10 WATER

10.1 Introduction

This chapter of the EIAR presents baseline information on the local hydrology and assesses the likely significant effects of the proposed development on the receiving water environment. The objective of this chapter is the following:

- To describe the hydrological characteristics of the catchment and present a baseline study;
- Identify likely potential impacts of the proposed development (positive or negative) on surface water;
- Identify mitigation measures to avoid, remediate or reduce significant negative impacts (if any);
- Identify residual impacts post mitigation; and
- Assess hydrological cumulative impacts of the proposed development along with other activities and developments in the local area.

The local hydrology and drainage for the site is inter-related with the aquatic ecology of the receiving waters and also the hydrogeology of the study area. Further details can be found in **Chapter 8** (Biodiversity) and **Chapter 9** (Soil, Geology and Hydrogeology) of this EIAR.

10.2 Methodology

The EIA was carried out in accordance with the following specific guidelines in relation to hydrology:

- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Environmental Protection Agency (2011): BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities; and
- Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2001.

As part of the desktop study to inform the assessment, reference has been made to the following:

- Online databases of the Environmental Protection Agency (EPA) https://gis.epa.ie/EPAMaps/, and www.catchment.ie, for information on:
  - Surface water courses in the area and their respective water quality status;
  - Special Areas of Conservation & Special Protected Areas; and
  - Water Framework Directive (WFD) data.
- Office of Public Works (OPW); www.opw.ie and www.floodinfo.ie for flooding information;
- Ordnance Survey Ireland aerial photographs and historical mapping;
- Met Eireann www.met.ie for historic rainfall data; and
- National Parks and Wildlife Services (NPWS) http://webgis.npws.ie/npwsviewer/ for designated sites.

Other online databases consulted included:

- www.epa.ie/licensing for Annual Environmental Reports (W0129-02); and
- www.fingalcoco.ie for the Fingal County Development Plan 2017-2023 and the draft Fingal Development Plan 2023 – 2029.

A review of the relevant EIA consultation responses from statutory authorities and consultees as outlined in **Chapter 1** of this EIAR was also undertaken.

10.3 Assessment Criteria

The significance of an impact is defined by first considering the importance of the attribute impacted and secondly the magnitude of the impact. The importance of hydrology attributes (rating criteria) is defined in accordance with the NRA Guidelines[12]. This guidance includes intermediate steps for rating site importance (**Table 10-1**) and magnitude of impact (**Table 10-2**) and then significance (**Table 10-3**).

Table 10-1 Rating Criteria for Site Importance of Hydrology Attributes

Importance	Criteria	Typical Examples
Extremely high	Attribute has a high quality or value on an international scale.	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very high	Attribute has a high quality or value on a regional scale.	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale.	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2-3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes. Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 10-2 Rating Criteria for Estimation Magnitude of Impact on Hydrology Attributes

Magnitude	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or	Increase in predicted peak flood level >50mm Partial loss of fishery. Calculated risk of serious pollution incident >1% annually.

[12] NRA (2008), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes

Magnitude	Criteria	Typical Examples
	loss of part of attribute	Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute of loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but not of sufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm.

Table 10-3 Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Potential Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely high	Imperceptible	Significant	Profound	Profound
Very high	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008)

10.4 Baseline Conditions

10.4.1 Rainfall and Climate

The 30-year average annual rainfall measured at Dublin Airport is 757.9mm for the period 1981 to 2010. The annual average values for the period 2010 to 2021 are shown in **Table 10-4** where data is available. The data shows that for the period 2016 to 2018 the average rainfall has been lower than the 30-year average but this increased again in 2019 to levels similar to 2014 and 2015 but decreased again in 2020 and 2021. Annual potential evapotranspiration has not changed significantly since 2015. Effective rainfall which is the amount of rainfall available to infiltrate the ground (and not evaporated or taken up by plants) has been notably low in 2018, due to dry summer months in 2018, but has raised again in 2019.

Table 10-4 Annual Rainfall and Potential Evapotranspiration measured at Dublin Airport

Year	Rainfall (mm/yr)	Potential Evapotranspiration (mm/yr)	Effective Rainfall (mm/yr)
2021	666.1	554.0	112.1
2020	748.6	548.9	199.7
2019	886.1	555.4	330.7
2018	709.4	584.0	46.3
2017	660.7	552.7	108
2016	713.6	571.0	142.6
2015	878.4	551.3	327.1
2014	927.2	-	-
2013	763.9	-	-
2012	849.5	-	-
2011	671.8	-	-
2010	671.4	-	-

10.4.2 Existing Site Drainage

The topography of the site varies with a topographic high of 148mAOD in the west of the site at the existing site entrance to 92mAOD at the stream in the north east. The areas of the site under the EPA Waste Licence boundary have large stepped and steep depressions that represent the land awaiting infill. The proposed development will restore the south west of the site to the highest point at 148mAOD, the rest of the site will shallowly decline radially away from this point, predominantly towards the east. The lowest proposed level is 98mAOD in the north east of the site approaching the Ballough Stream.

The storm water runoff from the hardstanding area around the current entrance yard, weighbridge and site offices at the west of the site is diverted into a silt settlement tank and oil interceptor at the north western part of the site. The discharge from the settlement tank flows into a ditch which runs parallel to the local road (LP-1090) west of the site and flows towards the stream which flows adjacent to the northern site boundary. SWD1 is the discharge point at the stream, immediately downstream of surface water monitoring point SW1 at Clonany Bridge. The monitoring locations as per EPA licence W0129-02 are illustrated in **Figure 10-1**.

There is a total of seven discharge points from the landfill to the stream, between upstream monitoring point SW1 and downstream monitoring point SW2 at Joinery Bridge. **Table 10-5** summarises the locations of the licensed surface water monitoring and discharge points at the site. SWD2 - SWD7 were previously surface water discharge points from surface water pumping associated with quarrying operations. The water pumping activities have been suspended; therefore, any water/flow now observed at these locations is sourced from surface water run-off from non-landfill areas. The norm is that these locations are dry and this is verified during the surface water sampling events required under the Waste Licence.

The water table lies below or at the base of the quarry void, and rainwater infiltrates to the ground or runs off towards the deeper sections of the quarry pits including the pond in the rock cells located in the south west corner of the site (Cell 6 area) which represents the groundwater table. Some rainwater is also collected in bowsers and sprinklers systems and used for controlling dust nuisance on site as required.

During previous phasing of the landfill, water ponding at the base of the quarry cell was pumped to the two inline settlement ponds currently located along the northern part of the site, left to settle and allowed to discharge to the stream at SWD3 in line with the Waste Licence requirements. The lands outside the quarry void drains naturally to the stream at the north east via existing open drains along the boundaries.

At the filled cells (Cells 1 to 5), rainwater percolates through the deposited material in the landfill cells and is contained within the confines of the engineered cells. If required, this may be pumped out and disposed of at a licensed facility as leachate. Leachate build up in the cells has not been a significant environmental impact at the site given the high level of containment offered by the clay liner. At present, any leachate that builds up in the cells is recirculated back over the existing capped landfill cells. This removes a large component of the aqueous content of the leachate.

Table 10-5 Location of Surface Water Monitoring Points

ID	Location	Easting	Northing
SW1	Clonany Bridge (North (upstream) of site, ca. 280m)	315677	258518
SW2	Joinery Bridge (East (downstream) of site, ca. 1630m)	317230	257820
SWD1	Discharge after flowing through silt trap/oil interceptor	315660	258522
SWD2	Surface water run-off	315847	258415
SWD3	Water discharge from settlement pond	315937	258366
SWD4	Surface water run-off	315999	258306
SWD5	Surface water run-off	316139	258267
SWD6	Surface water run-off	316068	257856
SWD7	Surface water run-off	315779	257719

10.4.3 Water Supply & Waste Water

Mains water is pumped onto the site for drinking water purposes. In 2020, a total of 45.9m^3 of water from public supply was used on site. Water is also used on site for controlling dust and mud nuisance at the site. This water is collected rainwater, used in the sprinkler system and water bowsers. The existing wheel wash is passive operation with a limited water requirement other than periodic top up.

10.4.4 Surface Water Catchment

The site is located in the Nanny-Devlin River Catchment. The regional river drainage in this catchment resembles a parallel to dendritic pattern flowing towards the east coast.

