Cooley Distillery IPPC Review Application Attachments

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Attachment A.1 Certificate of Incorporation

Short Certificate of Incorporation of a Company

(Electronic Form, for Public Service Use only)

I hereby certify

that company number **125363**,

COOLEY DISTILLERY PUBLIC LIMITED COMPANY,

was Incorporated under the Companies Acts, 1963 to 1986,

as a Limited Company on

Wednesday, the 30th day of September, 1987.

Certified by me at Dublin, this **Thursday, the 26th day of April, 2007.**

(6C3814)

Registrar of Companies

Paul Farrell

Companies Act 1963, section 370(1); Electronic Commerce Act 2000, sections 12 and 13

Note

The above certificate of incorporation is furnished free of charge by the registrar of companies and is valid solely for public service use. A process has been put in place whereby, where necessary, the certificate may be verified by a public service body on inquiry to the registrar.

The applicant for any public service who is required to produce a certificate of incorporation must certify below that the certificate has not been tampered with in any way. The certificate shall be retained by the public service organisation that requires its delivery and may be used as evidence of any wrongful use.

I, (name) Leonard Mathers

of (address) Cooley Distillery, Riverstown, Dundalk Co. Louth

hereby declare that this is one and the same as the Certificate of Incorporation of the above company that was made available electronically, for public service use, at my request, by the registrar of companies. I further declare that to the best of my knowledge, information and belief, the said Certificate has not been altered or amended in any way. I acknowledge that it is a criminal offence to forge a public document with intent to defraud or deceive, and that it is an offence to utter a forged document with intent to defraud or deceive, in each case punishable with imprisonment for a term not exceeding two years.

I make this Declaration for the benefit of

(name of public body) ____________________

to whom I am furnishing the Certificate.

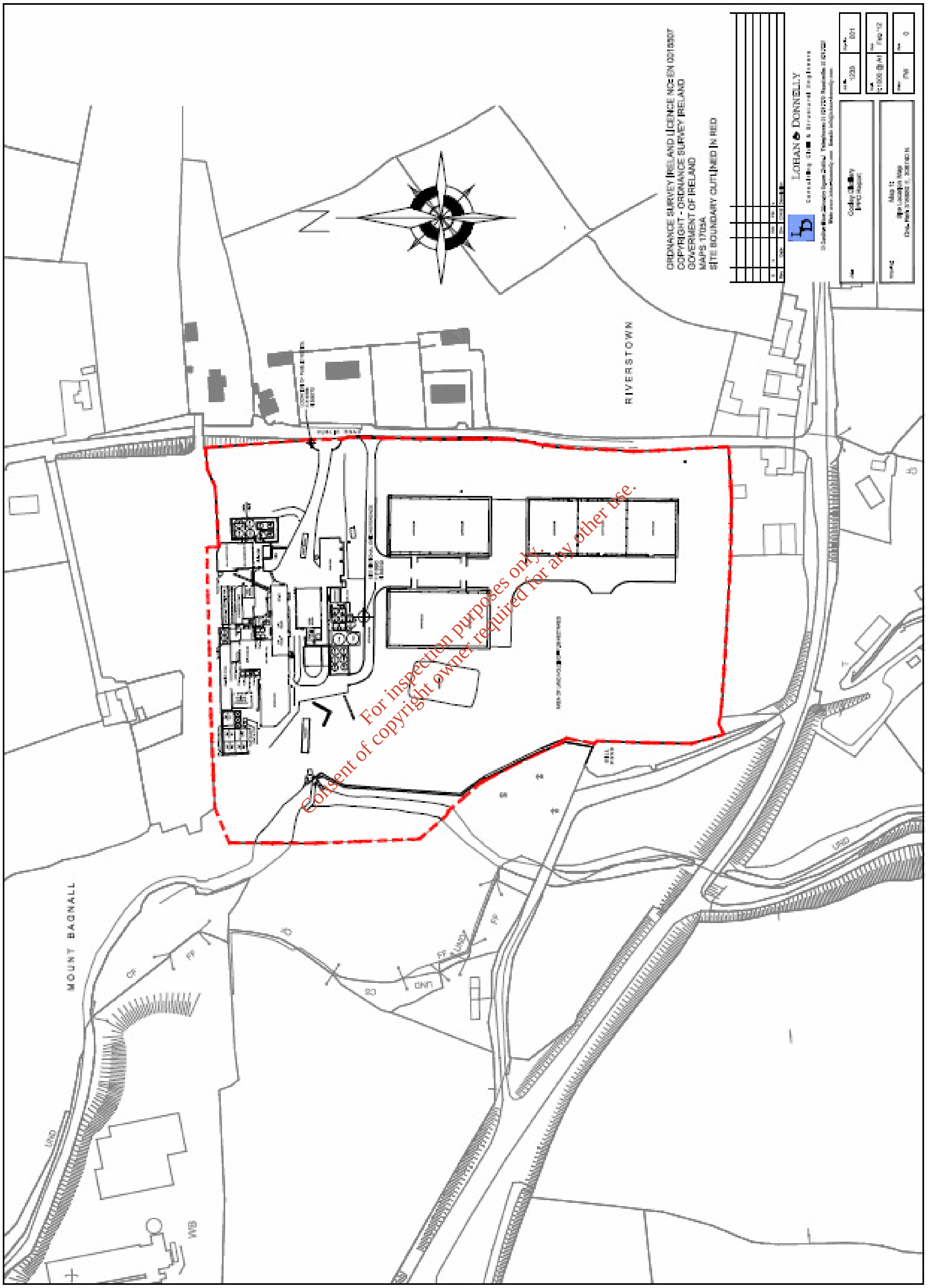
[signature] 26-4-07

Signature of Applicant Date

Forgery Act 1913, section 4 and 6

For inspection purposes only. Consent of copyright owner required for any other use.

Attachment A.2 Location Map



Attachment B.1 Emissions to Surface Waters &/or Ground

Water Emission at Cooley Distillery

1. SE-1 Cooling water Discharge

SE-1 is the cooling water discharge to the River Big (Piedmont). Cooling water is discharged to this river via a cascade, which both aerates and reduces the temperature prior to its discharge. The cooling water discharges at a weir in the river. The current licensed max flow per day is 1,920m^3/day, and 81m^3/hour.

2. SE-3 Combined effluent & cooling water discharge to sea

SE-3 is the combined treated process effluent and cooling water to the Irish Sea. The cooling water is discharged to the sea outfall in order to maintain sufficient flow velocity in the pipeline to prevent seawater ingress. The process effluent on site receives biological treatment and tertiary treatment (reedbed) prior to mixing with the cooling water. The current licensed max flow per day is 600m^3/day, and 27m^3/hour.

