STREAM

BIOENERGY

SLR

Chapter 13

Hydrology

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SUMMARY

13.1 This section of the EIS describes the hydrology of the application area and surrounding region and assesses the potential impact of the proposed development on the surface water environment. It is based on a desk study review of published hydrological data for the area, a review of previous hydrological investigations carried out at the Huntstown Quarry complex, and a site walkover. The site lies within the catchment of the Ballystrahan Stream which is a sub-catchment of the Ward River to the north. All surface water runoff from the site will drain north to the Ballystrahan Stream, which drains downstream to the Ward River and ultimately to the Irish Sea at Swords. The water quality in the Ballystrahan Stream is good however water quality in the Ward River is poor, mainly due to diffuse agricultural pollution and dredging. Drainage in the Ballystrahan Stream and Ward River has been augmented by an Arterial Drainage Scheme implemented in the 1960s, with ongoing maintenance by the Office of Public Works (OPW). The combined discharge of treated water from Huntstown Quarry and Huntstown Power Station is discharged to the Ballystrahan Stream under licence at the northern boundary of the quarry site. The site in not located in a flood prone area, however preliminary flood risk assessment mapping by the OPW suggests that there could be some pluvial (rainfall) flooding at the site in an extreme event. Mitigation measures have been proposed to address the potential impacts and the residual impact of the proposed development on the surface water environment is expected to be 'imperceptible'.

INTRODUCTION

13.2 This chapter of the Environmental Impact Statement (EIS) assesses the impacts on the surface water environment arising from the proposed development of a Renewable Bioenergy Plant (henceforth referred to as the plant) at Huntstown, North Road, Finglas, Dublin 11. This chapter has been prepared by SLR Consulting (Ireland) Limited.

13.3 The application area of 2.38 ha (circa 5.9 acres) encompasses the proposed plant which will occupy a footprint of 1.79 ha (the subject site). The remaining 0.59 ha includes the route of the foul sewer line from the plant to the

municipal sewer connection point on North Road, as well as locations where directional signage will be erected for the plant.

13.4 This study presents available information on hydrology within and immediately beyond the subject site together with an interpretation of the existing hydrological environment at the site. It will identify how the surrounding surface water environment could potentially be impacted by the proposed development and how significant impacts (if any) would be mitigated.

13.5 The study area for the purpose of this assessment comprises the application area of the proposed development and the surrounding wider area including the Ballystrahan Stream catchment, a sub catchment of the Ward River, and the northern part of the River Tolka catchment (lower) immediately to the south of the subject site (see **Figure 13.1**).

Characteristics of the Proposed Development

13.6 A detailed description of the proposal including the layout, sections and elevations, are presented in Chapter 6 of the EIS. In summary, the proposed 90,000 tonne per annum plant will comprise the following:

- the **Main Building** which will contain the reception, pre-treatment areas, digestate treatment and storage areas and office and welfare facilities. The waste reception and pre-treatment area will be kept under negative pressure and all the extracted air from this area will be treated prior to discharge;
- an **Odour Control System** comprising a bio-trickling filter which will consist of two filter bed containers, a plasma injection and carbon filtration system which will treat the air extracted from the main building. It will also comprise a 25m stack, through which all treated air will be exhausted;
- the **Digestion Tank Farm** which will be bunded and will contain the pre-pasteurisation tanks (x2), digester feed buffer tanks (x2), digestion tanks (x4) and post-digestion tanks (x2). The tallest tanks will be contained within this bund and will be approximately 25m to the highest point.

- a **Wastewater Treatment Plant (WwTP) Tank Farm** which will be bunded and will host sequential batch reactors (x3), a process liquor tank, a process water tank and a sludge tank

13.7 A number of ancillary structures will be located outside these areas and will include:

- plant and vessels including pasteurisation units, heat exchangers, liquid waste tanks, a biogas holder, storm water tank, pumps and a vehicle refuelling area;
- a Combined Heat and Power (CHP) unit consisting of 2 x 2MW engines. The CHP engines will discharge the residual levels of pollutants to atmosphere from a single multi-flue stack at a height of 28m above ground level;
- a standby gas flare which can be used to combust excess biogas when combustion by the CHP or storage in the gas holder is unavailable;
- ancillary equipment including an electrical substation, sewer pumping station, weighbridge and wheel washes.

13.8 The process can be broadly divided into 3 main stages:

- Pre-treatment: after waste is delivered inside the main building, material that is unsuitable for treatment by anaerobic digestion (AD) will be recovered (e.g. metal, plastic etc.). This materail will be exported off-site for further treatment, recycling or disposal. The remaining organic material will then be blended with recycled process water to create an organic slurry which will be heated to 70^{o}C for at least 1 hour to meet the requirements of the Animal By-Product Regulations.
- AD treatment: following pasteurisation the slurry will be pumped to the digestion tanks where the organic material will be broken down in the absence of oxygen in enclosed sealed tanks to produce both biogas and digestate.
- Post-treatment: in the final phase the biogas will be captured and combusted in CHP engines to produce renewable heat and electricity. The electricity will be exported to the national grid (approximately

3.8MW), enough renewable electricity to power 7,500 homes. The heat will be reused in the process and can also be made available to neighbouring activities which have a requirement for heat. The digestate will undergo moisture content reduction through the use of centrifuges to produce a cake-like material which, if derived from source separated material, can be used as a biofertiliser. The process liquor remaining after the centrifuge will be treated at the onsite WwTP which will reduce the ammonia and BOD content prior to reuse within the process with the excess discharged to the municipal sewer.

13.9 The Strategic Policy in the Fingal Development Plan is to '*Avoid building on areas liable to flooding or which would be liable to exacerbate flooding*'. However, there are no planning policies in the Fingal Development Plan (2011-2017) relating to flooding at the site of the proposed plant.

13.10 The design of the proposed site has been undertaken in accordance with technical guidance, relevant pollution prevention guidelines and other codes of best practice in order to limit the potential for contamination of surface waters, flooding, and other potential adverse impacts.

STUDY METHODOLOGY

13.11 This section of the EIS was prepared having regard to the:

- EPA *Guidelines on the information to be contained in Environmental Impact Statements* (2002); and
- EPA *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (2003).

13.12 The following legislation, planning policy and guidance were consulted during the course of the assessment:

- EU Water Framework Directive (Directive 2000/60/EC);
- EU 'Floods' Directive (Directive 2007/60/EC);
- The Planning System and Flood Risk Management: Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government/Office of Public Works, 2009);
- Eastern River Basin District Management Plan (2010);
- Greater Dublin Strategic Drainage Study, Regional Drainage Policies - Technical Documents (2005);
- Requirements for the Protection of Fisheries; and
- Control of Water Pollution from Construction Sites – Guide to Good Practice (CIRIA, 2002).

13.13 The following information was obtained in the preparation of this chapter of the EIS:

- Water quality and catchment hydrology data (EPA and Water Framework Directive, www.wfdireland.ie);
- Flood and hydrological information (Office of Public Works, www.floodmaps.ie);
- Base mapping (Ordnance Survey of Ireland);
- Planning and flood designations (Fingal County Council); and
- Climate data (Met Eireann).

13.14 This study was prepared using published regional hydrological data. SLR has carried out hydrological work at the Huntstown Quarry on behalf of Roadstone Wood Ltd (RWL) for a number of years including discharge flow measurements; this data is publicly available as it accompanied a recent planning application to Fingal County Council for continuation of extraction at the Huntstown quarry (Ref: FW12A10022). RWL has consented for such publicly available data to be referenced in this EIS.

13.15 The methodology involved in the assessment of the hydrology at the site can be summarised as follows:

- A desk study, in which relevant published data sources for the area were examined.
- A site walkover survey and a topographic survey of the proposed discharge route to the headwaters of the Ballystrahan Stream.
- Review of previous hydrological investigations carried out at the Huntstown Quarry complex by SLR for RWL.
- Analysis of the information gathered and assessment of the potential impacts of the development.

13.16 The hydrology and the existing drainage regime of the subject site and in the surrounding areas were inspected during visits, undertaken in September 2011 and February 2012.

13.17 The terminology and associated criteria for defining impacts and effects on the environment are presented in **Tables 13-1 to 13-3** below. These terms are derived from EPA Guidance and are used in the assessment to describe the predicted and potential residual impacts on hydrology as a result of the proposed development being implemented.