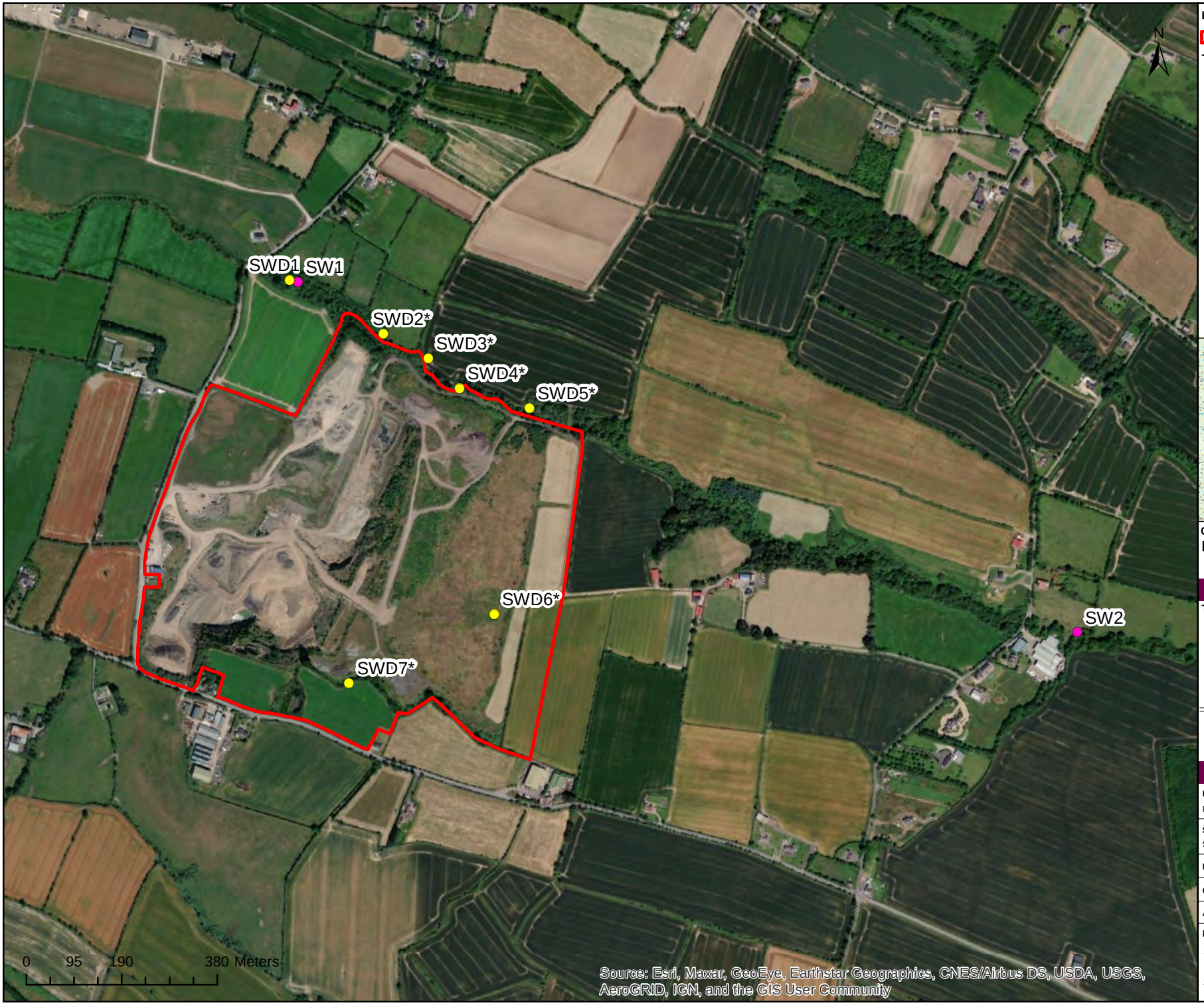
According to the EPA database, the stream that flows along the northern perimeter of the site is the Tooman Branch Stream, a tributary of the Ballough Stream (Ballough Stream_10; IE_EA_08B031500). Approximately 500m south of the site is the Knightstown Branch Stream which adjoins the Ballough Stream_10 approximately 2.5km southeast the site. The Ballough Stream_10 continues in a southeast direction adjoin Ballough Stream_020 approximately 5.8km south east of the site and flows directly into the Rogerstown Estuary (IE_EA_050_0100).

The Ballough Stream and its tributaries, as shown in **Figure 10-2,** are referred to as the Water Framework Directive (WFD) Ballough[Stream]_SC_10 sub-catchment and forms part of the wider EPA Hydrometric Area no. 08 (HA08). Review of OSI historic maps between 1830 and 1930 show that the stream and river courses have not changed significantly in the interim.

Potentially dependent Groundwater Bodies (GWB) which spatially intersect the Ballough WFD sub-catchment include:

- Swords GWB (IE_EA_G_011);
- Lusk-Bog of the Ring GWB (IE_EA_G_014); and
- Hynestown GWB (IE_EA_G_033).

Groundwater bodies are discussed in further detail in **Chapter 9** (Soils, Geology and Hydrogeology).

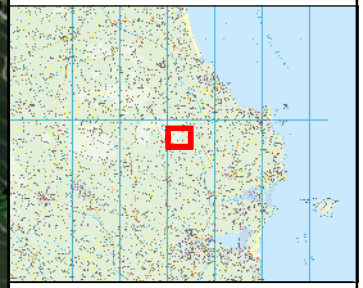


Legend

Site Boundary

Type

- Drain monitoring station
- River monitoring station



Client

Integrated Materials Solutions (IMS) Limited Partnership

IMS Hollywood 2022 Update

Title

Figure 10-1: Surface Water Monitoring Locations

rps

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Issue Details

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Status: S0	**Rev:** P01	**Model File Identifier:**
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10.4.5 Surface Water Quality

10.4.5.1 Regional Baseline

The WFD requires 'Good Water Status' for all European waters by 2015 or at the latest by 2027, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. The overall objective of the river basin management plans is to restore the status to 'Good' by 2021.

The WFD status 2010 to 2015 for the Ballough Stream_10 remains 'unassigned' and is at 'at Risk' of not achieving 'Good' status by 2021, primarily due the results of additional water quality sampling. Agriculture is listed as the significant pressure on this surface water body. The Ballough Stream_10 flows into the Ballough Stream_20 which is assigned a Poor WFD status, and also 'at Risk'.

The WFD status 2010 to 2015 for Rogerstown Estuary transitional waterbody is assigned as 'Bad' due to poor ecological status and overall is 'at Risk' of not achieving Good status by 2021.

The biological quality of the Ballough Stream is assessed by the EPA at the bridge west of the Five Roads monitoring station (RS08B031400) located approximately 2.5km east of the site and at Corduff Bridge monitoring station (RS08B031600) located 6.7km south east of the site.

Q-Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. The higher the pollution level in a watercourse, the lower the Q-value as summarised in **Table 10-6**.

The EPA Q values for the Ballough Stream between 1988 and 2020 (**Table 10-7**) indicate predominantly moderate pollution within this surface waterbody. The EPA note that the Ballough Stream maintained moderate ecological condition in July 2020 with evidence of heavy siltation and excess flamentous algae.

Table 10-6 EPA Biological Q –Value Ratings

Quality Ratings (Q)	Status	Water Quality
Q5, Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly polluted
Q3, Q2-3	Poor	Moderately polluted
Q2, Q1-2, Q1	Bad	Seriously polluted

Table 10-7 EPA Q -Values for Ballough Stream

Station Code	1988	1991	1996	1998	2001	2005	2008	2010	2014	2017	2020
Bridge west of the Five Roads RS08B031400	-	-	3	3	3-4	-	-	-	-	-	-
Corduff Bridge RS08B031600	3	3	3	3	3-4	3	3	3-4	3	3-4	3-4

10.4.5.2 Local Baseline

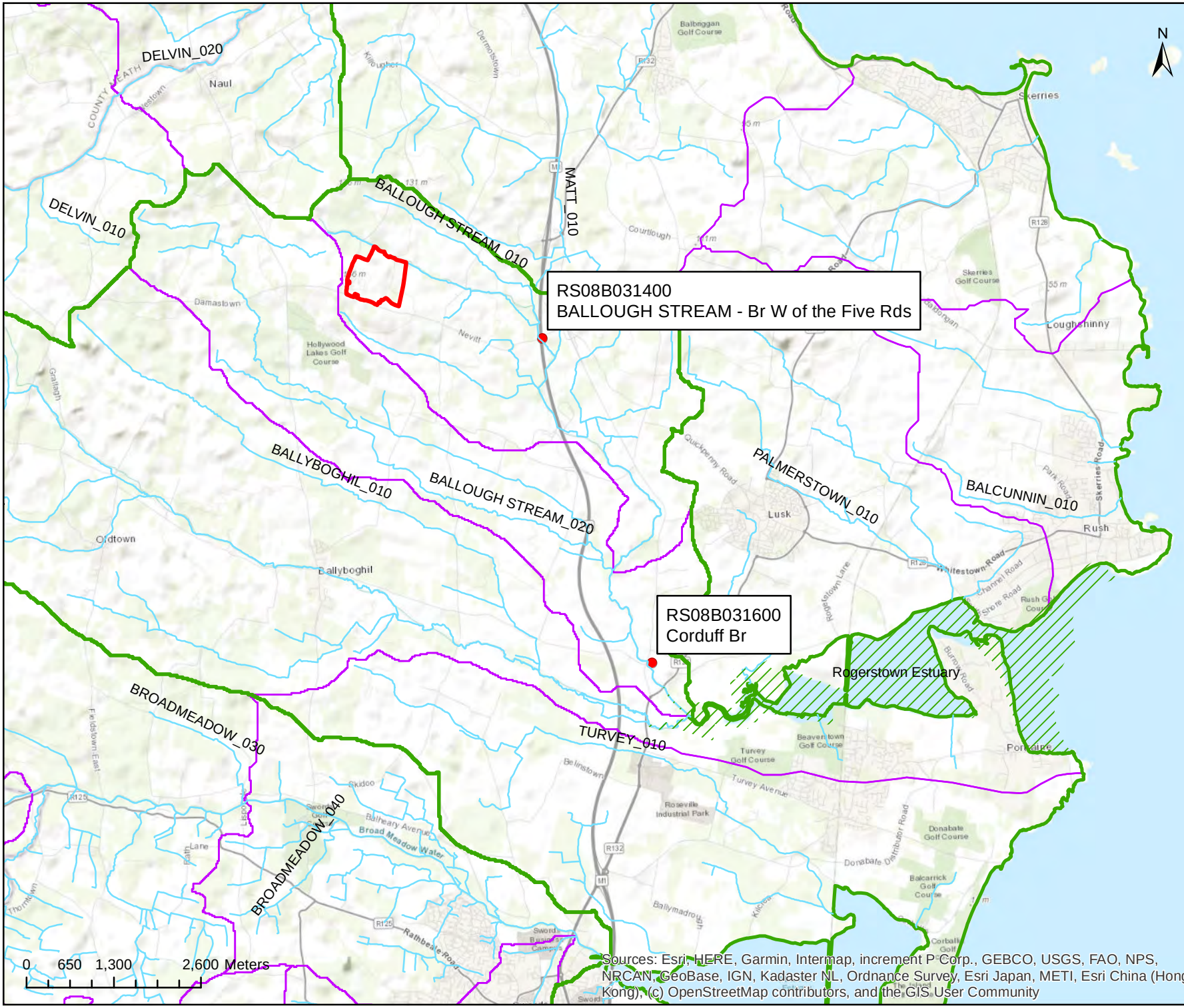
There are two surface water monitoring points with SW1 located upstream of the site and SW2 located downstream of the site. Water samples are taken biannual and analysed for parameters as specified in the EPA Waste Licence W0129-02. Surface water quality results between 2014 up to 2021 for SW1 and SW2 are presented in **Table 10-8** and **Table 10-9** respectively.