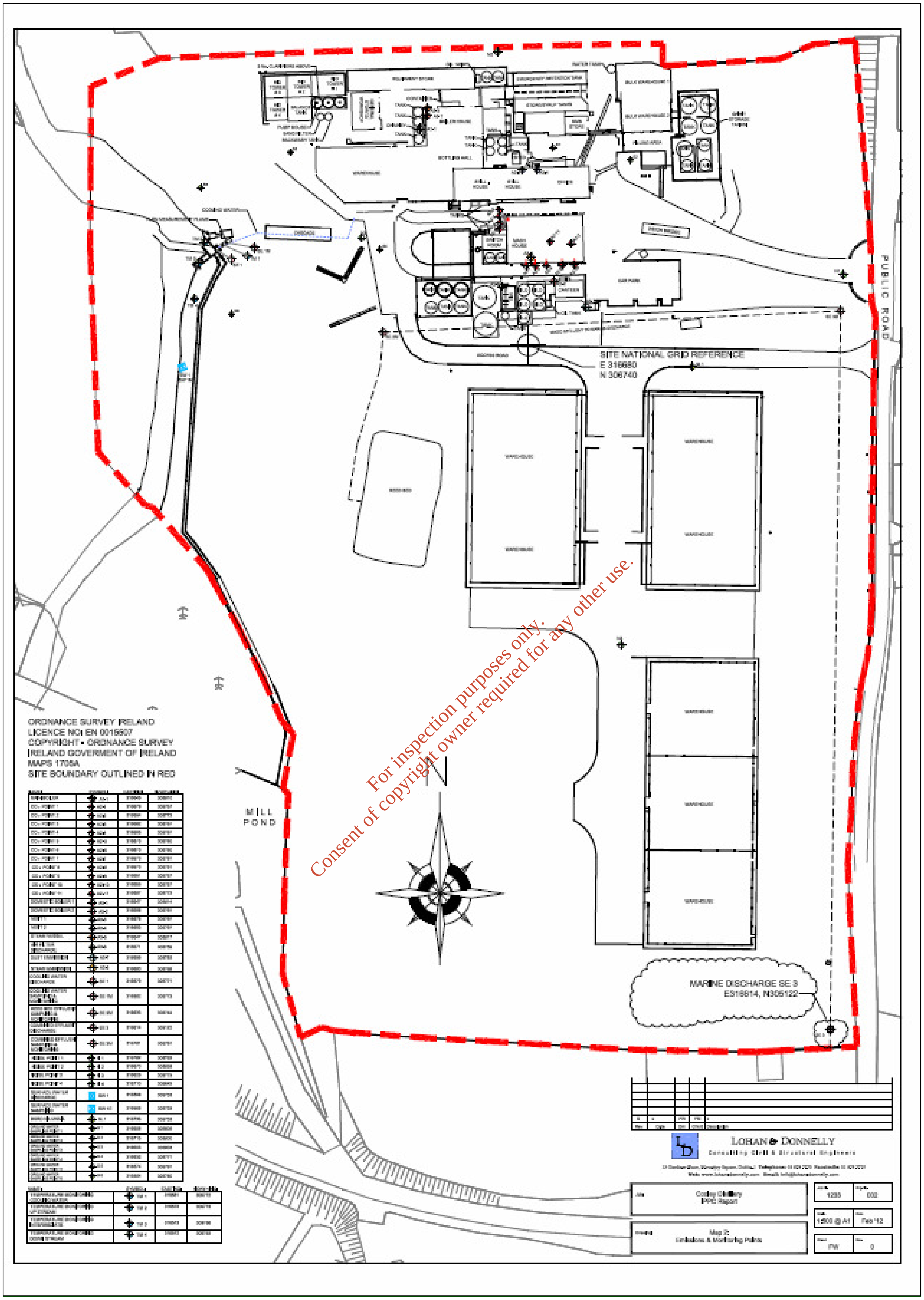
3. SW-1

SW-1 is the storm water from impervious areas on site which discharges to the River Big (Piedmont). There is presently no interceptor on this discharge, however a part of a recent firewater risk management programme, the distillery has proposed to install a Class I oil and grit interceptor on the storm water system.

4. SL1

SL1 is the discharge to ground (percolation area) from the Bord na Mona packaged treatment system which treats the sites sanitary effluent.

Emission Maps (Map 2)

