identified parameters and at a stipulated frequency, as identified in Section 2.6 previously. Likely foulwater parameters and indicative ELVs are presented in Table 12-6, with surfacewater parameters to be monitored also likely to include:

- pH
- temperature
- BIOD
- COD
- Suspended solids
- Electrical conductivity
- Ammoniacal nitrogen
- Mineral oils
- Fats, oils, grease

12.9 Residual Impacts

In this section the potential impacts are reassessed following the implementation of the mitigation measures outlined above.

- The potential for pollution from the facility during the construction and operational phases is reduced significantly through the measures outlined in Section 12.6 and Section 12.7 above, to protect surface water flows during the construction phase as well as the measures to avoid contamination of the drainage system in the operational phase;
- The potential for downstream flooding due to the increase in hard surfacing (the eastern portion of the site is currently surfaced with gravel) of the land is reduced by the implementation of rainwater harvesting, permeable paving and the attenuation tank structure.

12.10 Summary & Conclusion

The proposed material transfer facility on the Cappagh Road will have a negligible effect on the surrounding hydrological environment following the implementation of the mitigation measures outlined above. In particular, the proposed attenuation tank and the pollution control and treatment measures will ensure that the drainage of the site will result in an improvement over that of the undeveloped site.

A flood risk assessment was undertaken for the proposed development. Pluvial flooding has been identified on the site in the Dublin Pluvial Study (FloodResilienCity). It is anticipated that pluvial flood warnings will be in place and it is expected that pluvial flooding will not occur on the site to any significant extent following the construction of the development. A Justification Test has been prepared for the proposed development and this is included in Appendix 22 of Volume 3 of this EIS.

It is expected that the water quality status of the receiving waterbodies will not be affected by the proposed development and the WFD management plan objectives will be achieved subject to no other sources of pollution having a detrimental impact

12.11 References

Environmental Protection Agency (EPA) guidance with respect to the preparation of an EIS (EPA 2002 and 2003) and draft revised guidance (2015)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a Framework for Community Action in the Field of Water Policy

Flood Mapping Website http://www.floodmaps.ie

OPW preliminary flood risk assessment (PFRA) indicative mapping website www.cfram.ie

Eastern Catchment Flood Risk Assessment and Management Study (Eastern CFRAMS) and Flood Extent Mapping.

Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies, March 2005

Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses, 2016

The Planning System and Flood Risk Management - Guidelines for Planning Authorities - Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)

Environmental Good Practice on Site (C692) - Construction Industry Research and Information Association (UK)

Best Practice Guide BPGCS005 Oil Storage Guidelines

Control of Water Pollution from Linear Construction Sites (C648) - Construction Industry Research and Information Association (UK)

Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) - Construction Industry Research and Information Association (UK

Sustainable Construction Procurement. A Guide to Delivering Environmentally Responsible Projects (C571) - Construction Industry Research and Information Association (UK)

UK Pollution Prevention Guidelines (PPG):

- PPG1: Understanding your environmental responsibilities – good environmental practice
- PPG2: Above ground oil storage tanks
- PPG3: Pollution Prevention Guidelines
- PPG4: The disposal of sewage where no mains drainage is available
- PPG5: Works in, near or liable to affect watercourses
- PPG6: Working at construction and demolition sites
- PPG8: Safe storage and disposal of used oil
- PPG21: Pollution incident response planning
- PPG22: Incident Response - Dealing with Spills
- PPG26: Drums and intermediate bulk containers

Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes -National Roads Authority, 2005

TII Publications (Standards) Documentation, June 2016.)

Eastern River Basin District, River Basin Management Plan 2009-2015

Water Framework Directive (2000/60/EC)

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