Table 13-1 Quality of Potential Impacts on the Receiving Hydrological Environment

Quality of Impact	Impact Description
Negative Impact	• A change which reduces the quality of the hydrological environment.
Neutral Impact	• A change which does not affect the quality of the hydrological environment.
Positive Impact	• A change which improves or enhances the quality of the hydrological environment.

Table 13-2 Significance of Hydrological Impacts

Significance of Impact on the Receiving Environment	Description of Potential Impact
Imperceptible	• An impact capable of measurement but without noticeable consequences.
Slight	• An impact which causes noticeable changes in the hydrological character of the environment without affecting its sensitivities.
Moderate	• An impact that alters the character of the hydrological environment in a manner that is consistent with existing and emerging trends.
Significant	• An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Profound	• An impact which obliterates sensitive characteristics.

Table 13-3 Duration of Impact

Duration of Impact	Description
Temporary	• Impact lasting for one year or less
Short-term	• Impact lasting one to seven years
Medium-term	• Impact lasting seven to fifteen years
Long-term	• Impact lasting fifteen to sixty years
Permanent	• Impact lasting greater than sixty years

CONSULTATIONS

13.18 Pre-planning consultation was undertaken with both statutory and non-statutory consultees. Full details of the consultation process and feedback received are presented in Chapter 6 of the EIS.

13.19 Responses received which relate specifically to this hydrological assessment are presented in **Table 13-4**. These responses have been considered within this chapter of the EIS.

Table 13-4 Responses Received from Consultees

Organisation	Response Received
Office of Public Works (OPW)	Proposed development lies outside area of Broadmeadow and Ward Arterial Drainage Scheme and will not interfere with future maintenance of this channel.
Inland Fisheries Ireland (IFI)	The Ward and Tolka rivers are both important salmonid rivers, therefore construction activities must not cause deterioration in surrounding watercourses. There should be no deterioration in groundwater or surface water quality as a result of the proposed development.
Irish Airport Authority (IAA) & Dublin Airport Authority (DAA)	IAA and DAA need to be satisfied that the proposed development would not form a habitat attractive to birds as this could be a hazard to the safety of aviation at Dublin Airport.

Difficulties Encountered

13.20 No particular difficulties were encountered compiling this assessment.

RECEIVING ENVIRONMENT: Hydrology (Surface water)

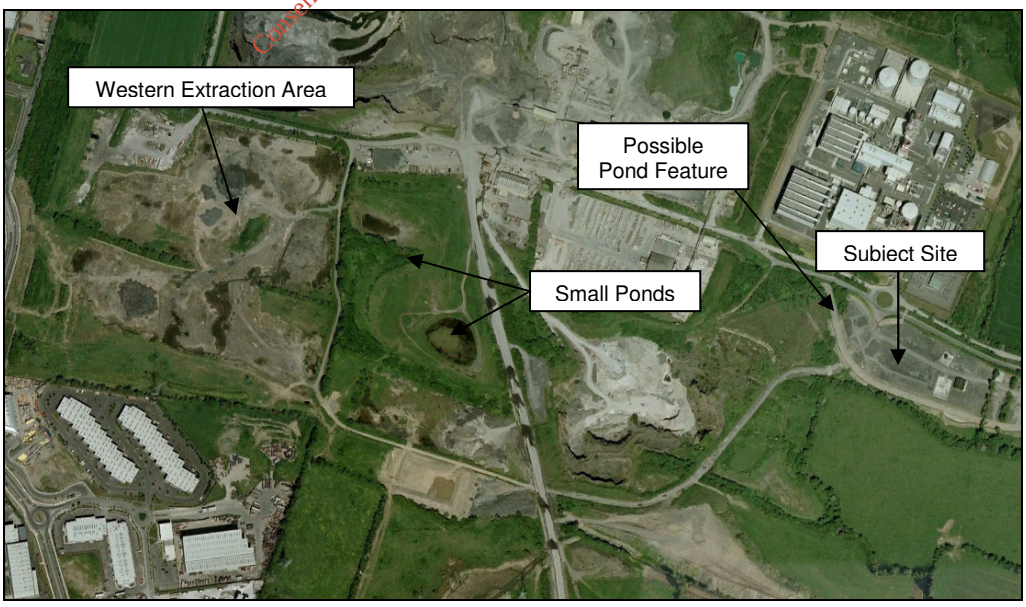
Description of the Environment

13.21 The subject site is at an elevation of c. 78mOD to 79mOD and is underlain by fill material overlying natural ground (glacial till material) (see Chapter 12 of this EIS). The topography around the subject site is flat with no obvious surface water drainage falls in the immediate vicinity of the site.

13.22 The extraction area to the west of the quarry site, where overburden cover has been stripped but no rock extraction has taken place, sometimes contains areas of standing water following heavy rainfall events. Surface water within this extraction area does not drain to a surface water course; ponded water slowly infiltrates into the underlying bedrock.

13.23 Two small pond features are located immediately to the east of this extraction area which also occasionally fill with surface water, see **Plate 13-1**. These surface water features are self-contained and do not drain to a surface water course; ponded water slowly infiltrate into the underlying bedrock.

Plate 13-1 Surface Water Features in the Vicinity of the Subject Site



13.24 There is a small circular pond feature depicted on early Ordnance Survey maps at the western boundary of the subject site in the order of 15-20m in diameter. Later Ordnance Survey maps show a drainage ditch crossing this feature. The area is currently overgrown and surrounded by trees; no standing water has been observed in this feature during site walkovers and it may be drained by a drainage ditch running along the adjoining quarry access road. It is unknown whether it is naturally occurring or artificial. The base of the feature is <77mOD therefore it is possible that during periods of high groundwater level it could intersect the local water table.

13.25 The subject site is located on a surface water catchment divide between two catchments, the Ward River catchment to the north and the River Tolka catchment to the south.

13.26 North County Dublin is one of the driest parts of the country, receiving an average of less than 800mm of rainfall annually over the period 1961-1990 (Fitzgerald & Forrestal, 1996).

13.27 The average annual rainfall from the Met Eireann Dublin Airport synoptic weather station (elevation 71 mOD) located 5.8km northeast of the study area is 758mm for the period 1981-2010 (Met Eireann).

13.28 Rainfall values for one-hour and two-day events of 5-year return period intensity are 16 mm and 55 mm respectively (AGMET Group, 1996).

13.29 The long-term mean annual Potential Evaporation (PE) measured at Dublin Airport since records began is approximately 440mm/year (European Climate Assessment & Dataset website). In this region, average actual evapotranspiration (AE) is likely to be in the order of 90% of PE, approximately 396mm/year. The average effective rainfall is obtained by subtracting the AE from the rainfall. Therefore in this area, effective rainfall (water available for surface water runoff and potential groundwater recharge) is in the order of 362mm/year.

13.30 At the adjacent quarry and in the immediate area of the subject site, the AE will be lower due to the absence of significant vegetation cover, and

therefore the AE is estimated to be approximately 200mm/year. In this case, the average effective rainfall here is approximately 558mm/year.

Surface Water Catchments

13.31 At a regional level, the EPA River Sub-Basin catchment mapping indicates that the subject site is located just inside the River Tolka surface water catchment, as shown on **Figure 13-1**. However, it is apparent from walkover surveys of the site and surrounding area that the local surface water drainage pattern and catchments have been altered through the previous construction of a number of drainage ditches in the vicinity of the subject site.

13.32 The head of the Ballystrahan Stream is located approximately 450m to the north of the subject site. A topographic survey of the drainage route, north from the site to the headwaters of the Ballystrahan Stream, has been undertaken as part of this assessment and indicates a c. 3m fall from the proposed discharge point to the stream, confirming a revised catchment boundary at a local level as indicated on **Figure 13-2**. On the basis of a walkover and topographic survey it is considered that the subject site is located in the Ballystrahan catchment which is a sub-catchment of the Ward River catchment. The route of the proposed c. 1km sewer line is however located within the Tolka catchment.