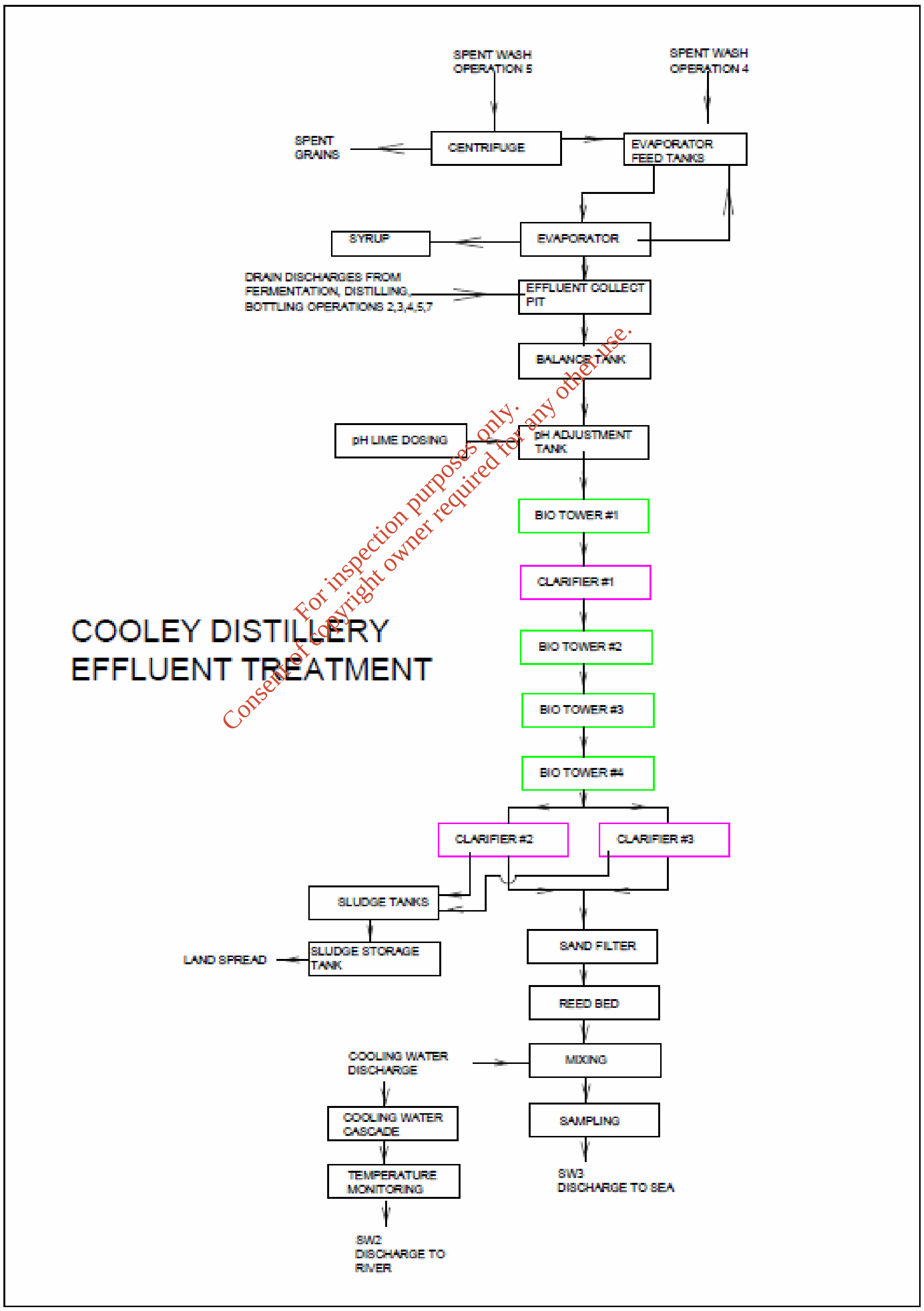


Attachment B.2 Tabular Data on Emission Points to surface water

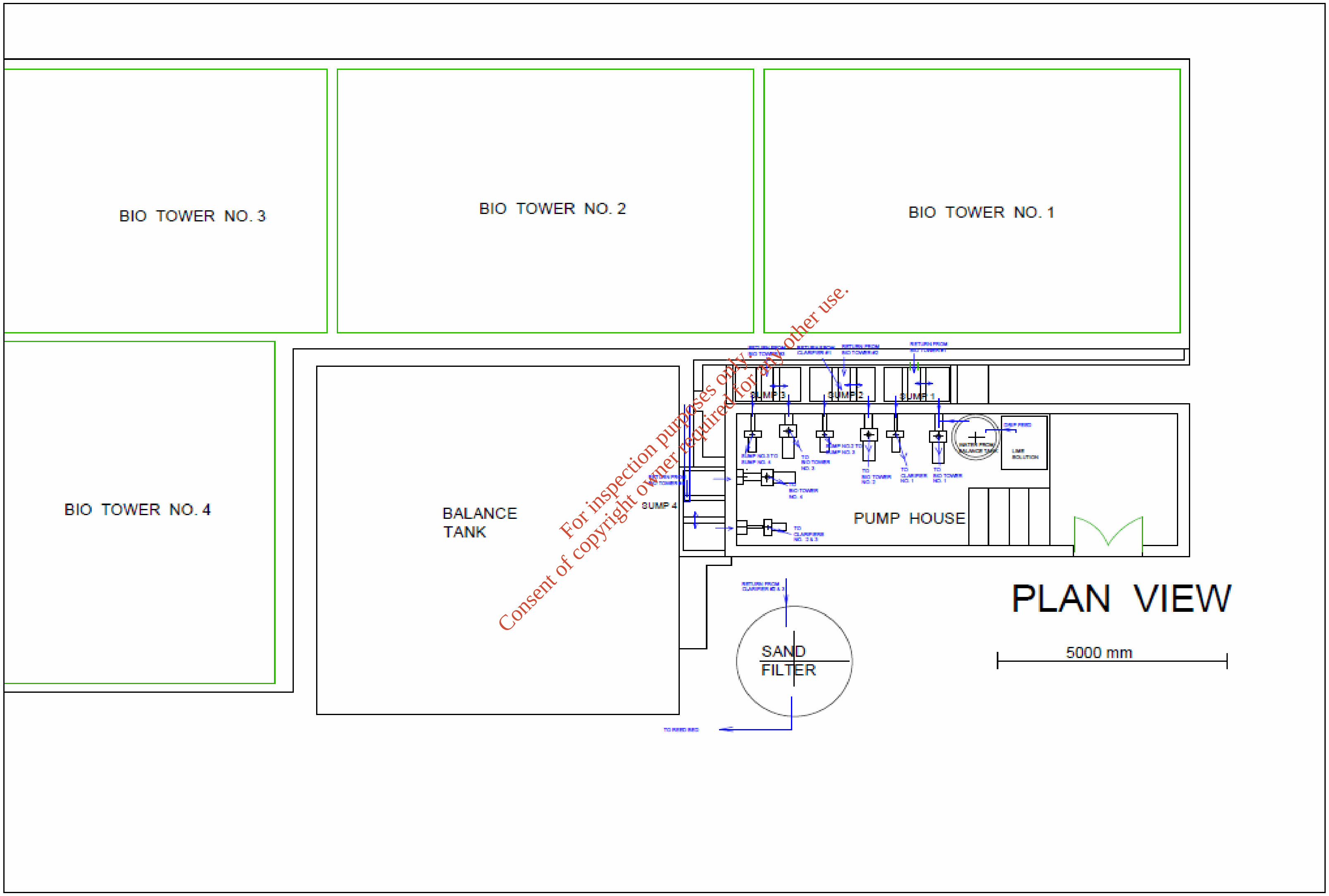
Point Code	Easting	Northing	Verified	Emission
SE-1 Cooling water	316579	306771	Y = GPS used	Temperature
SE-3 Combined Treated Effluent & cooling Water	316614	305122	N = GPS not used	Suspended solids, pH, BOD, BOD, Nitrates, Ammonia, Total Phosphorus, Copper, Lead, Zinc & Mineral oil.
SW-1 Storm Water	316569	306733	Y = GPS used	pH, COD
SL-1 Percolation area	316733	306733	Y = GPS used	BOD

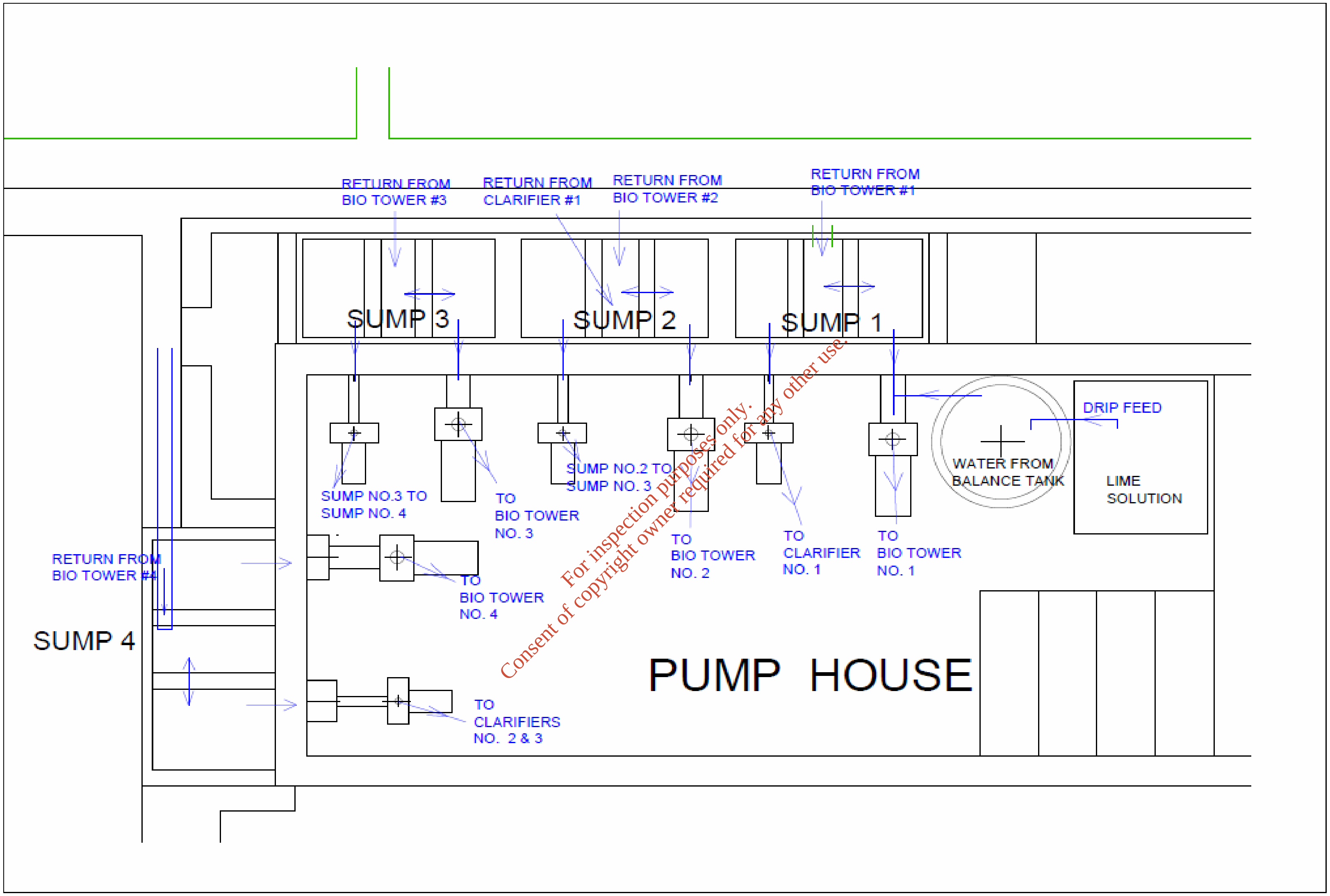
Attachment C.1 Treatment, Abatement and Control Systems

Cooley Distillery WWTP Flow Diagram



Cooley Distillery WWTP Schematics




RETURN FROM
BIO TOWER #3
RETURN FROM
CLARIFIER #1
RETURN FROM
BIO TOWER #2
RETURN FROM
BIO TOWER #1
SUMP 3
SUMP 2
SUMP 1
DRIP FEED
WATER FROM
BALANCE TANK
LIME
SOLUTION
SUMP NO.3 TO
SUMP NO. 4
TO
BIO TOWER
NO. 3
SUMP NO.2 TO
SUMP NO. 3
TO
BIO TOWER
NO. 2
TO
CLARIFIER
NO. 1
TO
BIO TOWER
NO. 1
RETURN FROM
BIO TOWER #4
TO
BIO TOWER
NO. 4
SUMP 4
PUMP HOUSE
TO
CLARIFIERS
NO. 2 & 3

Cooley Distillery WWTP (SE-2)

The Cooley Distillery WWTP consists of the following stages (in sequence):

1. Balance Tank

The inconsistency of the incoming effluent from the site is required to be adequately stabilised in a balance tank. The full capacity of the balance tank is 269m^3. The main function of the tank is to operate as a buffer zone, to allow a steady flow and loading. From here effluent is pumped to the biotowers.