The results show elevated levels of suspended solids recorded commonly observed in downgradient surface water monitoring point SW2 but compliant results in recent years (up to Q4 2021). For each suspended solid exceedance, the Annual Environmental Reports state that these likely to be

unrelated to the operation of the facility and instead are associated with silt/run-off from streams bed/banks, and/or adjacent agricultural activities.

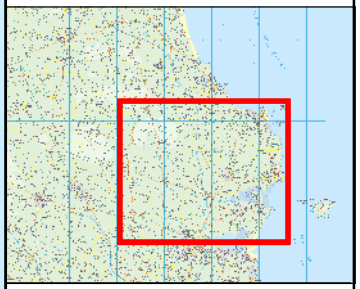
To assess the water quality from the site, the seven discharge points to the stream (SWD1 to SWD7) that run along the northern boundary of the site are monitored bi-annually under the Waste Licence. As noted, not all of the discharge points are active on a continuous basis and on review of the AERs, most of these locations are typically dry, although this is verified during each surface water sampling event. **Table 10-10** to **Table 10-15** summarise the quality results from the surface water discharge points SWD1, SWD2, SWD3, SWD4, SWD5 and SWD6 taking the most recent dataset from 2018 to 2021. The remaining discharge point, SWD7, is generally dry and not sampled.

The results show that suspended solids and sulphates are generally below the EPA trigger value and the limits in the Surface Water Regulations but there are periodic breaches of these levels likely as a result of rainfall levels. All other parameters are within the limits and trigger values.



Legend

- Site Boundary
- Water Monitoring Station
- Rivers
- WFD Subcatchments
- WFD River Sub-basins



Client
Integrated Materials Solutions (IMS) Limited Partnership

IMS Hollywood 2022 Update

Title

Figure 10-2:
Surface Water Environment

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Issue Details

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Table 10-8 Surface Water Results at SW1 upstream monitoring point

Parameter	Units	Surface Water Regulations (2016)	EPA licence Trigger Level	2014 Q4	2015 Q2	2015 Q4	2016 Q2	2016 Q4	2017 Q2	2017 Q4	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_4 N	3.11	-	0.03	0.1	0.61	0.28	0.07	0.12	0.12	0.05	0.05	0.04	0.15	0.10	0.16	0.09	0.03
Calcium	mg/l	-	-	-	96.6	-	110.3	-	122.6	-	105.4	-	118.8	-	97.3	94.4	102.3	102.8
Chemical Oxygen Demand	mg/l	40	-	15	9	25	7	7	28	11	16	<7	9	9	12	11	18	24
Chloride	mg/l	250	-	36.4	28.5	31.5	29.9	39	40.8	34.2	36.7	42.6	40.0	30.3	38.8	23.1	37.5	41.3
Conductivity	mS/cm	1	-	0.67	0.56	0.62	0.68	0.76	0.82	0.43	0.43	0.51	0.48	0.29	0.66	0.61	0.67	0.64
Dissolved Oxygen	mg/l	-	-	10	10	11	7	10	8	10	8	9	6	11	8	9	10	10
Magnesium	mg/l	-	-	-	10.9	-	14	-	14.1	-	12.8	-	13.5	-	12	9.7	11.4	10.8
Manganese	mg/l	1	-	-	0.161	-	**2.274**	-	<0.002	-	0.454	-	<0.002	-	0.636	0.515	0.531	0.217
Orthophosphate	mg/l	-	-	-	<0.06	-	0.07	-	0.26	-	<0.06	-	<0.03	-	<0.06	<0.06	0.08	0.11
Phosphorus	mg/l	-	-	-	0.048	-	0.116	-	0.077	-	0.042	-	0.048	-	0.029	0.046	0.095	0.091
pH	pH Unit	5.5 to 9.0	-	8	8	7.1	7.7	8.5	8.6	8.01	8.1	8.4	8.3	8.1	8.25	8.12	8.26	8.27
Sodium	mg/l	-	-	-	19.6	-	17.2	-	23.1	-	20.5	-	22.8	-	19.2	14.5	19.6	18.5
Sulphate	mg/l	200	-	-	91.24	-	85.31	-	118.1	-	83.9	-	76.5	-	60.3	71.7	71.3	69.2
Temperature	°C	25	-	8.2	11.3	9.1	9.1	8.9	15.3	6.8	10.4	9.4	11.3	8.3	<15	<15	<15	<15
Total Alkalinity	mg/l	-	-	-	212	-	224	-	268	-	226	-	234	-	232	222	230	246
Total Suspended Solids	mg/l	-	35	<10	<10	<10	<10	**60**	11	**162**	<10	12	<10	<10	<10	<10	<10	27

*Exceedances marked in bold

Table 10-9 Surface Water Results at SW2 downstream monitoring point

Parameter	Units	Surface Water Regulations (2016)	EPA Trigger Level	2014 Q4	2015 Q2	2015 Q4	2016 Q2	2016 Q4	2017 Q2	2017 Q4	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH4- N	3.11	-	0.03	0.03	0.05	0.03	0.04	0.04	0.05	0.04	0.05	0.03	0.03	<0.03	0.16	0.03	0.04
Calcium	mg/l	-	-	-	141.3	-	144.6	-	148.5	-	147.7	-	173.7	-	123.2	95.1	145.2	98.6
Chemical Oxygen Demand	mg/l	40	-	<7	<7	19	11	7	34	11	17	<7	9	8	10	<7	<7	21
Chloride	mg/l	250	-	32.7	28.9	32.8	31.2	34.9	35.4	32.5	34.3	35.8	57.3	31.4	43.5	22.5	33.3	31
Conductivity	mS/cm	1	-	0.8	0.74	0.76	0.86	0.81	0.83	0.51	0.54	0.52	0.69	0.36	0.84	0.62	0.82	0.60
Dissolved Oxygen	mg/l	-	-	11	10	10	11	9	9	10	11	11	8	11	9	9	10	10
Magnesium	mg/l	-	-	-	12.6	-	11.2	-	10.9	-	11.7	-	12.6	-	9.5	9.8	11.9	10.7
Manganese	mg/l	1	-	-	0.002	-	<0.002	-	<0.02	-	<0.002	-	<0.002	-	0.043	0.524	0.068	0.224
Orthophosphate	mg/l	-	-	-	<0.06	-	0.1	-	0.32	-	0.08	-	<0.03	-	<0.06	<0.06	0.09	0.09
Phosphorus	mg/l	-	-	-	0.108	-	0.106	-	3.81	-	0.42	-	0.11	-	0.026	0.046	0.053	0.099
pH	pH Unit	5.5 to 9.0	-	8.4	8.4	7.2	8.3	8.4	8.9	8.3	8.5	8.0	8.3	8.2	8.29	8.13	8.38	8.27
Sodium	mg/l	-	-	-	16.3	-	16.3	-	16.7	-	17.1	-	35	-	22.1	14.6	16.8	18.3
Sulphate	mg/l	200	-	-	169.99	-	173.67	-	179	-	188	-	**237**	**-**	185.5	70.4	162	68.1
Temperature	°C	25	-	9.2	11.8	8.9	7.6	9.4	16.3	6	10.5	10.0	13.4	7.8	<15	<15	<15	<15
Total Alkalinity	mg/l	-	-	-	220	-	208	-	290	-	236	-	196	-	202	216	234	236
Total Suspended Solids	mg/l	-	35	**125**	**57**	34	**41**	**351**	**1537**	34	**226**	**338**	90	24	<10	<10	<10	<10