13.33 All surface water runoff from the subject site will drain to the north, to the Ballystrahan Stream, which lies within the catchment of the Ward River. The Ballystrahan Stream drains to the Ward River 5.2km to the northeast of the site, and the Ward River discharges to the Irish Sea a further 6km to the northeast at Swords. As there will be no discharge of surface water from the subject site to the River Tolka catchment, there will be no impacts on this catchment arising from the proposed plant.

13.34 A River Basin Management Plan (RBMP) has been prepared for the Eastern River Basin District (ERBD) for the period 2009 to 2015, as part of Ireland's obligations under the Water Framework Directive (Directive 2000/60/EC). Individual river catchments in the ERBD has been grouped into a number of Water Management Units (WMU) and the Ward River catchment and

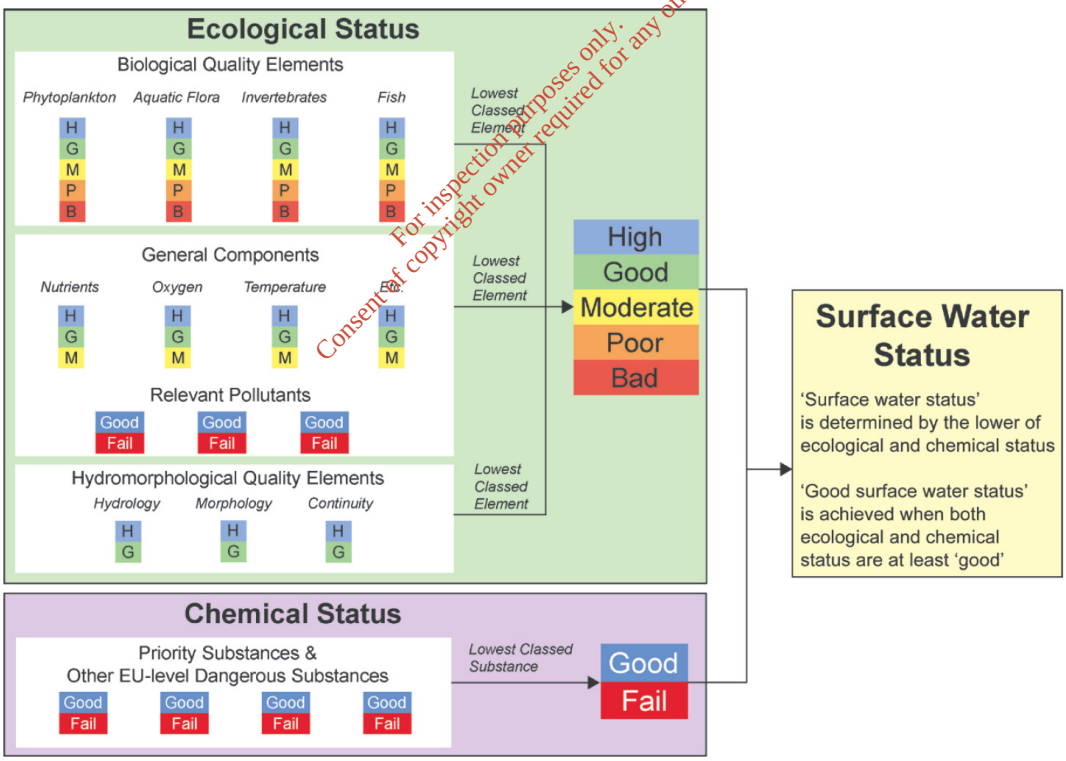
Ballystrahan sub-catchment are included in the Broadmeadow WMU, see **Figure 13-3**.

Surface Water Quality

13.35 The Water Framework Directive establishes a framework for the protection, improvement and management of all waters. The overall aim for surface waters, which include rivers, lakes, transitional (estuaries and lagoons) and coastal waters, is to achieve at least 'good ecological status' and 'good chemical status' by 2015, as well as preventing deterioration in those waters that have been classified as 'High' or 'Good'.

13.36 The status of each surface water body is determined by the lower of the ecological status and chemical status, see **Plate 13-2**.

Plate 13-2 WFD Classification of Surface Water Status (EPA)



13.37 The Ballystrahan Stream is a monitored river water body ('Ballystrahan Upper river water body') and the overall status is classified as 'Good' in terms of its chemical and ecological status (see **Appendix 13-1)**.

13.38 Although the current status of this river water body is 'Good', it is considered at risk of not maintaining 'Good' status by 2015 due to risks posed by diffuse agricultural pollution, discharge from IPPC licenced sites and channelization (dredging impacts).

13.39 The Ballystrahan Upper river water body passes downstream to the Ballystrahan Lower river water body (also classified as of overall 'Good' status) before discharging to the Ward River.

13.40 The RBMP indicates that the 'interim overall status' of the water in the Ward catchment is 'Bad'. Although the general physico-chemical status of the water in the Ward catchment is classified as 'Good' status, the failing elements in terms of the overall status relate to the fish populations in the river. A programme of measures is underway in the Broadmeadow WMU which aims to restore the overall status of all river water bodies within its area to 'Good' status by an extended deadline of 2027.

13.41 The Ward River upstream and downstream of the Ballystrahan sub-catchment has been assigned a median Q-rating of 3 (poor) in the 2007/08 water quality monitoring undertaken by the EPA (EPA).

13.42 The principal pressures which are thought to be preventing the achievement of 'Good' status in surface water at present are diffuse agricultural pollution, low ecological rating and dredging.

13.43 Local surface water quality data are discussed below under 'Discharge Consents'.

Surface Water Flow

13.44 There is no hydrometric recording on the Ballystrahan Stream.

13.45 As part of work for the Water Framework Directive, the EPA has prepared an internet-based model for the estimation of flow from ungauged catchments (http://watermaps.wfdireland.ie/HydroTool/). The Ballystrahan catchment covers an area of c. 8.5km^2. The stream flows in the Ballystrahan catchment have been estimated and are shown in **Table 13-5** below.

Table 13-5 Estimated Flows for the Ballystrahan Sub-Catchment

Flows equalled or exceeded for the given percentage of time (litres/sec)										
5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
385	255	160	113	87	69	53	39	30	16	11

13.46 The EPA hydrometric website indicates that a hydrometric station was installed previously (no longer operational) on the Ward River at Owens Bridge (see **Figure 13-1**) which is immediately downstream of the confluence with the Ballystrahan Stream. The catchment area at Owens Bridge is approximately 36.6 km^2. The estimated flows for the Ward River at this point are shown in **Table 13-6** below.

Table 13-6 Estimated Flows for the Ward River at Owens Bridge

Flows equalled or exceeded for the given percentage of time (litres/sec)										
5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
1,412	96	628	460	388	286	207	143	116	66	42

13.47 The flows monitored at Owens Bridge include the flows from the Ballystrahan Stream; comparison of flows shows that the discharge from the Ballystrahan Stream contributes approximately 25% of the flows in the Ward River at this point. Flows from the Ballystrahan Stream have been enhanced by an arterial drainage scheme within this catchment originally intended to improve land drainage for agriculture (see Section 13.84) and include discharged water from both Huntstown Quarry and Huntstown Power Station (see below).

Discharge Consents

Ward Catchment

13.48 There is one consented discharge to the headwaters of the Ballystrahan Stream from Huntstown Quarry which discharges downstream to the Ward River. Storm water and treated effluent from the adjacent Huntstown Power Station combine and discharge to the quarry dewatering network which is regulated under a discharge licence from Fingal County Council (discharge licence reference WPW/F/008-01).

13.49 Roadstone Wood Ltd. was granted a revised licence to discharge trade effluent from the Huntstown North Quarry by Fingal County Council in November 2011, under the Local Government (Water Pollution) Acts 1977 and 1990. The discharge licence is for a maximum combined discharge of 1,800m^3/day from the North Quarry, equivalent to c. 20.8l/s.

13.50 Huntstown Power Station operates under two separate Integrated Pollution Prevention & Control (IPPC) licences: Huntstown Power Company Ltd. (IPPC Reg. No. P0483-04) which has a maximum effluent discharge limit of 200m^3/day, and Viridian Power Ltd. (IPPC Reg. No. P0777-02) which has a maximum effluent discharge limit of 312m^3/day. These IPPC licences define a combined emission limit value of 512m^3/day of treated water or a maximum rate of 21.3m^3/hr., equivalent to c. 5.9l/s.