2. Lime Dosing

Prior to the balanced effluent entering the Biotowers, the effluent is neutralised with lime being dissolved into lime slurry and dosed into the raw effluent. The pH in the raw effluent is at approx 4.01 and this pH is increased for optimum bacteria conditions in the biotowers.

3. Biotowers

There are 4 No. biotowers in the WWTP. The total wetting area is 197m^2 while the total volume of media is 1187m^2. Each bio-tower is designed with a three chamber system. The raw effluent flows to the first chamber where it is pumped up to the top of the biotower. The treated effluent flows into the second chamber which can pass under the wall back to chamber 1 as recycled effluent. The forward feed consists of raw effluent mixed with recycled treated effluent. The biotowers are designed to remove BOD.

4. Clarifiers

The 3 No. clarifiers (30.2m^2) allow suspended solids settle to the bottom of the clarifier leaving a clearer effluent. If desludging of the clarifiers is required then the sludge is sent to the sludge holding tank. The sludge is landspread in accordance with a nutrient management plan on approved landbanks.

5. Sand Filter

The sand filter (7.3m^3) with a backwash system provides a tertiary stage of treatment.

6. Reed bed

The reed bed (861m^2) located on site provides a second tertiary stage of treatment prior to discharge.

7. Discharge

The overflow from reed bed drains to SE-2 where there is a 24 hour flow proportional composite sampler here for monitoring the treated effluent. Both flow and temperature continuously measured on the discharge. The treated effluent combines with cooling water in a chamber (SE-3) and is conveyed c.1 km into the Irish Sea.

In Treatment Effluent Control Monitoring

The following table details the analysis and frequency undertaken currently by Cooley Distillery for the efficient WWTP control and operation in accordance with Schedule C.2.1 of their IPPC Licence.

Parameter	Continuous	Daily	Other
Balancing Tank			
BOD			**Weekly**
COD		X	
pH	X	X	
Flow	X		
Suspended solids			**Twice Weekly**
pH Correction Tank			
pH	X		
2 No. Intermediate Clarifiers			
pH	X		
Final Clarifier			
Suspended solids			**3 No. per week**
COD			**3 No. per week**
pH	X		
Flow		X	
Sand Filter			
Suspended solids			**3 No. per week**
Reed Bed			
Flow	X		

Table 1 In treatment effluent control monitoring

In addition to the in treatment analysis outlined above; a check sheet is completed by the WWTP operator to ensure that all WWTP equipment is operating correctly.

Final Effluent Treatment Monitoring

The final treated effluent is monitored at SE-2 in accordance with the IPPC licence requirements. A summary of the monitoring currently conducted at SE-1 is provided in the table below.

Parameter	Continuous	Daily	Weekly	Quarterly
Flow	X			
Temperature	X			
Suspended Solids			X	
pH			X	
BOD			X	
COD			X	
Nitrates (as N)			X	
Total Ammonia			X	
Total Phosphorus				X
Copper, Lead & Zinc				X
Mineral Oil				X

Table 2 Final treated effluent monitoring

Final Treated Effluent Parameters

The final treated effluent (SE-2) Emission limit Values (ELV's) are detailed below.

Final effluent (SE-2)	Units	Current IPPC Licence ELV's
Flow per day	m^3/day	400
Flow per hour	m^3/hr	18
Temperature	°C	<25
pH	pH units	6 - 9
BOD	(mg/l)	100
COD	(mg/l)	500
Suspended Solids	(mg/l)	50
Ammonia (NH_3)	(mg/l)	10
Copper	(mg/l)	0.5
Lead	(mg/l)	0.2
Zinc	(mg/l)	20.2
Mineral Oil	(mg/l)	1

Table 3 Final treated effluent emission limit values at SE-2

Corrective Action

Corrective action seeks to achieve positive change in performance. A check sheet is completed by the trained WWTP operator at Cooley Distillery to ensure that all WWTP equipment is operating correctly.

If there are any discrepancies with the WWTP analysis or the operation of the wastewater treatment plant action has to be taken. The corrective actions for the operation of the wastewater treatment plant are outlined in the Environmental Management System.

Cooley Distillery Cooling Water System (SE-1)

SE-1 is the cooling water discharge to the River Big (Piedmont). Cooling water is discharged to this river via a cascade, which both aerates and reduces the temperature prior to its discharge. The cooling water discharges at a weir in the river. The current licensed max flow per day is 1,920m^3/day and 81m^3/hour.

The cooling water emission is monitored at SE-1 in accordance with the IPPC licence requirements. A summary of the monitoring currently conducted at SE-1 is provided in the table below.

Parameter	Continuous	Monthly	Quarterly
Flow	X		
Temperature	X		
pH	X	X	
BOD		X	
COD		X	
Suspended Solids		X	
Total Ammonia		X	
Copper			X

Table 4 Cooling water monitoring (SE-1)

Furthermore, ambient monitoring as detailed below is taken upstream (TM2) and downstream of the cooling water emission (TM3 & TM4) for temperature on a continuous basis.

Parameter	Continuous	Monthly	Quarterly
Flow	X		
Temperature	X		
pH	X	X	
BOD		X	
COD		X	
Suspended Solids		X	
Total Ammonia		X	
Copper			X

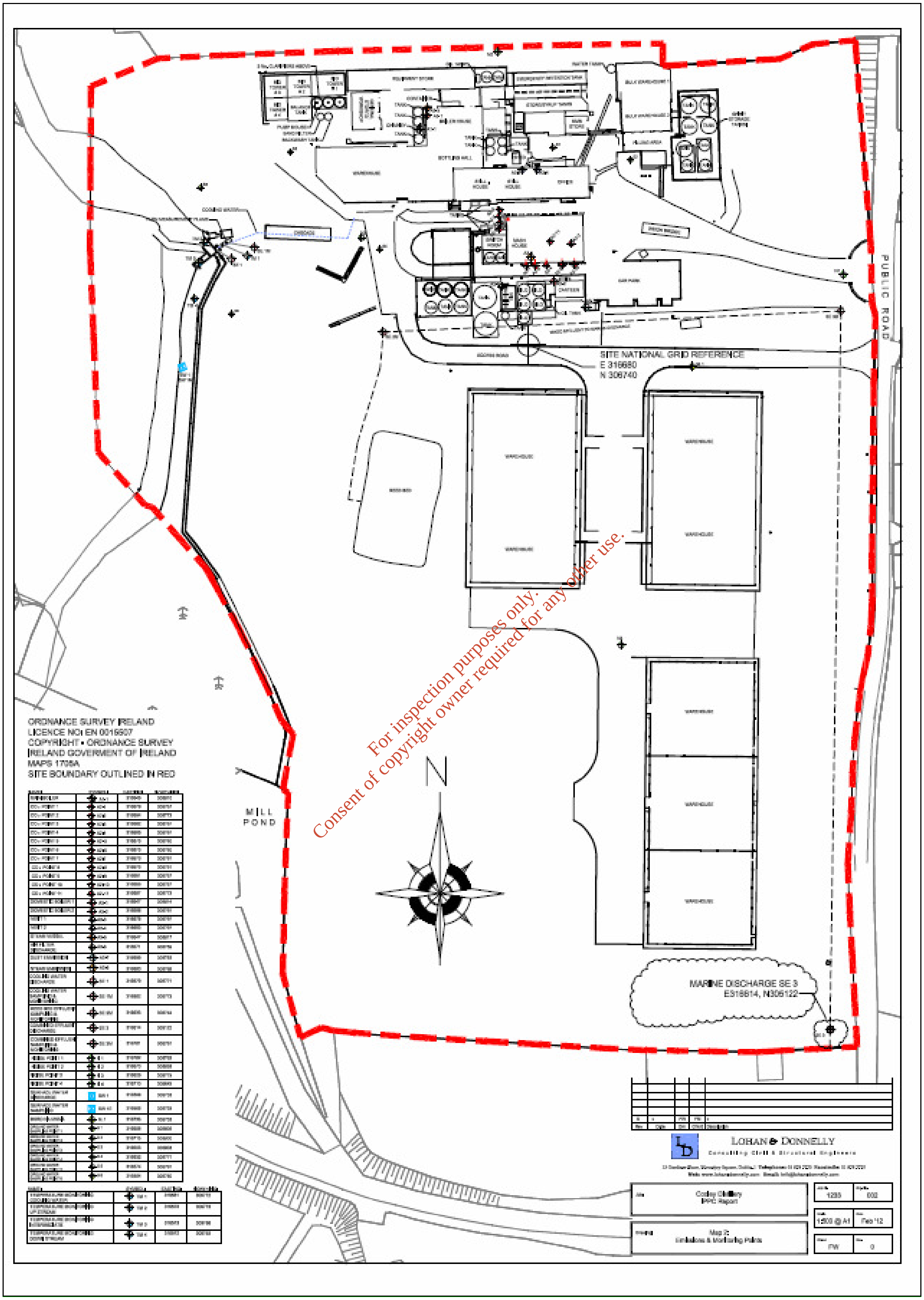
Table 5 Ambient river monitoring upstream at TM2