*Exceedances marked in bold

Table 10-10 Water Quality Results for discharge point SWD1

Parameter	Units	SW Regs 2016	EPA Trigger Level	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_{4-} N	3.11	-	0.05	Dry	Dry	0.13	Dry	Dry	Dry	Dry
Calcium	mg/l	-	-	105.5			-				
Chemical Oxygen Demand	mg/l	40	-	22			14				
Chloride	mg/l	250	-	36.7			30.5				
Conductivity	mS/cm	1	-	0.441			0.30				
Dissolved Oxygen	mg/l	-	-	8			11				
Magnesium	mg/l	-	-	12.8			-				
Manganese	mg/l	1	-	0.326			-				
Odour	-	-	-	None			-				
Orthophosphate	mg/l	-	-	<0.06			-				
Phosphorus	mg/l			0.057			-				
pH	pH Unit	5.5 to 9.0	-	8.16			7.9				
Sodium	mg/l	-	-	20.6			-				
Sulphate	mg/l	200	-	81.5			-				
Total Suspended Solids	mg/l	-	35	<10			**195**				
Temperature	°C	25	-	11			8.2				
Total Alkalinity	mg/l	-	-	224			-				
Visual	-	-	-	Clear			Clear				

*Exceedances marked in bold

Table 10-11 Water Quality Results for discharge point SWD2

Parameter	Units	SW Regs 2016	EPA Trigger Level	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_{4-} N	3.11	-	No Access	Dry	Dry	0.05	Dry	Dry	Dry	Dry
Calcium	mg/l	-	-				-				
Chemical Oxygen Demand	mg/l	40	-				<7				
Chloride	mg/l	250	-				40.3				
Conductivity	mS/cm	1	-				0.38				
Dissolved Oxygen	mg/l	-	-				10				
Magnesium	mg/l	-	-				-				
Manganese	mg/l	1	-				-				
Odour	-	-	-				None				
Orthophosphate	mg/l	-	-				-				
Phosphorus	mg/l						-				
pH	pH Unit	5.5 to 9.0	-				8.15				
Sodium	mg/l	-	-				-				
Sulphate	mg/l	200	-				-				
Total Suspended Solids	mg/l	-	35				<10				
Temperature	°C	25	-				5.3				
Total Alkalinity	mg/l	-	-				-				
Visual	-	-	-				Clear				

Table 10-12 Water Quality Results for discharge point SWD3

Parameter	Units	SW Regs 2016	EPA Trigger Level	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_{4} N	3.11	-	No Access	<0.03	<0.03	0.06	<0.03	Dry	Dry	Dry
Calcium	mg/l	-	-		-	188.1	-	140.1			
Chemical Oxygen Demand	mg/l	40	-		<7	12	8	<7			
Chloride	mg/l	250	-		29.0	67.5	37.8	45.7			
Conductivity	mS/cm	1	-		0.65	0.74	0.36	0.846			
Dissolved Oxygen	mg/l	-	-		10	7	12	10			
Magnesium	mg/l	-	-		-	12.3	-	8.5			
Manganese	mg/l	1	-		-	0.059	-	0.066			
Odour	-	-	-		None	None	None	None			
Orthophosphate	mg/l	-	-		-	<0.03	-	<0.06			
pH	pH Unit	5.5 to 9.0	-		7.7	7.4	-	8.05			
Phosphorus	mg/l	-	-		-	-	8.1	0.066			
Sodium	mg/l	-	-		-	44.4	-	23.7			
Sulphate	mg/l	200	-		-	**253.4**	-	188.2			
Total Suspended Solids	mg/l	-	35		<10	<10	**116**	<10			
Temperature	°C	25	-		9.3	14.2	5.9	<15			
Total Alkalinity	mg/l	-	-		-	192	-	188			
Visual	-	-	-		Clear	Clear	Clear	-			

Table 10-13 Water Quality Results for discharge point SWD4

Parameter	Units	SW Regs 2016	EPA Trigger Level	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_{4-} N	3.11	-	0.12	Dry	Dry	0.08	Dry	Dry	Dry	Dry
Calcium	mg/l	-	-	106.8			-				
Chemical Oxygen Demand	mg/l	40	-	25			9				
Chloride	mg/l	250	-	35.4			37.4				
Conductivity	mS/cm	1	-	0.43			0.36				
Dissolved Oxygen	mg/l	-	-	9.4			12				
Magnesium	mg/l	-	-	12.7			-				
Manganese	mg/l	1	-	<2			-				
Odour	-	-	-	None			None				
Orthophosphate	mg/l	-	-	<0.06			-				
pH	pH Unit	5.5 to 9.0	-	-			-				
Phosphorus	mg/l	-	-	8.2			7.9				
Sodium	mg/l	-	-	19.4			-				
Sulphate	mg/l	200	-	83.1			-				
Total Suspended Solids	mg/l	-	35	16			**356**				
Temperature	°C	25	-	10.1			6.2				
Total Alkalinity	mg/l	-	-	240			-				
Visual	-	-	-	Suspended Solids			Clear				

Table 10-14 Water Quality Results for discharge point SWD5

Parameter	Units	SW Regs 2016	EPA Trigger Level	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_{4-} N	3.11	-	Dry	Dry	Dry	0.04	Dry	Dry	Dry	Dry
Calcium	mg/l	-	-				-				
Chemical Oxygen Demand	mg/l	40	-				7				
Chloride	mg/l	250	-				17.9				
Conductivity	mS/cm	1	-				0.36				
Dissolved Oxygen	mg/l	-	-				11				
Magnesium	mg/l	-	-				-				
Manganese	mg/l	1	-				-				
Odour	-	-	-				None				
Orthophosphate	mg/l	-	-				-				
pH	pH Unit	5.5 to 9.0	-				-				
Phosphorus	mg/l	-	-				7.9				
Sodium	mg/l	-	-				-				
Sulphate	mg/l	200	-				-				
Total Suspended Solids	mg/l	-	35				**327**				
Temperature	°C	25	-				7.4				
Total Alkalinity	mg/l	-	-				-				
Visual	-	-	-				Clear				

Table 10-15 Water Quality Results for discharge point SWD6

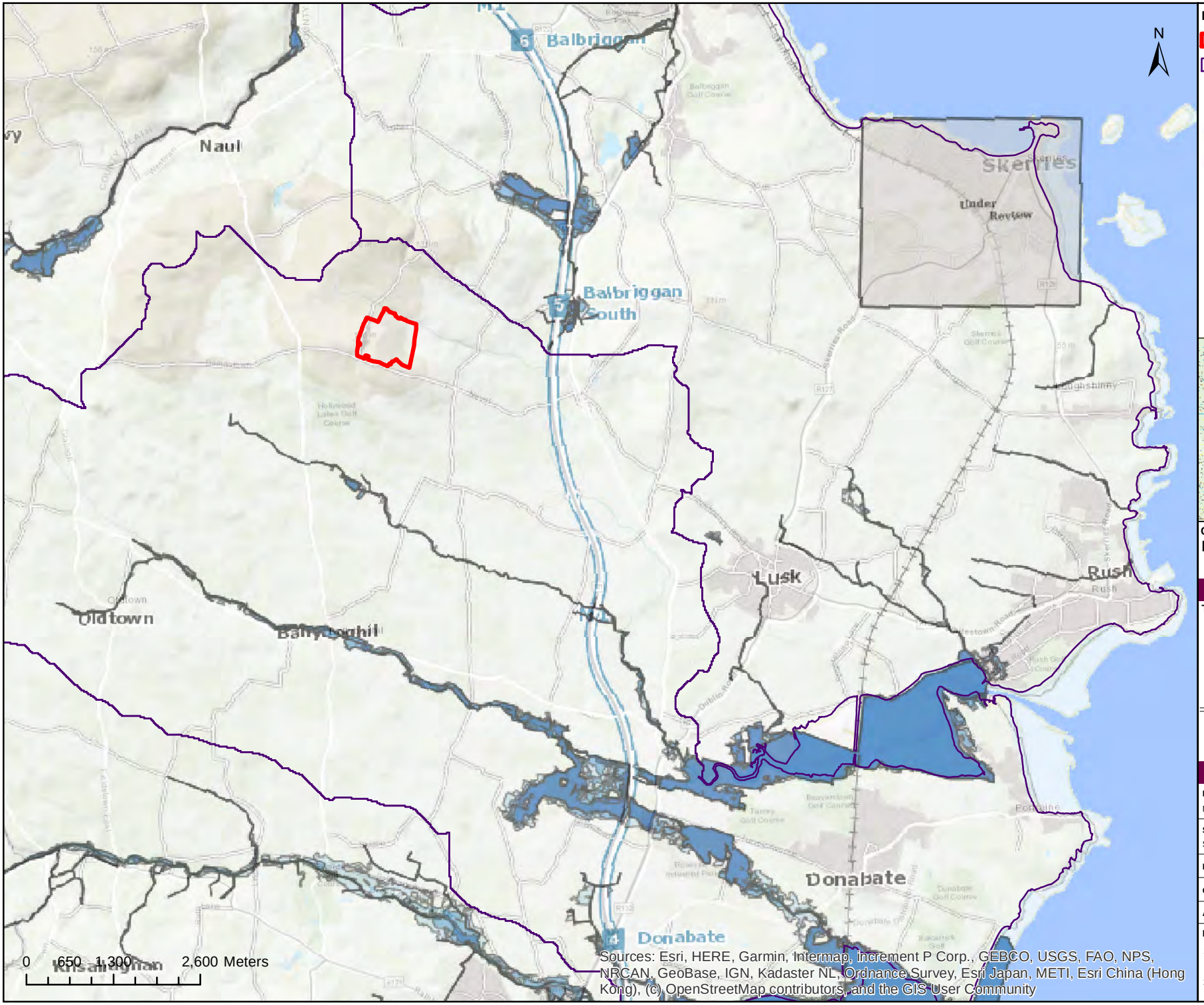
Parameter	Units	SW Regs 2016	EPA Trigger Level	2018 Q2	2018 Q4	2019 Q2	2019 Q4	2020 Q2	2020 Q4	2021 Q2	2021 Q4
Ammoniacal Nitrogen	mg/l NH_{4-} N	3.11	-	0.04	Dry	Dry	<0.03	Dry	Dry	Dry	Dry
Calcium	mg/l	-	-	206.5			-				
Chemical Oxygen Demand	mg/l	40	-	14			7				
Chloride	mg/l	250	-	31.7			16.6				
Conductivity	mS/cm	1	-	0.73			0.73				
Dissolved Oxygen	mg/l	-	-	6.7			8				
Magnesium	mg/l	-	-	15.1			-				
Manganese	mg/l	1	-	0.66			-				
Odour	-	-	-	None			None				
Orthophosphate	mg/l	-	-	<0.06			-				
pH	pH Unit	5.5 to 9.0	-	0.046			-				
Phosphorus	mg/l	-	-	6.9			7.3				
Sodium	mg/l	-	-	16.5			-				
Sulphate	mg/l	200	-	**316.4**			-				
Total Suspended Solids	mg/l	-	35	<10			**54**				
Temperature	°C	25	-	11			10.5				
Total Alkalinity	mg/l	-	-	232			-				
Visual	-	-	-	Suspended Solids			Clear				