13.51 The quantity of water pumped from the north of Huntstown Quarry is not monitored however estimations have been made at different times of the combined flow in the stream downstream of the discharge point at location W1, see **Figure 14-1** and **Table 13-7**.

Table 13-7 Discharge Estimates and Measurements at W1 (North Quarry)

	Discharge amount (m^3/day)
1999 Average Estimate	1,870
2003 Average Estimate (half of maximum estimate)	3,710
2009 Average Estimate	2,600
2010 Measurement (February)	1,470

13.52 Locations of surface water monitoring points are identified on **Figure 14-1**. Water quality of the combined discharge is monitored by Roadstone Wood Ltd. at point W1, water quality from the Central Quarry is monitored at point W2, and water quality from the South Quarry is monitored at point W3. The quality of surface water is summarised in **Table 13-8**.

Table 13-8 Average / Median Surface Water Quality draining to Ward catchment

	Year	Number of Samples	pH	BOD*	Suspended Solids	Temperature	Ammonia (NH4)*	Calcium	Phosphorus*	Sulphate
W1	2002	17	7.99	<2	13.9	11.3				
	2003	23	7.98	<2	9.4	10.9	<0.1	122	<0.05	161
	2004	21	8.08	<2	12.0	11.5	<0.1	140	<0.05	193
	2005	13	8.04	<2	16.9	10.8	<0.1	137	<0.05	213
	2006	11	8.01	<2	12.1	12.0	<0.1	152	<0.05	214
	2007	11	8.04	<2	20.5	12.8	<0.1	180	<0.05	235
	2008	12	7.97	<2	18.0	10.3	<0.1	160	<0.05	248
	2009	11	7.75	<2	17.9	11.7	<0.1	146	<0.05	236
	2010	12	8.12	<2	8.0	10.0	<0.1	141	0.074	219
	2011	6	8.0	<2	6.0	8.8	<0.1	147	0.07	214
W2	2003	38	8.15	<2	11.2	10.8	<0.1	160	<0.05	171
	2004	36	8.16	<2	13.2	11.2	<0.1	147	<0.05	160
	2005	25	8.12	<2	16.0	10.3	<0.1	152	<0.05	136
	2006	24	8.17	<2	30.3	12.4	<0.1	149	<0.05	129
	2007	23	8.22	<2	16.2	14.2	<0.1	162	<0.05	142
	2008	24	8.07	<2	27.9	13.4	<0.1	131	<0.05	148
	2009	13	7.84	<2	28.2	13.3	<0.1	142	<0.05	168

All values are in mg/l except for pH, which is in pH units
* Median Values, since most values were below the detection limit

13.53 It can be seen that the discharge quality monitoring results are, on average, of acceptable quality. Monitoring of existing discharges from the Huntstown quarry complex is continuing.

13.54 The monitoring of discharge from Huntstown Power Station is regulated under IPPC licence and the average discharge parameters are indicated in **Table 13-9**.

Table 13-9 Average Power Station Discharge Quantity and Quality Monitoring Results

Parameter	Unit	Average Value	Licence Limit
Discharge volume	m^3/day	99.96	600
Total Suspended Solids	mg/l	11.32	30
Nitrate	mg/l NO_3	2.62	-
BOD	mg/l	1.01	20
COD	mg/l	10.31	50
Total Dissolved Solids	mg/l	784.5	2000
Total Nitrogen	mg/l N	1.49	-
Total Phosphorus	mg/l P	0.028	0.1
Ammonia	mg/l NH_3	0.16	1.5

13.55 It can be seen that the flow quantities from the power station average <3% to 7% of the total quarry related flow. Flows from the power station contribute to a marginal increase in ammonia but are within licence limits.

Tolka Catchment

13.56 There is a separate discharge of surface water and groundwater from the Huntstown South Quarry to the Tolka catchment via settlement ponds in the southern part of the quarry site.

13.57 The quantity of water pumped from the southern quarry is routed through settlement ponds prior to discharge. Flow monitoring during the summer of 2010 shows discharges between 1,000-5,400m^3/day.

13.58 Water quality from the South Quarry is monitored at point W3. The quality of surface water is summarised in **Table 13-10**.

Table 13-10 Average / Median Surface Water Quality draining to Tolka catchment

	Year	Number of Samples	pH	BOD*	Suspended Solids	Temperature	Ammonia (NH4)*	Calcium	Phosphorus*	Sulphate
W3	2002	11	8.1	<2	5.5	13.1	-	-	-	-
	2003	23	7.8	<2	8.5	10.9	<0.1	133.9	<0.05	169.2
	2004	22	8.0	<2	3.6	11.5	<0.1	120.9	<0.05	157.7
	2005	15	8.0	<2	5.5	11.0	<0.1	120.2	<0.05	146.4
	2006	9	7.8	<2	3.2	12.3	<0.1	127.7	<0.05	133.1
	2007	11	8.0	<2	4.5	13.1	0.20	137.8	<0.05	149.4
	2008	12	8.0	<2	15.1	10.4	0.22	134.4	<0.05	180.0
	2009	6	7.6	<2	35.5	12.2	0.69	126.8	<0.05	178.7
	2010	8	8.2	<2	7	11	<0.1	118	0.07	170
	2011	4	8.0	<2	6	10	<0.1	130	0.06	177

13.59 It can be seen that the discharge quality monitoring results are, on average, of acceptable quality. Monitoring of existing discharges from the Huntstown quarry complex is continuing.

Abstraction Licences

13.60 There are no licenced surface water abstractions within the Ballystrahan catchment (EPA).

13.61 It is not proposed to abstract water from a surface water course for use at the subject site.

Flood Risk

13.62 In accordance with the guidelines produced by the DEHLG *The Planning System and Flood Risk Management: Guidelines for Planning Authorities* (2009), a Stage 1 Preliminary Flood Risk Assessment (PFRA) has been undertaken.

13.63 The Stage 1 PFRA is a screening exercise, largely based on available desktop information and preliminary walkover surveys of the site. The results of the PFRA will determine if it is necessary to proceed to Stage 2 and undertake a full flood risk assessment for the site.

13.64 The methodology for undertaking a Stage 1 PFRA is set out in Appendix A of the above DEHLG guidelines for planning authorities in relation to flooding.

Flood Risk - Available Information

13.65 The first task in the Stage 1 assessment is to collate and review available desktop information relating to flooding. The Guidelines list potential sources of desktop available information relating to flooding which have been used in this assessment.

13.66 The primary source of information relating to flooding in Ireland is the Office of Public Works (OPW) which is the lead state agency in relation to flooding matters. The records include historical details of flooding incidents and predictive modelling of flooding.

The Office of Public Works

13.67 The OPW was consulted directly as part of this assessment and indicated that there are no records of flooding incidents at the site held within their database, see consultation response in **Appendix 13-2**.

13.68 The OPW also indicated that the site is outside the section of Ballystrahan Stream channel that they maintain under the Arterial Drainage Scheme and for which they would require access for maintenance purposes, see **Appendix 13-2**.

Flood Hazard Maps

13.69 The National Flood Hazard Mapping website (www.floodmaps.ie) is a facility that records details of documented flood incidents ranging from river flooding to pluvial (rainfall) flooding and coastal flooding.

13.70 There are no flooding incidents recorded on the flood hazard website for the subject site.

13.71 The closest flooding incident to the site that is recorded in the OPW flood hazard website (www.floodmaps.ie) is at Dubber Cross, Meakstown, 1.2km to the east of the subject site. A surface water flooding incident was recorded here at a sewer pumping station in October 2002, see **Plate 13-3**.

Plate 13-3 Local Historic Flooding Incidents (www.floodmaps.ie)

13.72 Another flooding incident was recorded 1.4km to the north of the subject site at Kilshane Cross where the Ballystrahan Stream passes under the N2 National Primary Road. Flooding incidents were recorded here in 2002 and 2005. These flooding incidents appear to have occurred on the N2 road and are described as being caused by runoff from adjacent 'grasslands'. The reports do not indicate that the flooding incidents at Kilshane Cross arose from the Ballystrahan Stream. As a result of the historical flooding incidents, drainage works were carried out here in 2005 as part of the N2 road development.