Attachment C.3 Tabular Data on Monitoring and Sampling Points

Point Code	Point Type	Easting	Northing	Verified	Pollutant
SE-1 M (Composite*)	S & M	316582	306773	Y	Temperature
SE-2 M Reed Bed Effluent (Composite*)	S & M	316633	306744	Y	Suspended solids, pH, BOD, BOD, Nitrates, Ammonia, Total Phosphorus, Copper, Lead, Zinc & Mineral oil.
SE-3 M Combined Treated Effluent & cooling Water (Composite*)	S & M	316761	306751	Y	Suspended solids, pH, BOD, BOD, Nitrates, Ammonia, Total Phosphorus, Copper, Lead, Zinc & Mineral oil.
SW-1 M Storm water runoff (pipe)	S	316568	306733	Y	pH, COD
S1 (Groundwater) S2 (Groundwater)	S S	316688 316713	306805 306800	Y Y	N/A N/A
S3 (Groundwater)	S	316603	306803	Y	N/A
S4 (Groundwater)	S	316632	306771	Y	N/A
S5 (Groundwater)	S	316574	306791	Y	N/A
S6 (Groundwater)	S	316584	306750	Y	N/A
TM1 (Cooling Water)	S & M	316581	306772	Yes	Temperature
TM2 (River Upstream)	S	316575	306773	Y	N/A
TM3 (River Intermediate)	S	316573	306766	Y	N/A
TM4 (River Downstream)	S	316572	306755	Y	N/A

*24 hour flow proportional composite samplers in place

Emission Monitoring Map (Map 2)



Attachment D.1.1 Assessment of impact on the receiving waters

Attachment D.1.1 (A) Assimilative Capacity Study for combined effluent and cooling water emission to Dundalk Bay

A report on the assimilative capacity of Dundalk Bay, Co. Louth.

Prepared for David Kelly and Associates,
Environmental Consultants,
Dublin.

By Aqua-Fact International Services Ltd.,
12, Kilkerrin Park,
Galway.
May 2004.

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Appendix I. Faunal data

1. Introduction

D. Kelly and Associates, Environmental Consultants, commissioned Aqua-Fact International Services Ltd to carry out a marine survey in Dundalk Bay, Co. Louth on behalf of his client who discharges treated organic wastewater to the bay via a sea outfall pipe. The discharge point is located in shallow water ca 500 m offshore. As part of a proposed discharge permit review being undertaken by the Company it became necessary to establish a number of aspects relating to the receiving system as follows:

Flora and Fauna – current status.

This would entail generating a qualitative indication of the flora and fauna in the general vicinity of the discharge.

Chemical status

Water quality in the vicinity of the outfall was to be established to determine the extent of the impact of the discharge on water quality. The key environmental characteristics of the wastewater are BOD and suspended solids.

Assimililative capacity

The most important part of the work was to establish assimilative capacity of the receiving water primarily for the biodegradable organic content of the wastewater in the vicinity of the discharge point. The physical measurements of the field study would be used to validate a computer-generated estimation of the BOD as it disperses in Dundalk Bay through tidal flushing. The model should also provide a spatial mapping/presentation of the degree of dilution available with progressive distance from the discharge point.

The quality of detail in the output of the study was to be suitable to form a sufficient basis for the client, assisted by D Kelly & Associates, to make a credible projection of a suitable discharge allowance in their subsequent negotiations with the Regulatory Authority.

Specifically, Aqua-Fact were to carry out the following:

1. Water quality and sediment biology.

Collect water and duplicate sediment samples from a selected number (ca 6) of sites in the direction of the prevailing current (North/South), see Figure 1 and to analyse the water for orthophosphate, ammonia, nitrite, nitrate, B.O.D. and suspended solids. Sediments were to analysed for organic carbon, redox depth, granulometry and macrobenthic invertebrates. The results of these analyses were to provide data to comment on the environmental status of the sea and the sea bed.

2. Develop a mathematical model of the area.

In order to be able to develop such a model, data on currents and tidal heights needed to be collected. This was to be achieved by deploying current meters and tide gauges both at the site and at selected boundaries to the modelled area for at least a two week period to allow for Springs and Neap tidal data to be collected. Bathymetric data from the appropriate Admiralty Chart were to be digitised and the velocity, direction and tidal height data were to be used to calibrate the model. Dye studies at Spring and Neap tides were to be carried out by introducing a slug of dye into the effluent pipe at the distillery site using the flow rate that the plant normally work at. These results were also to be used to calibrate and validate the model.

Effluent characteristics and flow were to be provided by Cooley Distillery Ltd.

3. Prepare a report the assimilative capacity of Dundalk Bay in the vicinity of the long sea outfall pipe.

2. MATERIALS AND METHODS

2.1. Position fixing

Dynamic horizontal positioning for the survey boat was achieved by means of Differential Global Positioning system (DGPS), which delivered precise, homogenous and continuous navigational output over the entire study area. Regular checks were made against suitable control points to ensure integrity and cross-calibration between terrestrial and sounding data. A continuous real-time record of the survey track was made in conjunction with depth data output from the echo sounder.

2.2 Water quality studies

Seawater samples were collected at the locations in Figure 1. Parameters measured included salinity, temperature, dissolved oxygen, orthophosphate, ammonia, nitrite, nitrate, B.O.D. and suspended solids. The positions of the stations were fixed by DGPS.