10.4.6 Flood Risk

The site is located in the north western section of the Ballough Stream sub-catchment at a maximum topographic height of 148mAOD and is close to the catchment divide with the Delvin 20 WFD sub-catchment to the north. The OPW flood mapping website shows the site does not reside within river or coastal flood zones. Similarly, the site does not reside in any rainfall (pluvial) flood zones. **Figure 10-3** presents the recorded and predicted flood risk at the site as per the OPW flood risk mapping tool (http://www.floodinfo.ie/map/floodmaps/).

The flood mapping website also contains records of historical flooding incidents in the surrounding area. The nearest single flood event listed is approximately 4.5km south east of the site and corresponds to flooding in the Ballough, Ballystrane and Baldrumman areas of Lusk, Co. Dublin on the 9th and 10th August 2008. There are currently no OPW flow gauges present within the Ballough sub-catchment or within the Nanny-Delvin Catchment.

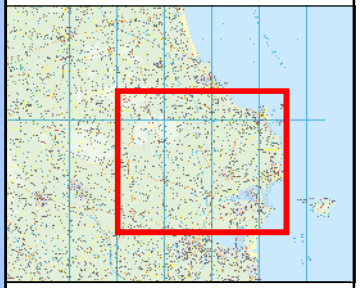
From reviewing all available data is concluded that site is an appropriate development within this area, and there are no flooding or surface water management issues related to the site.



Legend

- Site Boundary
- WFD Subcatchments
- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)

Data Sources: www.floodinfo.ie



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Integrated Materials Solutions (IMS) Limited Partnership

IMS Hollywood 2022 Update

Title

Figure 10-3: Flood Risk Map

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Issue Details

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10.4.7 Areas of Conservation

The NPWS database lists no areas of conservation in the immediate vicinity of the site. The sites designated for nature conservation within a 15km radius are as follows:

- Special Areas of Conservation (SAC)
  - Malahide Estuary SAC (000205)
  - Rogerstown Estuary SAC (000208)
  - Rockabill to Dalkey Island SAC (003000)
- Special Protected Areas (SPA)
  - Rogerstown Estuary SPA (004015)
  - Broadmeadow/Swords Estuary SPA (004025)
  - River Nanny Estuary and Shore SPA (004122)
  - Rockabill SPA (004014)
- Natural Heritage Areas (NHA)
  - Skerries Islands NHA (001218)
- Proposed National Heritage Areas (pNHA);
  - Loughshinny Coast pNHA (002000)
  - Feltrim Hill pNHA (001208)
  - Bog of the Ring pNHA (001204)
  - Knock Lake pNHA (001203)
  - Portraine shore pNHA (001215)
  - Cromwell's Bush Fen pNHA (001576)
  - Rogerstown Estuary pNHA (000207)
  - Malahide Estuary pNHA (000205)
  - Laytown Dunes/Nanny Estuary pNHA (000554)

Further details on the above designated sites and their distance from and connectivity to the site are presented in **Chapter 8 Biodiversity**.

10.4.8 Other Projects & Facilities

Figure 10-4 shows other operations and EPA licenced facilities in the surrounding area. Note that a haulier identified as located to the north west of the site (Coolcat Plant Services Ltd.) is no longer operating.

In July 2020, Meath County Council (Ref. AA191263) granted permission to Kilsaran Concrete (trading as Kilsaran Build) for sand and gravel extraction, associated processing plant and upgrade works to existing site entrance over an area of 17 hectares with restoration back to an agricultural after use. This development is circa 4.5km north west of the Hollywood site.

In addition, in September 2019 the EPA have granted a licence to Clashford Recovery Facilities Limited (W0265-01) to continue restoration of the quarry through the recovery of waste soil and stones and dredging spoil with a maximum annual intake of 170,000 tonnes. This site is circa 4km north west of the Hollywood site.

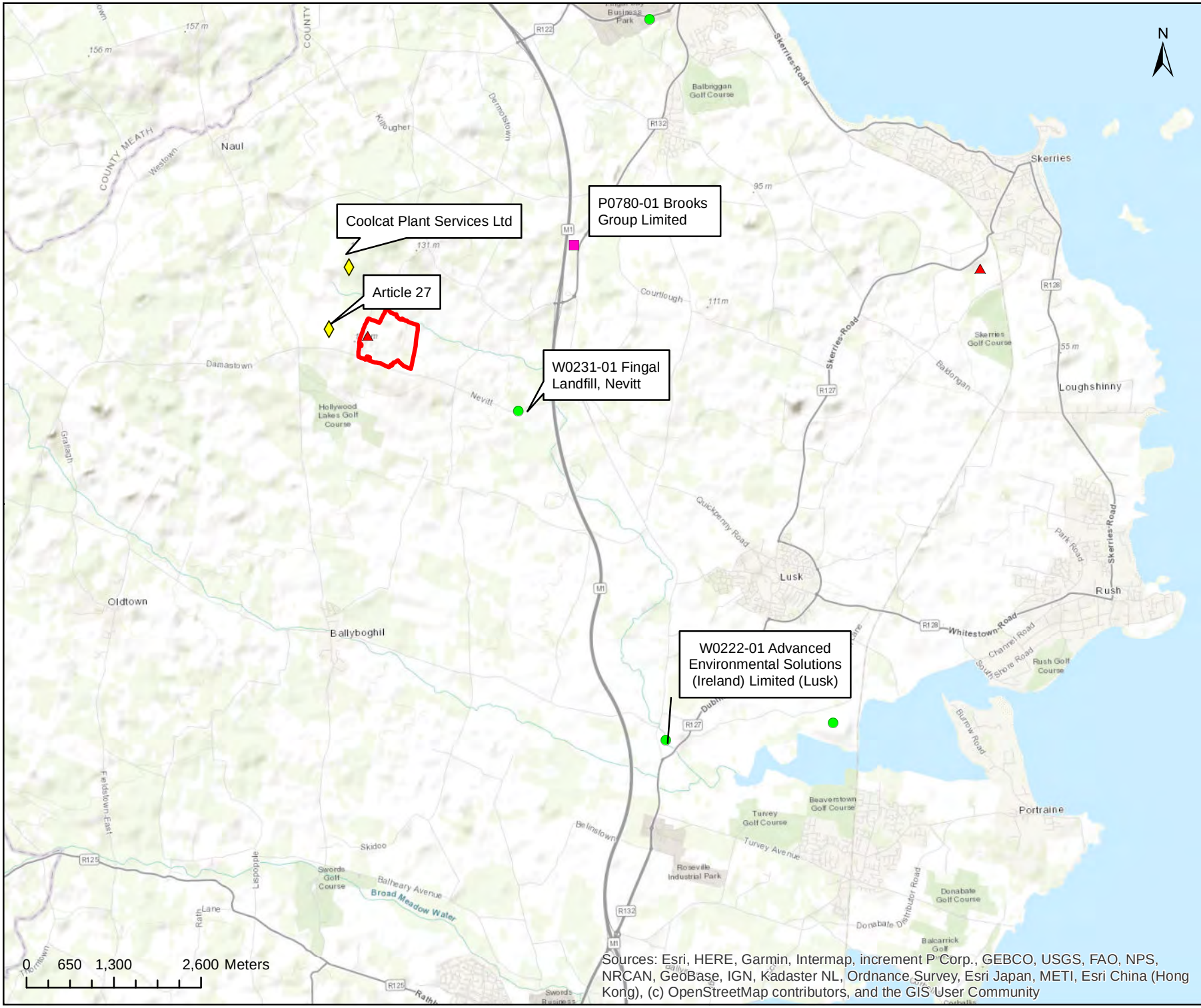
Fingal County Council applied to the EPA for an Industrial Emissions Licence for the proposed Fingal Landfill, a planned municipal solid waste landfill on a greenfield site in north County Dublin (W0231-01) (An Bord Pleanála case reference: PL06F.EL2051), 1.4km south east of the site. The EPA granted Fingal County Council a Waste Licence in May 2010 for third (class 4, 5, 6, 7, 11 and 13) and

fourth (class 3, 4, 9, 11 and 13) scheduled activities. However, this facility was never constructed and there are no known plans to commence operation at this site.