Preliminary Flood Risk Assessment

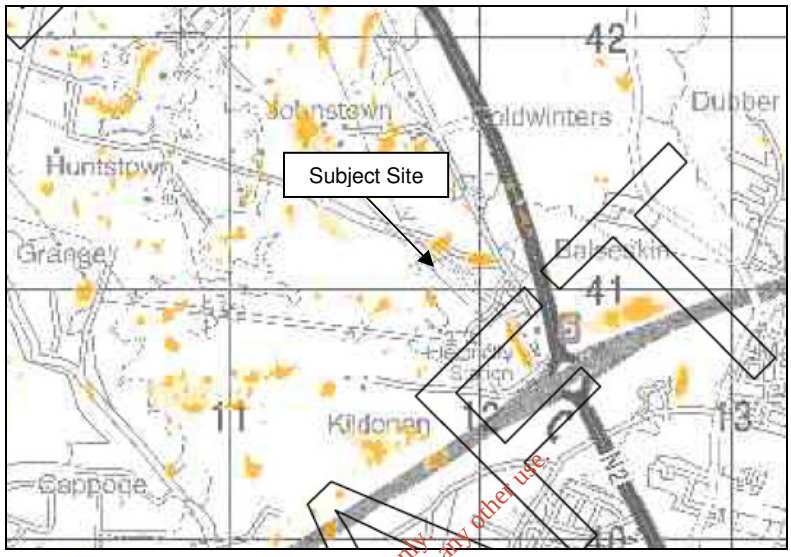
13.73 Draft Preliminary Flood Risk Assessment maps have been prepared by the OPW for consultation purposes as part of the National Catchment Flood Risk Assessment and Management (CFRAM) Programme under the EU 'Floods' Directive (Directive 2007/60/EC).

13.74 Preliminary flood risk assessment maps have been developed for the whole country at 1:50,000 scale and show 'indicative extents' of fluvial (river), pluvial (rainfall), groundwater and coastal flooding (www.cfram.ie).

13.75 The subject site is covered by Preliminary Flood Risk Assessment Figure No. 2019/MAP/256/A Rev0. The map does not show indicative flood extents from fluvial, groundwater or coastal sources at the subject site. However, the

draft map does indicate that there could be some pluvial (rainfall) flooding at the site, see **Plate 13-4**.

Plate 13-4 Indicative Areas of Potential Pluvial Flooding in Extreme Rainfall Events



Extract from draft PFRA map

13.76 The pluvial 'indicative extents' were produced using Digital Terrain Model (DTM) data for the ground surface with various rainfall durations and intensities (National Preliminary Flood Risk Assessment Draft Overview Report, 2011). As such the pluvial 'indicative extents' map identifies low lying areas where surface water from rainfall could pond or collect at a depth of more than 200mm.

13.77 The pluvial 'indicative extents' mapping is presented at a regional/national scale and may not be site specific due to the accuracy of the national DTM data set used in the modelling and therefore is indicative only.

13.78 The OPW were consulted in February 2012 regarding the proposed development and did not indicate that there were any flood risk or flooding incidents at the subject site.

13.79 The site is not adjacent to any river or stream channels and its location, on the catchment divide between the River Tolka and the Ward River suggests that it is unlikely to be flooded from a fluvial or coastal source. Surface water

in the two small ponds and western extraction area to the west of the proposed development is self-contained and does not discharge to a surface water body or flood beyond their boundaries. It is possible that the small pond feature on the western boundary of the subject site may fill with groundwater during times of high groundwater level and drain to the ditch alongside the adjoining access road to the quarry.

Flood Zones

13.80 The DEHLG/OPW Guidelines indicate three flood zones for land use planning matters, Zones A, B and C.

13.81 Zone A is indicated as an area with a high probability of flooding and most types of development would be considered inappropriate in this zone. Zone B is indicated as having a moderate probability of flooding and highly vulnerable development would be considered inappropriate in this zone. Zone C is indicated as having a low probability of flooding and development in this zone is considered appropriate from a flood risk perspective as long as flooding from other potential sources is considered also.

13.82 Based on the available baseline information relating to flooding and flood risk assessed, it is considered that the site of the proposed development is in Zone C for flood risk planning purposes and therefore the site has a low probability of flooding.

13.83 Development in Zone C is considered appropriate from a flood risk perspective.

13.84 Based on this information it is not considered that a site specific flood risk assessment is required for the site and it is not considered necessary, based on the available information assessed here, to proceed to a more detailed Stage 2 initial flood risk assessment for the site.

Benefiting Lands

13.85 The site of the proposed development is located partly within an area of 'Benefiting Lands' as described by the OPW, see **Figure 13-2** and **Appendix**

13-2, which cover part of the headwaters of the Ballystrahan Stream catchment.

13.86 Benefiting lands do not necessarily indicate flood hazard or flood extent but identify lands which have benefited, or might benefit, from the implementation of Arterial Drainage Schemes undertaken by the OPW. Benefiting lands typically indicate low-lying land near rivers and streams that might be expected to be prone to flooding; the primary purpose of arterial drainage schemes in the past was to improve lands for agriculture. The benefiting lands to the north of the proposed development form part of the Broadmeadow and Ward Arterial Drainage Scheme which was implemented from 1961-1964.

13.87 The OPW has been consulted regarding the proposed development and their response noted that the site does not appear to be adjacent to a channel that forms part of the Broadmeadow and Ward Arterial Drainage Scheme, and as such would not interfere with the future maintenance of this channel. The OPW considers that the proposed controlled discharge of attenuated surface water runoff from the site is a matter for Fingal County Council; no response was received from Fingal County Council in relation to the consultation.

13.88 Drainage works undertaken in the vicinity of the subject site, including around Roadstone Wood's Huntstown Quarry and the Huntstown Power Station, has improved the local drainage.

IMPACT ASSESSMENT

13.89 This section addresses the potential impacts of the proposed development, without mitigation measures implemented at the site, on the surface water environment in terms of the Quality, Significance and Duration of each potential impact. This represents a worst case scenario for the proposed development, with no mitigation measures implemented.

13.90 **Tables 13-1 to 13-3** presented in section 13.17 of this assessment explain the terminology and associated criteria for defining impacts and effects on the environment. These terms are derived from EPA Guidance and are used in the following paragraphs to describe the predicted and potential residual

impacts on hydrology as a result of the proposed development being implemented.

'Do Nothing'

13.91 In the 'do nothing' scenario there will be no immediate impact on the hydrology at the site and surrounding area. The site is zoned for 'Heavy Industry' in the Fingal Development Plan 2011-2017, so it is likely that the site will be developed at some time in the future, if it is not developed under the current proposal.

Construction Phase Impacts

13.92 The main potential direct impacts associated with the construction phase of the proposed plant, if unmitigated, would be from the uncontrolled discharge of waters to the Ballystrahan Stream, accidental fuel spillages, and from the generation of suspended solids.

13.93 The potential impact of a hydrocarbon spill on the surface water quality is considered to be temporary in duration, during construction, as any spills would consist of relatively small volumes that would be cleaned quickly on the site. Without mitigation measures, the significance of the potential impact of a hydrocarbon spill on the receiving environment is considered to be significant. The quality of any impact would potentially be negative on the receiving environment as these materials could result in the potential contamination of the surface water. However, the volumes of any hydrocarbons on site during construction will be small and with construction site management measures in place for reduction or elimination of pollution, as described in Chapter 2, the likelihood of an accidental spillage would be remote.

13.94 The potential impact of sediment in the runoff from the site on surface water quality is considered to be temporary in duration, during construction, as it is expected that the volumes of sediment would be relatively small. Without mitigation measures, the significance of the potential impact of sediment on the receiving environment is considered to be significant. The quality of any potential impact would be negative as these materials could result in the

potential contamination of the surface water. Given the relatively level nature of the site of the proposed development and implementation of a Construction Environmental Management Plan (CEMP) it is considered unlikely that there would be a large volume of uncontrolled runoff during a storm event.