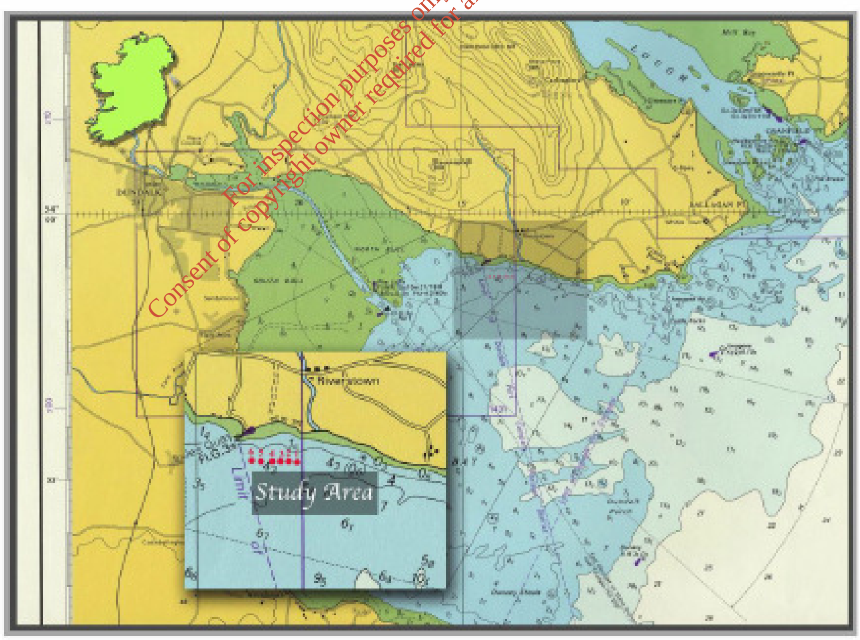


Figure 1: Study site sampling locations in Dundalk Bay, August 2003.

2.3 Granulometry

Due to the coarse nature of the sea bed at the outfall location, it was not possible to use a grab. A rectangular mouthed dredge (1.5 x 0.25 m) with a 1 mm mesh bag was used to collect samples from six subtidal sites located at right angles to the outfall pipe. A sub-sample was removed from the dredge for granulometric analysis. Granulometric analyses were carried out by dry sieve and laser methods. The sediment was visually inspected for anoxic conditions.

2.4 Sediment biology

The sample was washed through a 1 mm stainless steel sieve. The retained biological material was preserved in 70% alcohol for later identification and enumeration.

2.5 Dye studies

Dye dispersion studies were carried out at the outfall location at both spring and neap tides. Rhodamine WT was the fluorescent dye used and batches of dye were mixed with methanol and fresh water prior to release to achieve a density similar to that of the distillery waste.

Fluorimeter Specification

Fluorimeter:	Chelsea Instruments Minitracka II R In-situ Fluorimeter
Concentration Range:	0.03-100µg/l Rhodamine-WT
Resolution:	0.01 µg/l Rhodamine-WT
Excitation wavelength:	470/30 nm
Emission wavelength:	590/45 nm
Deck Unit: AQUA^{sirion} data logging interface unit	
Data Processor: Panasonic Toughbook with Pico software	

Prior to release, the fluorimeter was calibrated against the tracer used in the ambient seawater into which the tracer was to be released. This was done using a standard concentration solution. After the tracer was released from the plant and surfaced at sea, its dispersal was monitored visually, with its movement and expansion plotted through recording of positions with the DGPS unit.

Once it had dispersed sufficiently to monitor with the fluorimeter, transects were made regularly through the plume to record its progress. In addition to horizontal transects, vertical profiles from the centre of the plume were also taken.

The study was terminated when either the tracer plume was no longer visible and fluorimeter readings had returned to background levels or depth or light limitations curtailed movement of the boat.

2.6 Drogue studies

Window-blind type and designed to track currents at mid-water. An R.W. MUNRO digital, hand held anemometer was used to record wind speed and direction. It was initially planed that three groups of three current tracking drogues, released at the surface, mid-water and off-bottom, would be deployed at three stages during the tidal cycle at each of the proposed outfall points. The survey vessel was to track this drogue during the dye study and fix its positions at 30-minute intervals.

2.7 Current meter data

An Aandaara continuous recording current meter was deployed on site from 24th of July 2003 to the 31st of August 2003. The position of the meter was fixed by DGPS.

2.8 Tidal data

A CTD-Divers tide gauge was deployed in Dundalk Bay to automatically record tidal elevations for the study period. This unit was levelled to Ordnance Datum Poolbeg.

2.9 Modelling

A hydrodynamic and solute transport model for the area shown in Figure 7.1 was developed using DIVAST. The model area used in DIVAST is in order to ensure that the boundaries are sufficiently far enough away from the area of interest so that boundary effects do not adversely influence model results.

A grid spacing of 50m in two mutually orthogonal directions was used. The methodology for the study is detailed below.

DIVAST model:

- Develop bathymetric model of study area.
- Specify boundary conditions and perform preliminary model simulations.
- Calibrate the hydrodynamic model against the collected field data
- Validate the hydrodynamic model against the field data
- Develop a solute transport model based on the hydrodynamic bathymetric model.
- Calibrate the solute transport model against results from dye dispersion tests to optimise dispersion coefficients.
- Perform hydrodynamic simulations for tide and wind conditions.
- Perform solute transport simulations for discharge conditions.

Description of DIVAST

The model DIVAST was developed by Professor Roger Falconer at the University of Bradford about 17 years ago and is extended and upgraded on an ongoing basis. DIVAST (Depth Integrated Velocities and Solute Transport) is a two-dimensional, depth-integrated time-variant model, which has been developed for estuarine and coastal modelling. DIVAST consists of a number of modules, which can be activated according to the requirements of a particular problem e.g. the *hydrodynamic* and *solute transport* modules. The hydrodynamic model is capable of simulating tides, winds (wind induced stress and resulting currents) seabed friction, Coriolis force (responsible for surface slope) and discharge from rivers or outfalls.

The spread and fate of a solute in water is strongly dependent, *inter alia*, on the local water circulation patterns. Therefore, the solute transport model uses the output from the hydrodynamic model to compute concentrations of a particular solute in the water.

The solute transport model predicts the dispersion and dilution of the solute, taking into account the discharge rate and initial concentration, the decay rates, dissolved oxygen levels and temperature effects.

The DIVAST model is widely used in Ireland and the U.K. for many different types of hydro-environmental studies in coastal waters such as sewage effluent discharges, oil spill modelling, aquaculture assessment and water quality management planning. The mathematical formulation of the model is based on the well-validated Navier-Stokes equations that describe variations in current speeds and directions at discrete intervals of time. These equations have been well validated on many hydraulic engineering studies and are widely used for the type of problem considered in this study. DIVAST uses an implicit finite difference scheme to solve the Navier-Stokes equations for unsteady flow conditions. The finite difference technique is the most common method employed to solve these equations and is ideally suited for total water quality management of a water body as well as evaluating individual problems. The model has been used to date on more than 200 such studies throughout Ireland and the U.K. and has proven it to be a reliable tool for such analyses. DIVAST is an industry standard package for water quality model studies. Bathymetric data, current velocities and tidal ranges were input to the model and current velocity predictions were calculated for various stages of the tide.

3. RESULTS

3.1 A resumé of physical oceanographic conditions in inner Dundalk Bay.

Currents in Dundalk Bay are generated for the most part by tides and Spring tides extend to ca 5m above chart datum while Neaps only reach ca 2m over datum. These variations give rise to relatively weak velocities and Orren *et al.* (1989) and MSC (1994) record velocities of up to a maximum of ca 20 cms/sec. Dickson and Boelens (1988) note that residual currents in the area are weak and that there is little movement in Dundalk Bay. The inner bay is quite shallow throughout and because of this significant stratification at the outfall site will not occur. Orren *et al.* (1989) and Hydrographic Surveys (from Cooley Distillery Ltd.) both carried out drogue and dye release studies at the outfall site and the results of these studies also showed that velocities in the area are slack and that dye and drogue movements were not extensive i.e. ca 1 km over a flooding or ebbing tide. On a flooding tide, the direction is to the west northwest and on the ebbing tide, the water flows to the east. Given these low velocities, if winds are on-shore the wind-induced currents will be stronger that the tidal component and water will be driven on-shore. Prevailing wind direction in the area is from the southeast around to the southwest.

3.2 Water Chemistry

Table 3.2 shows the results for analyses carried out on the six water samples. Values for salinity, temperature and dissolved oxygen were similar at all stations and were as follows: 33.8S, 16.5 ° C and 89%.