Advanced Environmental Solutions Ltd. (AES), a waste transfer station is located Blakescross, Lusk, operates under EPA licence W0222 and is located approximately 7.5km south east of the site close to the Rogerstown Estuary. The site is licensed to accept and process up to 95,000 tonnes per annum of household, commercial & industrial, and construction & demolition waste.

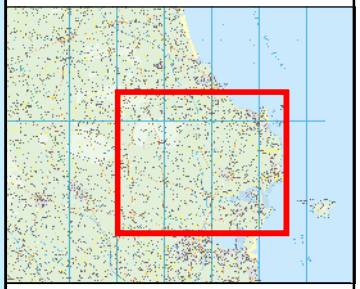
Brooks Group Ltd, a builder's provider is located in the M1 Business Park in Balbriggan and operating under EPA licence (P0780). The licenced activity is related to the pressure treatment of timber. However, this facility is located in the Palmerstown WFD sub-catchment.

In summary, the EPA licensed soil recovery facility and the sand and gravel pit have the greatest potential for cumulative impact to water quality. The other operations have a lower risk to water quality and flooding and are not considered further.



Legend

- Site Boundary
- Licenced Facilities
- Integrated Pollution Control (IPC)
- Integrated Emissions (IE)
- Waste
- Other



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Integrated Materials Solutions (IMS) Limited Partnership

IMS Hollywood 2022 Update

Title

Figure 10-4: EPA licenced facilities and other key operations in the surrounding area

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Issue Details

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10.5 Impact Assessment

10.5.1 General

This following section identifies, describes and presents an assessment of the likely significant impacts of the proposed development on the hydrological environment. The characteristics of the proposed development with regard to the water and hydrological environment, relate to construction, operation and post-closure activities. Issues related to pollution control are also addressed in **Chapter 9 Soils, Geology & Hydrogeology**.

10.5.2 'Do-Nothing' Impact

The 'Do-Nothing' scenario refers to a scenario whereby the facility would continue the existing permitted operations at the site including the landfilling of inert wastes and the processing of aggregates and concrete.

Under such a scenario the baseline status outlined above would remain largely unchanged. Current operations are having minimal impact and the continuation of operations would continue this impact in the medium term. Waste Licence monitoring of surface waters would continue until the licence was successfully surrendered with the EPA after which point the monitoring and regulation of water quality levels in the stream would cease.

10.5.3 Construction Phase

The proposed works will comprise new construction within the site boundary including an attenuation pond to the north of the site close to the Ballough Stream on the northern boundary. The key civil engineering works which will have potential temporary impact on the hydrology environment during construction are summarised below:

- Excavation for the attenuation pond and leachate management area and associated infrastructure; and
- Other construction activities will include site storage of cement and concrete materials, oils, fuels and other construction chemicals.

The potential impacts of construction in relation to the hydrological environments are described and assessed in **Table 10-16**. No indirect impacts of construction of the proposed development are anticipated in relation to the hydrological environment.

Based on the assessment presented in **Table 10-16**, the potential impact on the hydrology during construction is considered to have a temporary, direct, slight adverse effect, i.e. an effect which causes noticeable changes in the character of the environment without affecting its sensitivities on water quality of the receiving Ballough Stream.

Table 10-16 Potential Temporary Impacts during Construction Phase

Construction Activity	Attribute	Character of Potential Impact	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
Surface water run-off	Surface water	Silt-laden water can arise from exposed ground and soil stockpiles during construction. Surface water run-off containing large amounts of silt can cause damage to watercourses, in particular drains connecting to the stream, which can cause significant pollution of water through the generation of suspended solids. The site is situated within the Ballough_010 sub-catchment which is classed as moderately polluted. The proposed works at the attenuation pond are circa 50 metres from the stream with limited capacity for adverse impact.	Medium	Small adverse	Slight
Accidental Spills and Leaks	Surface water	Accidental spillages of fuels, chemicals or other contaminants during construction may result in localised contamination of soils and groundwater underlying the site, and/or surface water run-off could cause release of pollutants to surface water via drains, if materials are not stored and used in an environmentally safe manner. Concrete (cement component) is highly alkaline and any spillage which migrates to a local water course could be detrimental to water quality and local fauna and flora. As above, the proposed works will be located circa 50 metres from the stream with limited capacity for adverse impact.	Medium	Small adverse	Slight

10.5.4 Operational Phase

The operational phase of the site involves the diversification of infilling and restoration of the former quarry with non-hazardous and inert waste at a rate not exceeding 500,000 tonnes per annum. The activities which will have a potential direct impact on the water environment during operation and post-closure are summarised below:

- Direct sedimentation risk to the Ballough Stream from works in the north of the site;
- Surface water run-off from the wider landfill area from both the capped cells and the constructed and lined cells that are yet to commence waste intake;
- Leachate derived from surface water run-off from the active cells within landfill area;
- Surface water run-off from the IBA maturation area;
- In relation to flood risk, the site is located at a highpoint in the river sub catchment (the level of the site itself varies from approximately 92mAOD to 148mAOD). The site is therefore significantly elevated in relation to adjacent watercourses, even allowing for any potential increase in flood levels which may arise due to the potential impacts of climate change;
- Upon final restoration (post-closure), surface water management systems will ensure adequate storm water attenuation will allow the site to mimic greenfield runoff conditions to the stream. As such there will be no increase in local flood impact; and
- Management of stormwater runoff from the landfill section of the site with perimeter drains will be diverted to the proposed attenuation pond to the north east of the landfill with discharge to the stream to the north of the site.

The potential impacts of the operational phase in relation to the hydrological environment are described in the following sections and summarised in **Table 10-17**. It should be noted that a number of potential impacts have been identified early in the design stage and, as such, have been subject to mitigation inherent in the design as described in **Chapter 5**. In this regard, for these pathways there is no predicted significant adverse impact and no further mitigation is proposed.

Table 10-17 Potential Impacts during Operational Phase

Activity	Attribute	Character of Potential Impact	Importance of Attribute	Magnitude of Potential Impact	Significance of Potential Impact
Sedimentation from works directly adjacent to the Ballough Stream	Surface water	Silt-laden water can arise from run off from exposed ground or material stockpiles. Surface water run-off containing large amounts of silt can cause damage to watercourses which can cause significant pollution of water through the generation of suspended solids. The site is situated within the Ballough_010 sub-catchment which is classed as moderately polluted. There is a 70-80m buffer zone between the proposed works and the stream with limited capacity for adverse impact.	Medium	Small adverse	Slight
Surface water run-off from inactive or capped areas on the landfill	Surface Water	The design of the surface water system includes for the collection, reuse (where possible), attenuation in a pond of suitable capacity and treatment (interceptor and settlement in the pond) of the surface water run-off from the landfill body. This treated and collected storm water will be discharged to the Ballough Stream at greenfield run off rates (controlled by a hydro brake) and monitored for assessment with a series of emission limit values for compliance. With this high level of control incorporated in the design, there is no potential for significant adverse impact to the Ballough Stream from this discharge.	Medium	Small Adverse	Slight
Surface water impact to active landfill cells on the landfill generating leachate.	Surface Water (and groundwater)	As no leachate is to be treated on site there is no potential for direct adverse impact from leachate treatment on surface water from the proposed development. The lining, capping and leachate management systems are designed in line with the legislation and best practice to ensure leachate is actively managed and removed from the site as required. In this regard, there is no significant adverse impact predicted to surface water from leachate management at the site.	Medium	Small Adverse	Slight
Surface water runoff from the IBA Maturation Area	Surface Water	In the event that water misting sprays are employed to aid maturation or mitigate fugitive dusts, water will drain through the waste body and will be collected as leachate. Any leachates collected will be tankered to the leachate holding tanks for off-site disposal, as appropriate, in line with the requirements of the IE Licence.	Low	Small Adverse	Imperceptible
Accidental Spills and Leaks	Surface water	Accidental discharge of hydrocarbons could occur from site traffic, in car parking area or fuel storage and potentially entering the surface water drainage system if not mitigated. These can be mitigated with good working practices.	Medium	Small adverse	Slight

10.5.4.1 Sedimentation Risk from works directly adjacent to the Ballough Stream

The Waste Licence monitoring to date indicates that the site is largely in compliance with the suspended solids in the stream to the north of the site. The results show elevated levels of suspended solids recorded commonly observed in downgradient surface water monitoring point SW2. For each suspended solid exceedance, the Annual Environmental Reports (AERs) state that these likely to be unrelated to the operation of the facility and instead are associated with silt/run-off from streams bed/banks, and/or adjacent agricultural activities. This is supported with site observations which show a heavily modified bank at SW2 used for livestock feeding. In addition, ancillary voluntary monitoring of direct discharges from the site to the stream shows no sedimentation impact from the ongoing operations.