13.95 The potential direct impacts on flow in local surface water courses associated with the construction phase could be from increased runoff, particularly in the case of extreme rainfall events. An extreme rainfall event of 12 hours duration with a return period of 10 years would be expected to produce a rainfall depth of 46.6mm at this location (Met Eireann return period rainfall data). Assuming conservatively that there is 100% instantaneous runoff from the construction site area of c. 1.79ha, such an event would produce 834m^3 of runoff to the local surface water course over 24 hours, equivalent to a flow of 10l/s. The potential impact of any increase in flow is considered to be temporary in duration during construction. Without mitigation measures, the significance of the potential impact of increased flow on the receiving environment is considered to be slight and the likely significant effect on the receiving environment is negative**.** The quality of any impact could be considered negative as increased runoff from the site could marginally increase the risk of flooding downstream in local surface watercourses during periods of higher flow. The conservative estimate of increased flow in the local surface water course is not considered significant; in reality the flow would be much less due to surface-ponding on site, infiltration and evaporation. During periods of low flow however, any increase in flow in local surface water courses would be a potential benefit to the drainage network and a positive impact.

13.96 All runoff from the site will drain north to the Ballystrahan Stream therefore there will be no impact on surface water in the small ponds and western extraction area to the west of the proposed development.

Cumulative Impacts

13.97 A cumulative impact could potentially arise from surface water management during construction of the proposed plant, in parallel with surface water

management at the adjacent Huntstown Quarry and Huntstown Power Station. However, surface water management during the construction phase of this development will be minor, localised and temporary, and therefore no significant effects are expected from this potential cumulative impact. The calculation presented in Section 13.95 shows that the expected volumes of runoff in an extreme rainfall event during construction would not be significant.

Operational Phase Impacts

13.98 During the operation of the proposed development, the only discharge off-site will be the controlled release of clean treated surface water runoff; there will no discharge of process effluent other than to the foul sewer under licence as trade effluent.

13.99 The main potential direct impacts during the operational phase of the proposed plant on the local surface water courses could be the accidental uncontrolled discharge of process effluent, contaminated surface water runoff (fuels/chemicals/firewater), and increased runoff from the site with a resultant flood risk.

13.100 These potential direct impacts are considered here without any mitigation measures implemented at the site; as such these potential impacts represent a worst case scenario, with no mitigation measures implemented.

13.101 The potential impact of any accidental process effluent discharge from the site on water quality is considered to be temporary. Without mitigation measures, the significance of the impact of process effluent on the receiving environment is considered to be significant and the likely effect on the receiving environment is negative. The quality of any potential impact would be negative as the accidental discharge would lead to a reduction in water quality in local surface watercourses. Although the potential impact on the environment is considered to be negative here without mitigation, the design of the plant and management/operational procedures at the site will ensure that the potential for an accidental release of process effluent is low and procedures would be implemented to contain any such spill/release were it to occur.

13.102 The potential impact of contaminated surface water runoff from the site on water quality is considered to be temporary during the operational lifetime of the development. Without mitigation measures, the significance of the impact of contaminated surface water runoff on the receiving environment is considered to be significant and the likely effect on the receiving environment is negative. The quality of any potential impact would be negative as the contaminated runoff would lead to a reduction in water quality in local surface watercourses and possibly result in the Ballystrahan Stream not maintaining its 'Good' status under the WFD objectives. Although a potential impact on the environment exists and is considered to be negative without mitigation, management/operational procedures implemented at the site would limit the potential for any such material reaching the receiving water.

13.103 It is not proposed to discharge process liquid or effluent/wastewater to the drainage network therefore there will be no impact on the mass balance and assimilative capacity in the receiving surface water bodies.

13.104 All surface water runoff discharged from the subject site will drain to the north, to the Ballystrahan Stream, which lies within the Ward River catchment. The Ballystrahan Stream drains to the Ward River 5.2km to the northeast of the site, and the Ward River discharges to the Irish Sea a further 6km to the northeast, at Swords. As there will be no discharge of surface water from the subject site to the River Tolka catchment, there will be no impacts on this catchment arising from the proposed plant.

13.105 A potential impact on flow in the local surface water drainage network during the operational phase could be from an increased rate and volume of runoff from the site, if unmitigated. The calculation presented in Section 13.95 would suggest that for a typical storm event the instantaneous runoff from the site would be in the order of <10l/s. The impact of any increase in flow is considered to be long term, during the operational phase of the project. Without mitigation measures, the significance of the potential impact of increased flow on the receiving environment is considered to be moderate and the likely effect on the receiving environment is negative**.** The quality of any potential impact would be negative as increased flow could increase the risk of flooding downstream in local surface watercourses. Although a

potential negative impact has been identified without mitigation measures, the Ballystrahan stream channel has been significantly modified, deepened and straightened, in the past and has a large capacity at the present day. Furthermore, a surface water drainage management system has been designed for the plant that will attenuate and control the rate of discharge from the site to the surface water network.

13.106 Potential flooding of the site during the operation phase could occur from the ponding of surface rainfall (Pluvial) on the site, if unmitigated. The impact of any unmitigated rainfall flooding is considered to be temporary in duration. Without mitigation measures the significance of the potential impact of flooding of the site is considered to be moderate and the likely effect to the proposed facility would be negative. The quality of any impact on the facility would be negative due to potential water damage or if the flooding led to an uncontrolled discharge from the site. The surface water management drainage system that has been designed for the plant will prevent standing water on site as significant storage and attenuation capacity has been incorporated that considers the 1 in 100 year storm, together with an additional allowance of 20% to cater for the effects of climate change.

13.107 Potable water will be supplied via a connection to the public mains water supply. No groundwater or surface water abstraction is proposed therefore there will be no impact on the quantitative status of the surrounding surface water or groundwater bodies.

Cumulative Impacts

13.108 A cumulative impact could potentially arise in terms of water quality during the operation of the AD facility, in parallel with the operations at the adjacent Huntstown Quarry and Huntstown Power Station. Poor surface water quality as a result of an accidental discharge of process effluent or contaminated surface water runoff (fuels/chemicals/firewater) at the plant could combine with poor surface water quality from Huntstown Power Station as a result of an accidental spillage to pose a cumulative impact on water quality in the local surface water courses. The cumulative impacts on the receiving water would be long term and without mitigation measures the cumulative impact

on the receiving water is considered to be significant and the likely effect would be negative. The quality of any potential cumulative impact would be negative as the contaminated runoff would lead to a reduction in water quality in local surface watercourses and possibly result in the Ballystrahan Stream not maintaining its 'Good' status under the WFD objectives. Although a potential cumulative impact on the environment exists and is considered to be negative without mitigation, the design of the plant and the implementation of proposed best practice management/operational procedures, will limit the potential for any such adverse impacts occurring.

MITIGATION MEASURES

13.109 Mitigation measures to avoid the potential adverse impacts detailed above during the construction and operational phases are described below. The measures outlined here will mitigate against the potential adverse impacts identified.

Construction Phase Mitigation

Prevention of Pollution from Surface Water Runoff

13.110 During construction there will be plant and machinery required on site and as a result it is appropriate to adopt best working practices and measures to protect the local surface water. Accidental spillage of fuels or chemical reagents and the generation of suspended solids on site pose a potential contamination risk. To minimise this risk the following mitigation measures have been identified which will form part of a Construction Environmental Management Plan (CEMP) which will include measures for reduction or elimination of pollution:

- Any excavated vegetation, soil and subsoil will be temporarily stockpiled away from any surface water features in order to reduce the likelihood of any suspended solids reaching them;
- Surface water runoff from the site during construction and water pumped from the base of excavations will be diverted to temporary constructed sumps/settlement ponds comprising grit traps, which will afford some attenuation prior to discharge off-site to the local drainage network. The ponds will be designed to provide sufficient retention time to ensure the settlement of small particle size suspended solids prior to discharge of runoff to the drainage network. These ponds will be constructed early during the construction stage. A low earth berm will be constructed along the western site boundary to prevent surface runoff to the possible adjacent pond feature during the construction stage;
- Fuel will be stored in bunded tanks with the provision of a storage/retention capacity of 110% of tank storage volume and will be located in a designated area away from general site traffic movements;

- Oils, greases and hydraulic fluids will be stored on mobile bunds/spill pallets during construction;
- Refuelling and the servicing of plant and machinery will only occur in areas of hard standing which have been designated for this purpose;
- Good site management practices will be implemented during construction to reduce risks of spills, including regular monitoring and inspection of any plant or equipment to ensure that it is properly maintained and serviced;
- Temporary welfare facilities will be provided on site during construction and will include toilets, showers, canteens and washing facilities. Wastewater arising from these facilities during construction will be transported off-site to a licensed wastewater treatment plant;
- A contingency plan will also be developed to deal with potential leaks and spills and an emergency spill response kit will be maintained on site;
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste; and
- All vehicles exiting the construction site will pass through a temporary wheelwash to ensure that public roads in the vicinity of the site are maintained free of mud and dirt.