ST.	NH3 mgl^{-1}	NO3 mgl^{-1}	NO2 mgl^{-1}	P mgl^{-1}	SS mgl^{-1}	B.O.D μgl^{-1}
1	0.015	0.009	0.001	0.005	5.20	2
2	0.010	0.002	0.001	0.013	5.25	2
3	0.013	0.003	0.001	0.120	6.45	<2
4	0.014	0.005	0.001	0.050	5.20	<2
5	0.021	0.004	0.001	0.065	9.85	2
6	0.010	0.002	0.001	0.009	10.35	<2

Table 3.2. Results of analyses for ammonia (NH4), nitrate (NO3), nitrite (NO2), phosphrous (P), suspended solids (SS) and biological oxygen demand (BOD) on six water samples collected in Dundalk Bay.

3.3 Granulometry

The results of the granulometric analyses are presented in Table 3.3 and show that Stations 1 and 2 are characterised by very coarse sands and gravels, with Station 1 having ca 27% very fine sand. At Stations 3 – 6, very fine sands make up the majority of the sediment type.

Sediment Type (mm)	St. 1	St. 2	St. 3	St. 4	St. 5	St. 6
Mud/Clay 0.063	0.92	0.06	31.10	28.10	15.80	18.40
Very Fine Sand 0.062-0.125	27.42	1.36	43.10	40.70	46.30	49.50
Fine Sand 0.125-0.25	4.24	3.34	22.30	18.50	25.90	24.30
Medium Sand 0.25-0.5	1.04	0.95	3.50	4.40	10.20	7.50
Coarse Sand 0.5-1.0	0.72	0.57	0.00	0.70	0.60	0.20
Very Coarse Sand 1.0-2.0	1.32	4.54	0.00	7.60	1.20	0.10
Gravel >2	64.34	89.18	0.00	0.00	0.00	0.00

Table 3.3. Results of granulometric analyses on samples collected in Dundalk Bay, 2003.

3.4 Sediment chemistry

Observations made on-board when the samples came aboard recorded that the sediments were an olive brown colour without any blackness and there was no smell of hydrogen sulphide. No *Beggiatoa* was recorded.

3.5 Sediment biology

The results of the biological analyses on the six dredge samples are presented in Appendix 1. In this present survey, a total of 122 taxa represented by 3 cnidarians, 1 nemertean, 2 sipunculids, 58 polychaetes, 21 molluscs, 23 arthropods, 11 echinoderms and 2 urochords were recorded. Station 1 had a mixture of both infaunal and epifaunal species while Station 2 was dominated by the ascidian, *Ascidiella scabra* with its associated epifaunal species. Stations 3 - 6 had a rich and diverse infaunal grouping and as a community the species fall into a mixture of an *Abra alba/Chamelea gallina/Amphiura filiformis* assemblage. Station 1 is closest to the *Abra* grouping while Stations 5 and 6 are more similar to the *Chamelea* assemblage.

3.6 Dye studies

The first dye release occurred during a neap tide on 5th September 2003. Weather conditions were good with a gentle (ca 3 m/s) breeze blowing from the south. As the exact location of the outfall point was not known, it was decided to release the dye into the waste stream at the distillery and note the position of the dye when it reached the sea. Four litres of dye were released into the waste pipe at the distillery at 11:49. By 12:18, the dye was noted forming a patch in the sea at 53° 58.99', 06° 13.40 (316600 E, 305220 W), the location of the outfall point. This was approximately 50 m from the shore at low water.

Figure 2 presents the outline of the dye patch from release to 15:40 while Figure 3 presents movement of the patch and dye concentrations from 12:51 to 16:34 from three transects taken through the patch at regular intervals on 5th September 2003. Low water occurred at 12:51 and the dye patch was followed during the floodingtide.

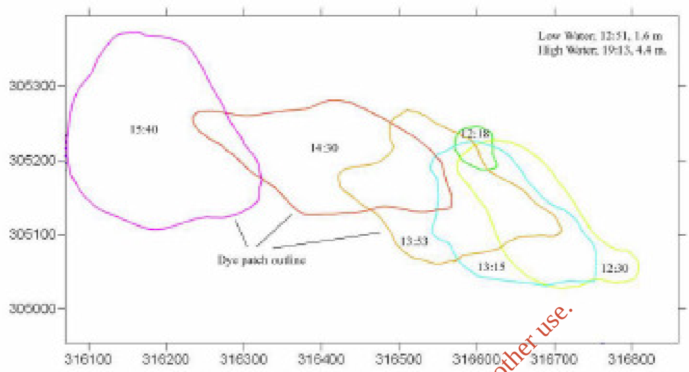


Figure 2. Progress of a dye patch initially released at the outfall location during a flooding neap tide in Dundalk Bay, 5/9/03.

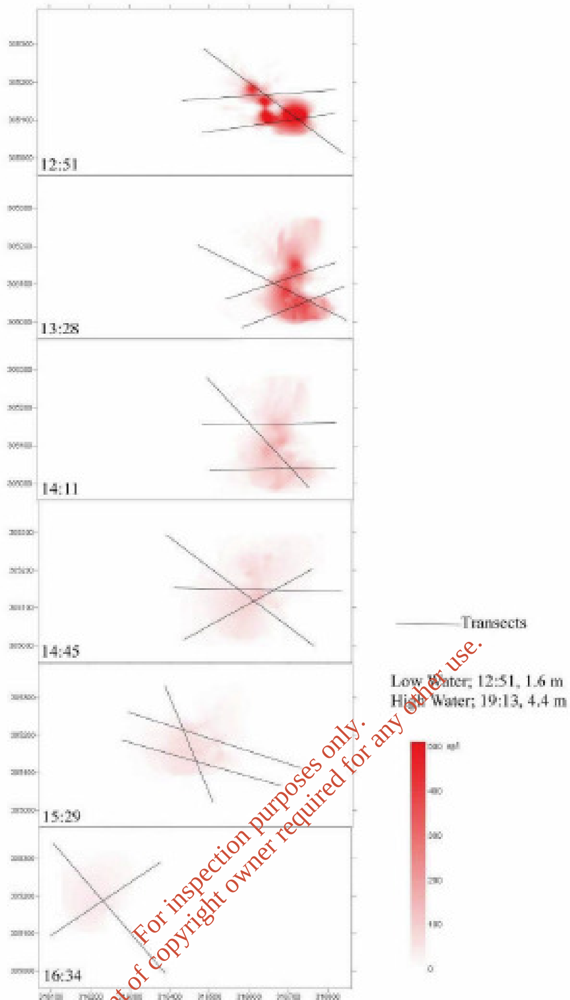


Figure 3. Dye concentration and progress during a neap tide in Dundalk Bay, 5/9/03.

There was little movement of the dye patch over the two hours following release with the patch expanded slowly from a central point as detailed in Figure 2. Transects through the patch show that dye concentrations reduced with time, as the dye patch moved in a westerly direction parallel to the shore (Figure 3).

A vertical profile of the patch carried out at 12:57 at 53° 58.93', 06° 13.30' (316646 E, 316648 N) revealed that the dye was mainly concentrated in the upper meter of water at the start of the study (Table 3.6.1).

Depth (m)	Concentration (µg/l)			
	12:57	13:36	14:52	16:39
0	606	223.5	69.1	45.7
0.5	606	235.8	71.6	40.7
1.0	43.2	185.2	74.1	33.3
1.5	0	49.4	74.1	18.5
2.0	0	2.5	69.1	5.2
2.5	0	2.5	12.3	0

Table 3.6.1. Dye concentrations relative to depth recorded during vertical profiles of the dye patch on 5/9/03.

The dye patch continued moving slowly west following a path parallel to the shore with concentrations reducing with time (see Figures 2 & 3.). By 16:34 only traces of dye were recorded in the water column although the dye patch had only progressed approximately 0.5 km from its release point. Additional vertical profiles taken at the centre of the patch at regular intervals indicated that the dye dispersed vertically in addition to its horizontal dispersion (see Table 3.6.2). Apart from the transects through the dye patch, spot checks and additional runs were made with the fluorimeter outside and surrounding the dye patch without picking up traces of dye.