In short, the evidence base indicates that the current operations at the site are not having an adverse impact on the stream through sedimentation. This is likely largely due to the 70-80m buffer zone that lies between the landfill body and the stream. This buffer zone is vegetated and acts as a natural barrier to fugitive sediment loss from the existing landfilling operation. The proposed operation will operate using similar operational principles to the existing operation and will be located within the same footprint. In this regard, the buffer zone will remain and hence the risk of sedimentation from the proposed operation will not change from the existing operation. It is concluded that there will be no adverse impact to the stream as a result of sedimentation from the proposed operation.

It is acknowledged that the landfill cells to the north of the site are proposed for non-hazardous wastes as opposed to the existing inert wastes landfilled at the site. These non-hazardous wastes including contaminated soils and high metal wastes such as IBA and, as such, the potential for loss of metal particles or other substances in the sediments to the stream is greater. However, by retaining an adequate buffer area between the north of the landfill body and the stream, these risks may be suitably mitigated and no significant impact is predicted.

10.5.4.2 Potential for Surface Water run-off from the Landfill (Capped or Inactive Cells)

The proposed surface water drainage system is designed to collect and transport run off from the landfill and surrounding area to drains at the periphery of the landfill for attenuation and discharge. The collection system will be a network of perimeter drains at the boundary of the landfill footprint. The drains will be designed to minimise run off entering the waste body for active cells and capture the run off from the drainage layers of the capped cells.

The surface water design has been carried out in accordance with requirements of BS 752; the GDSDS and the 'Recommendations for Site Development Works for Housing Areas' – published by the Department of the Environment. It is proposed to re-use water in the surface water attenuation pond for a number of purposes, namely:

- Supply of water for waste management processes (such as IBA maturation and or aggregate processing);
- Supply of water for firefighting requirements; and
- Supply of water for operation and maintenance requirements (such as dust minimisation).

Applying this SuDs in conjunction with site specific rainfall data, an allowable outflow from the landfill site of 5.24 l/s/ha was calculated (refer **Appendix E in Volume III**). It is proposed to limit outflow from the site through the attenuation pond, controlled by way of actuated valves such as a hydro brake.

A storage volume for a 1 in a 100 year storm event was used with provision included for a climate change factor of 20%. This results in a storage requirement of 15,000m^3 including a climate change factor of 20% for the site (refer **Appendix E in Volume III**). This storage for a 1 in 100 year will be achieved through provision of 1m of freeboard in the pond. The attenuation pond will be located in the north eastern section of the site as shown in **Figure 5.4**.

Surface water runoff will be discharged through a perforated pipe laid in crushed stone to a water course. The crushed stone allows infiltration into the ground but also provides the required attenuation for the worst case scenario, i.e. assuming that there is no infiltration. This runoff will pass through oil interceptors, as required, prior to reaching the surface water attenuation pond.

The drainage pipe network has been designed to incorporate gravity flow where feasible. The majority of the surface water flow comes from the landfill cover. This runoff will be collected by the proposed drainage pipes and gravitate to the surface water attenuation pond.

The quality of the runoff from the proposed development will be improved by the following measures:

- Runoff will pass through oil interceptor prior to discharge to the stream. These oil interceptors will retain any hydrocarbons in the runoff and thereby improve the quality of the runoff; and
- The attenuation pond will also act as settlement pond to reduce the levels of suspended solids in the surface water.

This new infrastructure will result in a new discharge point in the IE licence. This discharge will be from the attenuation pond will be at greenfield run off rates through the use of flow control unit via a monitoring chamber to the stream that bounds the site to the north. This new emission point will be referenced as SWD8 within this EIAR and the licence application to the EPA. All discharges from this new emission point will be required to comply with the limits set out in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No 272 of 2009). In this regard, the discharge will be monitored for a suite of parameters as listed in **Section 10.4.2** for the existing discharges and there is no predicted significant adverse impact predicted.

10.5.4.3 Potential for Leachate from the Landfill (Active Cells)

Leachate will be produced where rain water percolates through the waste (such as an active cell or an uncapped cell), picking up suspended and soluble materials that originate from or are products of the degradation of waste. The wastes to be landfilled at the Hollywood site will generate leachate and this leachate is controlled by means of a basal liner (to prevent a pathway to ground – refer **Chapter 9**) and an engineered cap to prevent rainwater ingress to the waste body. The cap and liner are described for each cell type in **Chapter 5** of this EIAR and these are required to comply with the requirements of the Landfill Directive and the EPA Manual on Landfill Site Design.

In addition to the liner and cap, leachate is actively collected from the cells to manage the risk to groundwater and surface water. In order to manage leachate risk from the proposed development, the leachate management on site will consist of the following requirements which are mandatory for a non-hazardous landfill cell:

- A drainage layer constructed of a 500mm leachate collection stone layer (non-calcareous, less than 10% $CaCO_3$ or equivalent as agreed with the EPA) with a minimum hydraulic conductivity of $1x10^{-3}$ m/s;
- A network of perforated smooth bore leachate collection pipes (minimum diameter 300mm and 200mm HDPE) within the drainage blanket laid to a self-cleansing gradient to collect leachate and carry it to a sump or collection header pipe;
- A network of leachate monitoring points and inspection chambers; and
- A leachate collection and storage tank where leachate will be stored temporarily prior to tankering off site.

Based on a maximum leachate generation rate of circa $102m^3$ per day a total of seven days of storage capacity is required in accordance with the EPA Landfill Operation Manual. Based on a seven day capacity a storage capacity of $714m^3$ is required for the leachate holding tanks on the site. In order to accommodate this volume, a set of twin $532m^3$ tanks have been proposed for this purpose to be located adjacent to the wheel wash within a fully bunded area.

All leachate collected in sumps and chambers will be pumped to these holding tanks to maintain levels of leachate within the landfill cells. The leachate will be transferred from the holding tank to enclosed $23m^3$ road tankers for transport to a suitably licensed wastewater treatment plant under agreement with Irish Water.

As no leachate is to be treated on site in the short term, there is no potential for direct adverse impact from leachate treatment on surface water from the proposed development. The lining, capping and leachate management systems are design in line with the legislation and best practice to ensure leachate is actively managed and removed from the site as required. In this regard, there is no significant adverse impact predicted to surface water from leachate management at the site in the short term.

While in the short term leachate tankering is proposed, the proposed development also includes provision for potential on-site leachate treatment infrastructure that may be developed in agreement with the EPA once more detailed information on leachate volumes and concentrations are available. Any development of this on-site treatment infrastructure will be subject to the SEW process approval with the EPA.

The system will consists of one or more Reverse Osmosis (RO) modular treatment systems which will separate contaminants from the leachate by using pressure to push the leachate through a specialized membrane. The concentrate will then be stored in an assigned holding tank to await removal off site by tanker to an Irish Water WWTP.

The remaining hydraulic load has a low contaminant concentration and may be diverted to a secondary treatment system such as an integrated constructed wetland (ICW). This ICW would be developed as part of the attenuation pond to the north of the site under agreement with the EPA.

The treated water would then discharge to the Ballough Stream at greenfield run off rates and monitored through the licence monitoring regime. The EPA will require any discharge to the Ballough Stream to comply with the requirements of the Surface Waters Regulations (S.I. No. 272 of 2009) as well as the relevant Best Available Technique (BAT) reference document or conclusions for the sector.

The design of any future treatment system will be required to achieve greenfield run off rates and discharge levels that comply with the limits in the Surface Waters Regulations thereby requiring mitigation by design to achieve this level of treatment. In the medium to long term, once the discharges from any treatment system comply with the limits in the Surface Waters Regulations, there is no predicted significant adverse impact to surface water from this system.

10.5.4.4 Potential for Surface Water run-off from the IBA Maturation Area

In the event that water misting sprays are employed to aid IBA maturation or mitigate fugitive dusts, water will drain through the waste body and will be collected. This collected water will be tankered to the leachate holding tanks for off-site disposal, as appropriate, in line with the requirements of the IE Licence.

The IBA maturation area will be located within the landfill void and maintained at a distance of greater than 100m from the Ballough Stream to the north of the site. With the above controls in place, there is no potential for significant adverse impact to the Ballough Stream or the surface water network.

10.5.4.5 Indirect Impacts

Potential leak of landfill leachate to groundwater has the potential to enter the surface water system fed by groundwater. The requirements for cell liners are mandatory and dictated by the Landfill Directive. Each cell is inspected, tested and certified through a construction quality assurance report which is submitted to the EPA.

The existing waste acceptance procedures at the site are highly robust and exceed the requirements of the existing Waste Licence to ensure maximum traceability and protection for the environment. For the proposed development, the various waste streams will undergo a similar three tier waste acceptance procedure as described in **Section 5.6.2**.

These procedures are carried out prior to acceptance into each cell and therefore eliminating any potential contaminants which have the potential to generate pollutant containing leachate. It is therefore considered that leachate at the site will not have a significant impact on the receiving water environment.