Operational Phase Mitigation

13.111 Potential operational impacts are substantially mitigated through avoidance of impacts due to the incorporation of separate surface water and process liquid and effluent management systems. A surface water and foul water drainage management strategy has been designed by SLR which is presented in **Appendix 13-3**. Furthermore the plant will be operated in accordance with conditions and emission limits that will be set in an EPA licence for the site.

Prevention of Pollution and Increased Flood Risk from Surface Water and Process Effluent Runoff

13.112 During the operational phase of the plant the following measures will be implemented at the site in order to mitigate against any potential adverse impacts on local surface water courses:

- All chemicals will either be stored under cover in a bunded area or will be stored outside in sealed tanks which will be bunded;
- All fuels will be stored in bunded tanks with the provision of a storage/retention capacity of 110% of tank storage volume and will be stored in a designated area;
- All unloading of waste material and all processing at the site will be undertaken indoors under cover to ensure that no contamination of surface water runoff occurs from this stage in the process.
- Washdown from the process area of the main building will be recycled to the AD process.
- Storage or treatment of process liquid and effluent will be in sealed tanks in areas bunded to 110% of the largest tank capacity;
- All process liquid will be diverted to and treated in an on-site Wastewater Treatment Plant (WwTP) utilising Sequential Batch Reactor (SBR) technology. From here it will be recycled to the process with excess discharged off site to the foul sewer network under licence from the EPA. A pipeline will be constructed form the site for a distance of c. 1km to a connection point with the municipal sewer on the North Road. A more comprehensive description of the foul drainage system is provided at Chapter 2.
- Wastewater effluent from onsite welfare facilities will be discharged directly to the public sewer.
- All vehicles existing the plant will pass through a wheelwash located near the exit gate to ensure that there is no soiling of public roads in the vicinity of the subject site.

- Runoff from the vehicle wash down area and water discharged from the wheelwashes will be directed to the onsite WwTP for treatment before being either reused or discharged off-site to the foul sewer.

13.113 The site has been evaluated for Sustainable (Urban) Drainage Systems (SuDS) and the most suitable measures have been incorporated into the surface water management system design. The SuDS measures are designed to manage and control surface water runoff from the development and also to treat the runoff in order to remove any suspended solids and hydrocarbons prior to discharge.

13.114 The surface water management system for the site has been designed based on a 1 in 100 year storm event with an additional allowance of 20% for climate change. Runoff from roofs, external hard standing and pavements, and from the bunded tank farm (assuming no leakages have been identified) drains to the surface water system.

13.115 Storm water runoff attenuation will be provided at the site and it will be designed to ensure that the surface water is discharged in a controlled manner at the greenfield runoff rate, and will not pose an increased flood risk downstream of the site to land and property. Attenuation and storage of storm water will be provided by an overground storm water storage tank with 2,000m^3 capacity, and an underground storage crate system providing approximately 450m^3 of attenuation capacity upstream of a silt trap and hydrocarbon interceptor.

13.116 Water will be required on site for process activities and will be harvested from the site rainfall runoff. The remainder of the runoff, which has been treated and is clean will be discharged to the receiving water; this volume of excess water for discharge from the site will be an average of 12m^3 a month. The harvesting of rainfall water for on site processes is considered to be a mitigation measure. The volume of clean treated water (12m^3/month) is small and is significantly less than the calculated greenfield runoff rate from the site; therefore any potential impact on volumes in the receiving water would be considered to be imperceptible and neutral.

13.117 The rate of discharge to the surface water course will be limited to the greenfield discharge rate by means of a flow control device (e.g. Hydro-Brake).

13.118 In the event of a major accident at the facility, a remotely controlled shut-off valve will be utilised at the discharge point from the site to ensure that all runoff will be retained on site for appropriate assessment, and if necessary treatment and disposal.

13.119 A more comprehensive description of the surface water management system is provided at Chapter 2.

13.120 The SuDS measures to be implemented at the site are outlined in **Table 13-11**.

Table 13-11 SuDS Measures in Surface Water Management Design

SUDS Technique	Flood Reduction	Water Quality Improvement
Above-ground Storage Tank	✓	
Below-ground Storage Tank & Flow Control Device	✓	
Silt Trap & Hydrocarbon Interceptor		✓
Rainwater Harvesting	✓	

Flooding

13.121 The implementation of the SuDS measures at the site will manage the rate of storm water discharge from the site thus mitigating against increased flood risk downstream in the Ballystrahan and Ward catchment.

13.122 The surface water runoff from the site will be managed and discharged in a controlled manner in accordance with the guidelines as set out in the Greater Dublin Strategic Drainage Study guidelines for runoff/discharge.

RESIDUAL IMPACTS

13.123 The potential impacts of the proposed development upon the hydrological receiving environment have been identified and assessed, and where

appropriate, mitigation measures have been accommodated into the design of the development.

13.124 The surface water management design for the proposed development will restrict surface water runoff from the site to the equivalent of greenfield runoff rates, therefore there will be no increase in runoff over that expected from an undeveloped greenfield site. No residual impact is therefore expected on flow in the local surface water drainage network.

13.125 All waste materials, chemicals and fuels will be stored and handled in areas that are designed for containment. Emergency procedures will be put in place for dealing with accidents or incidents that could lead to surface water contamination. In the event of a major accident at the facility, a remotely controlled shut-off valve will be utilised at the discharge point from the site to ensure that all runoff will be retained on-site for appropriate assessment, and if necessary treatment and disposal.

13.126 With incorporation of the proposed mitigation measures, the residual impacts from the proposed development on the hydrological environment are expected to be imperceptible, see **Table 13.12** below for details.

Table 13-12 Summary of Proposed Mitigation and Residual Effects

Potential Impact on Hydrogeology	Duration of Impact	Significance of Impact	Quality of Impact	Proposed Mitigation Measures	Mitigated Residual Impact	Mitigated Quality of Residual Impact
Construction Phase						
Contaminated runoff entering surface water courses	Temporary	**Significant**	Negative	Soil and Subsoil storage Bunded fuel tanks; Chemicals and Oils storage; Hard standing area for refuelling Site and equipment management; Emergency spill management plan; Temporary constructed sump/ settlement pond; and Emergency Spill Kit.	**Imperceptible**	Neutral
Increased runoff to local surface water courses	Temporary	**Slight**	Negative	Temporary constructed sump/ settlement pond to provide attenuation on site	**Imperceptible**	Neutral
Operational Phase						
Accidental discharge of process effluent to surface water	Temporary	**Significant**	Negative	Process liquor stored in tanks in bunded area Process liquor storage tanks are covered; Excess process effluent treated and discharged to foul sewer; Waste stored & handled in building with contained concrete floor. Process effluent circulated in sealed pipes and tanks. Wheelwash liquid diverted to onsite WwTP. Washdown from the main building recirculated to AD process.	**Imperceptible**	Neutral

Potential Impact on Hydrogeology	Duration of Impact	Significance of Impact	Quality of Impact	Proposed Mitigation Measures	Mitigated Residual Impact	Mitigated Quality of Residual Impact
Contaminants entering surface water	Long Term	**Significant**	Negative	Chemical storage under cover and bunded; Fuel storage bunded; Process effluent circulated/treated/stored in covered tanks within bunded area; Excess process effluent will be treated on site and then discharged to the foul sewer; Runoff from vehicle wash down area and wheelwashes will be treated on site; Building washdown recirculated to AD process; Hydrocarbon interceptor and grit trap for surface water runoff; Hard standing area for refuelling; Shut off valve at discharge point; Emergency Spill Kit. Emergency spill management plan;	**Imperceptible**	Neutral
Increased rate of runoff from the site leading to flooding	Long Term	**Moderate**	Negative	SuDS measures incorporated into surface water management at the site.	**Imperceptible**	Neutral
Uncontrolled discharge arising from the flooding of the site	Temporary	**Moderate**	Negative	Designed site storm water runoff drainage system; Designed SuDS measures incorporated into surface water management at the site.	**Imperceptible**	Neutral