No indirect impacts during operations of the proposed development are anticipated in relation to the hydrological environment.

10.5.5 Cumulative Impacts

It is noted that both the sand and gravel pit (Ref. AA191263) and the waste facility (Ref. W0265-01), described in **Section 5.12,** have the potential for cumulative impacts to water quality. However, it is noted that the Hollywood site is located within the WFD sub-catchment of the Ballough[Stream]_SC_010 while the local topography in the area results in these developments at the

Naul lying within the Delvin_SC_010 WFD sub-catchment. As such, there is no potential for cumulative adverse impact on the immediate aquatic environment. Similarly, the Ballough flows south east to discharge at the Rogerstown Estuary while the Devlin flows north east to discharge at Gormanstown so there is no potential for cumulative adverse impact regionally.

The Fingal County Development Plan 2017-2023 highlights a number of potential larger infrastructural projects within the county. Within this Plan, the study area is classed as 'HA – High Amenity', a classed attributed to areas of high landscape value and to which two specific objectives are set – Objectives NH51 and NH52. These Objectives state the intention of protecting these areas from inappropriate development and that development reflects and reinforces the distinctiveness of these areas, which provide a higher level of protection against the development of large infrastructural projects/developments. As such, further development of similar nature is not anticipated which may increase in hardstanding, increase in potential for contaminated run-off during constructions works or increase in waste water loading or water supply requirement.

In terms of hydrology there are no likely cumulative significant impacts from the proposed development if current mitigation measures in relation to surface water run-off are continued.

10.6 Mitigation Measures

The design of the proposed development has taken account of the potential impacts on the hydrology environment local to the area, e.g. surface water collection, attenuation, treatment and monitoring. Additional measures to mitigate the potential effects on the surrounding hydrology during the construction and operation stages are described in further detail below.

A series of water quality and sediment control measures are presented in the EMS for the site and these measures will be applied to both the construction and operation phases of the proposed development.

10.6.1 Construction Stage

The mitigation measures listed will be implemented to address potential impacts to the water environment during the construction stage.

- Topsoil shall be:
  - Stripped to an average depth of 300mm over the whole site area bounded by the temporary fencing;
  - Maintained in a tidy condition, separate from general spoil, with side slopes not steeper than 1 in 3;
  - Maintained in good condition keeping weeds under control and preventing vermin infestation.
- Stockpiling of construction materials shall be strictly prohibited within 5m of any ditch or water-laden channel, and appropriate management of excess material stockpiles will be enforced, to prevent siltation of watercourses;
- Excavations shall be left open for minimal periods to avoid acting as a conduit for surface water flows;
- All ready-mixed concrete shall be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline waste waters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite;
- Concrete shall be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will be prevented during periods of heavy rainfall, and quick setting mixes will be used;
- Waste materials shall be stored in designated areas that are isolated from surface water drains. Skips will be closed or covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage;
- Temporary construction compounds shall not be located within 20m of watercourses, or where it is likely that groundwater will be encountered;

- No harmful materials shall be deposited into nearby watercourses, including drainage ditches/pipes, on or adjacent to the site;
- Where located within 50m of a construction area, the existing outfalls (SWD1-7) shall have a maintainable geotextile membrane (equivalent to Terrastop™ Premium; 250 micron; 45 l/m^2/sec) installed as appropriate. Installation, maintenance, and removal will follow the manufacturers' specifications. The geotextile membrane will be inspected at least once a week, and following any period of heavy rainfall;
- Protection measures shall be put in place to ensure that all hydrocarbons used during the Construction are appropriately handled, stored and disposed of in accordance with recognised standards. These measures will include:
  - Hazardous materials including diesel, fuel oils, solvents, paints and/or lubricants stored on site will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container.
  - Re-fuelling of plant will not occur within 50m of any watercourse or surface water/groundwater feature. Drip trays will be used and spill kits will be kept available;
  - Machinery used on site will be regularly inspected to ensure there is no leakage from them and to ensure the machinery will not cause contamination of watercourses;
  - Where required, fuel will be transported in a mobile, double skinned tank and a spill tray will be used when refuelling (if taking place outside a compound area);
  - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling;
  - Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be readily available at strategic site locations and construction staff will be familiar with emergency procedures; and
  - Any spillage of fuels, lubricants of hydraulic oils will be immediately contained, with an appropriate emergent response put in place. Any contaminated soil will be removed from the site and properly disposed of.

The EMS covers all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures.

10.6.2 Operation Stage

In addition to the mitigation measures inherent in the project design (as described in **Section 10.5**) the following mitigation measures listed will be implemented to address potential impacts to surface waters during the operation stage:

- A buffer area of a minimum 50m should be retained between the Ballough Stream and all works. No works, material storage or stockpiling may take place within this buffer which should be clearly delineated for all operators;
- The proposed attenuation pond is designed at a capacity of 15,000m^3 to cater for a 1 in 100-year storm event. Discharge from the pond will be at greenfield run off rates through the use of flow control unit via a monitoring chamber to the stream that bounds the site to the north.
- The cell layout proposed is to minimise any potential leachate risk to the groundwater body and indirectly to any surface water body. The inert cells are located on the southern sections of the site where the underlying groundwater body (i.e. the Loughshinny Formation) is identified as locally important and extremely vulnerable. The north of the site is underlain by a poor aquifer with much greater natural protection and lower vulnerability, so the non-hazardous waste cells are located in this area.
- The foul water treatment system should be provided with an alarm to indicate operation failure in line with the requirements of EN12566:3. The system must meet the minimum performance standards set out in the EPA Code of Practice. Monitoring and maintenance of this system is required to ensure that effluent is treated to this standard.
- The facility will remain an EPA licenced facility. Under the terms of the revised IE Licence, pollution mitigation measures are designed to prevent or reduce the risk of significant impact by

contaminated run-off to surface water. Compliance is verified through regular quality monitoring of surface water and surface water discharge points and submitting the results to the EPA. This will include the new discharge point from the attenuation pond (SWD8) which will be subject to ongoing monitoring and reporting to regulate the discharge.

- The geo-textile membranes installed at all seven outfalls (SWD1-7) will be maintained throughout the lifetime of the operation of the proposed development (e.g. 25 years), follow the manufacturers' specifications; and
- Protection measures will be put in place to ensure that all hydrocarbons used during the operation are appropriately handled, stored and disposed of in accordance with recognised standards. These measures will include:
  - Hazardous materials including diesel, fuel oils, solvents, paints and/or lubricants stored on site will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container.
  - Re-fuelling of plant will not occur within 50m of any watercourse or surface water/groundwater feature. Drip trays will be used and spill kits will be kept available;
  - Machinery used on site will be regularly inspected to ensure there is no leakage from them and to ensure the machinery will not cause contamination of watercourses;
  - Where required, fuel will be transported in a mobile, double skinned tank and a spill tray will be used when refuelling (if taking place outside a compound area);
  - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling;
  - Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be readily available at strategic site locations and construction staff will be familiar with emergency procedures; and
  - Any spillage of fuels, lubricants of hydraulic oils will be immediately contained, with an appropriate emergent response put in place. Any contaminated soil will be removed from the site and disposed of properly.

10.7 Residual Impact

Implementing the mitigation measures during the construction phase as outlined in **Section 10.6.1**, would result in a negligible impact on the Ballough Stream's quality. Similarly implementing the mitigation measures during the operational phase of the facility as outlined in **Section 10.6.2,** would also result in a negligible impact on the Ballough Stream's quality and the surrounding surface water network.

Therefore based on the classification given in **Table 10-3**, the residual impact on the hydrology during construction is considered to have a short term, direct, negative, imperceptible effect, i.e. an effect capable of measurement but without significant consequences on water quality of the receiving Ballough Stream.

Similarly, the residual impact on the hydrology during operations is considered to have a long term (25 years), negative, imperceptible effect, i.e. an effect capable of measurement but without significant consequences on water quality of the Ballough Stream or the surrounding surface water network.

10.8 Monitoring

Annual and bi-annual analysis of upstream and downstream surface waters, surface water discharge points (including the new discharge point) and landfill leachate will continue to be undertaken as part of any EPA Licence requirements during operations at the site and into the future. The compliance monitoring and reporting will all serve to monitor any potential impacts.

10.9 References

1. CIRIA (2001); Control of Water Pollution from Construction Sites (2001); Guidance for Consultants and Contractors. CIRIA C532. London.
2. CIRIA (2004); Guideline Document C624 Development and Flood Risk - guidance for the construction industry, CIRIA C624.
3. EPA (2002): Guidelines on the Information to be Contained in Environmental Impact Statements, Environmental Protection Agency.
4. EPA (2003): Advice Notes on Current Practice (in the preparation on Environmental Impact Statements, Environmental Protection Agency.
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6. EPA (2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements), Environmental Protection Agency.
7. EPA (2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Environmental Protection Agency.
8. EPA (2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency.
9. Fingal County Development Plan 2017-2023. Fingal County Council.
10. NRA (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, National Roads Authority.
11. Patel Tonra Ltd. (2018) IMS Quarter 2, 2018 Surface Water Monitoring Report: Hollywood Inert Landfill (EPA Licence W0129-02).