REFERENCES

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Environmental Protection Agency, www.epa.ie

Water Framework Directive (Ireland), www.wfdireland.ie

Office of Public Works, *National Catchment Flood Risk Asessment and Management Programme*, PFRA maps online: www.crfram.ie

FIGURES

Figure 13-1 Site Location and Regional River Sub-Basins Catchment Map (1:50,000)

Figure 13-2 Site Location and Local River Sub-Basins Catchment Map (1:2,500)

Figure 13-3 WFD Water Management Units and Sub-Catchments (1:40,000)

Owens Bridge

WARD RIVER

BALLYSTRAHAN CATCHMENT

BALLYSTRAHAN STREAM

APPLICATION AREA

TOLKA CATCHMENT (LOWER)

TOLKA RIVER

N

W E

S

NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY MAP NO. 50

2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000713 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

3. SOURCE: RIVER SUB-BASINS (EPA 2012)

LEGEND

- APPLICATION AREA
- TOLKA CATCHMENT (LOWER RIVER SUB-BASIN)
- BALLYSTRAHAN STREAM CATCHMENT (PART OF THE WARD RIVER CATCHMENT)
- BALLYSTRAHAN STREAM

R2	EW	TP	07/13	
Revision	Drawn By	Chkd By	Date	Comments

CLIENT: STREAM BIOENERGY

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PROPOSED RENEWABLE BIOENERGY PLANT

HUNTSTOWN, NORTH ROAD, FINGLAS, DUBLIN 11

SITE LOCATION □ REGIONAL RI□ER SUB-BASINS CATCHMENT MA□

FIGURE 13.1

Scale	Date
1:50,000 @ A3	09.08.2013

BALLYSTRAHAN STREAM

BALLYSTRAHAN CATCHMENT

TOLKA CATCHMENT (LOWER)

JOHNSTOWN (ED BLANCHARDSTOWN)

COLDWINTERS

HUNTSTOWN (Part of)

N
W
E
S

NOTES

1. BASED ON 1:1000 & 1:2500 ORDNANCE SURVEY IRELAND DIGITAL MAPPING - MAP NO's. - 3063A, 3063C, 3062B, 3062C, 3062D, 3130A, 3130B, 3131-01 & 3131-06

2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000713 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- APPLICATION AREA
- REGIONAL CATCHMENT BOUNDARY BALLYSTRAHAN / TOLKA CATCHMENT LOWER (RIVER SUB-BASINS, EPA 2012)
- NATURAL DRAINAGE SYSTEM (WALKOVER SURVEY)
- DIRECTION OF FLOW IN SURFACE WATER COURSES
- REVISED SURFACE WATER CATCHMENT BOUNDARIES (BASED ON WALKOVER SURVEY & TOPO. SURVEY)
- BENEFITING LANDS (OPW)

Revision	Drawn By	Chkd By	Date	Comments
R2	EW	TP	07/13	

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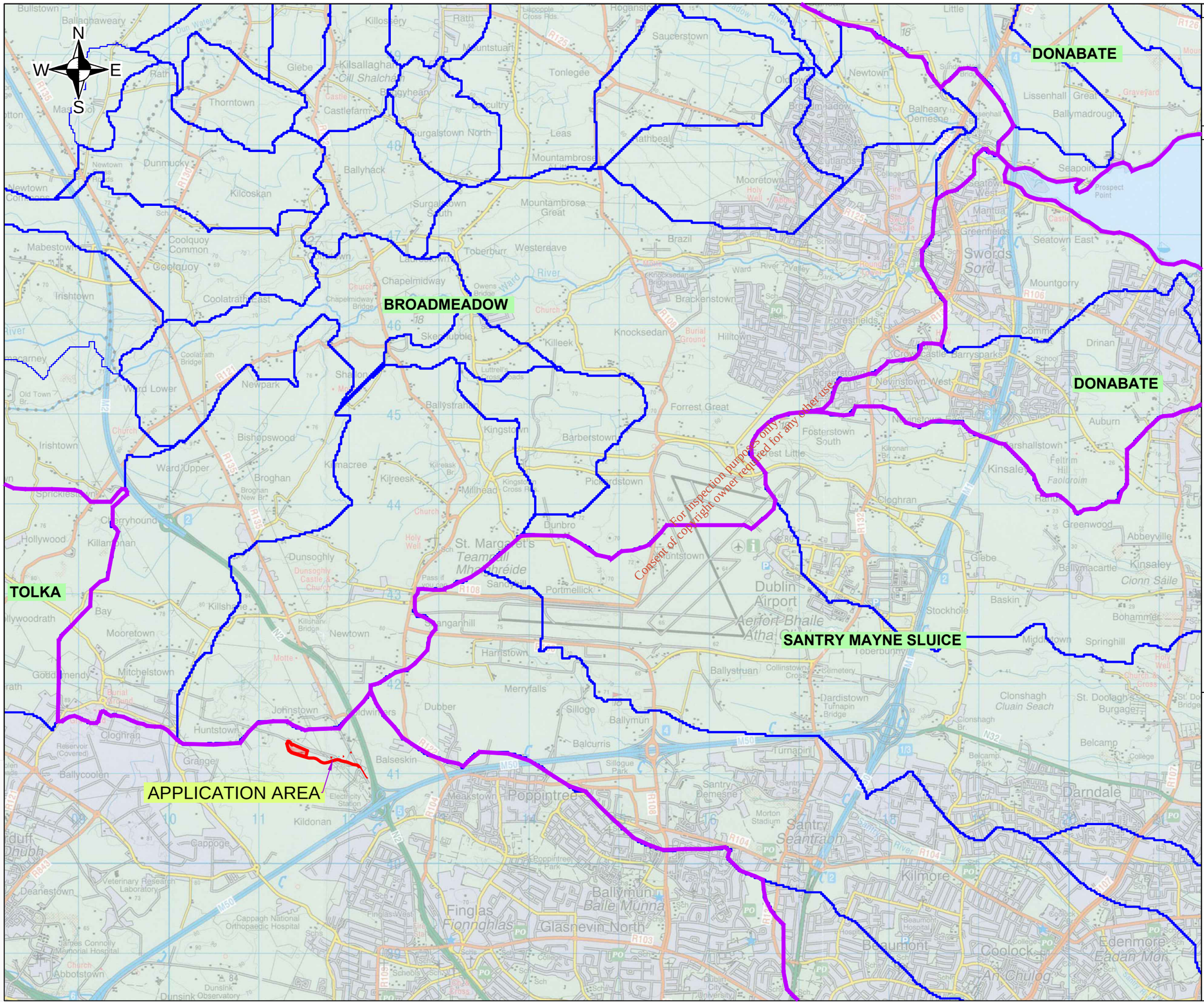
PROPOSED RENEWABLE BIOENERGY PLANT

HUNTSTOWN, NORTH ROAD, FINGLAS, DUBLIN 11

SITE LOCATION □LOCAL RI□ER SUB-BASINS CATCHMENT MA□

FIGURE 13.□

Scale	Date
1:2,500 @ A3	09.08.2013



NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY MAP NO. 50

2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000713 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

3. SOURCE: RIVER SUB-BASINS (EPA 2012)

LEGEND

APPLICATION AREA

SUB-CATCHMENTS

WMU BOUNDARIES

R2	EW	TP	07/13	
Revision	Drawn By	Chkd By	Date	Comments

CLIENT: STREAM BIOENERGY

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PROPOSED HUNTSTOWN BIOENERGY PLANT

HUNTSTOWN, NORTH ROAD, FINGLAS, DUBLIN 11

TITLE: WFD WATER MANAGEMENT UNITS & SUB-CATCHMENTS

FIGURE 13.3

Scale	Date
1:40,000 @ A3	09.08.2013

APPENDICES (See Volume III)

Appendix 13-1 WFD Report for Ballystrahan Upper river water body

Appendix 13-2 Office of Public Works Consultation Response

Appendix 13-3 SLR Proposed Drainage Strategy Report