A further dye study was carried out during spring tide conditions on the ebbing tide on the 10th December. Predicted high water occurred at 12:01 and dye was released into the water column at 12:57 close to the outfall point (316481 E, 305311 N). Weather conditions were good with a predominant light south-west wind. The dye patch expanded laterally in a north-south direction over the following half hour and also travelled in an easterly direction parallel to the shore. The first runs through the patch were carried out at 14:05 and the concentrations and movement of the patch over the study are presented in Figure 4.

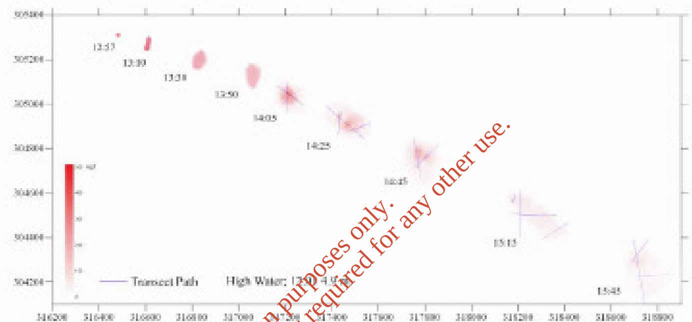


Figure 4. Dye concentrations and progress during a spring ebb tide from the outfall location, Dundalk Bay, 10/12/03.

In general, the patch travelled parallel to the shore with dye concentrations reducing progressively with time. By 15:45 the dye had progressed approximately 2.3 km along the coast when the study was terminated due to low light conditions. Vertical profiles of the patch (Table 3.6.2) taken at 14:09 (317274 E, 305012 N) and 15:49 (318866 E, 304237 N) indicate that the dye also dispersed through the water column with the higher concentration found in the top half of the column.

Depth (m)	Concentration (µg/l)	
	14:09	15:49
0	296.2	46.7
0.5	220.1	3.5
1.0	109.4	16.4
1.5	3.6	1.2
2.0	1.5	0
2.5	0	0

Table 3.6.2. Dye concentrations relative to depth recorded during vertical profiles of the dye patch on 10/12/03.

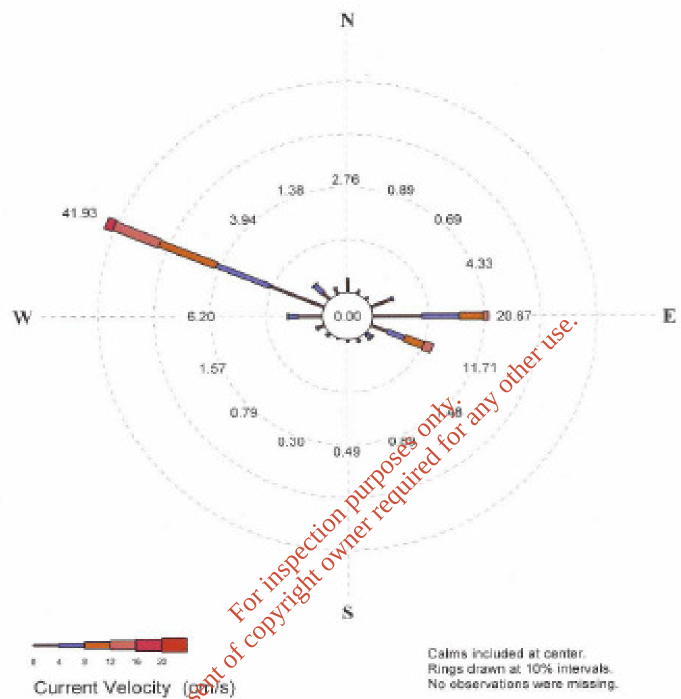
3.7 Drogue studies

The drogues were released at the same time as the dye was first observed off the shore. The drogue that was set to track the current within the dye patch moved in the same direction and at the same velocity as the dye patch while the deeper drogue, although following the same direction as the patch did not travel as far at the dye patch.

3.8 Current meter output

The current velocity and direction data collected by the current meter deployed at the outfall site between 21.VIII – 4.IX.'03 are presented in Figure 5.

Figure 5. Frequency Distribution of Current Velocity and Direction from Dundalk Bay, 21/8/03 - 4/9/03.



Calms included at center.
Rings drawn at 10% intervals.
No observations were missing.

PERCENT OCCURRENCE: Current Velocity (cm/s)
LOWER BOUND OF CATEGORY

DIR	0	4	8	12	16	20
N	2.76	0.00	0.00	0.00	0.00	0.00
NNE	0.89	0.00	0.00	0.00	0.00	0.00
NE	0.69	0.00	0.00	0.00	0.00	0.00
ENE	3.94	0.39	0.00	0.00	0.00	0.00
E	8.66	6.79	4.23	0.98	0.00	0.00
ESE	3.15	3.35	3.54	1.67	0.00	0.00
SE	0.39	0.79	0.30	0.00	0.00	0.00
SSE	0.69	0.20	0.00	0.00	0.00	0.00

TOTAL OBS = 1016 MISSING OBS = 0

PERCENT OCCURRENCE: Current Velocity (cm/s)
LOWER BOUND OF CATEGORY

DIR	0	4	8	12	16	20
S	0.49	0.00	0.00	0.00	0.00	0.00
SSW	0.30	0.00	0.00	0.00	0.00	0.00
SW	0.69	0.10	0.00	0.00	0.00	0.00
WSW	1.18	0.39	0.00	0.00	0.00	0.00
W	4.33	1.77	0.10	0.00	0.00	0.00
WNW	10.43	10.33	10.93	8.66	1.57	0.00
NW	1.77	1.97	0.20	0.00	0.00	0.00
NNW	1.28	0.10	0.00	0.00	0.00	0.00

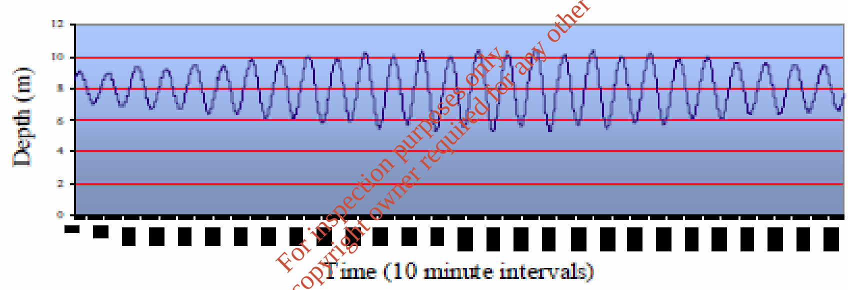
CALM OBS = 0 PERCENT CALM = 0.00

This shows a strong west north west/east component with ca 42%of the records representing the former direction and 21% the latter. 12% of the data are represented by an east/southeast component. The remaining 25% of the data are made up of small percentages of a variety of directions. Velocities were mostly between 0 – 20 cm/sec with only few records of velocities higher than 20 cm/sec. These measured data were compared to the velocities and directions predicted by the model and the level of similarity was found to be satisfactory.

3.9 Tidal data

The data recorded by the tidal gauge, over the period 21.VIII – 5.IX.'04, is presented in Figure 6.

Figure 6. Tidal Data Collected in Dundalk Bay, 21/8/03 - 5/9/03



The data show a neap/spring/neap cycle with minimal differences between high water and low water of ca 2 m being recorded at the start and at the end of the survey and maxima of ca 5 m during the middle of the observation period. These measured tidal elevation data were compared to modelled output and there was a very high level of similarity between the two data sets (see Figure 7.2).

3.10 Model output

Figure 7.1 represents the bathymetry of the area that was modelled. Water depths for most of the area are less than 10m but there is one deeper part in the eastern section of Dundalk Bay where depths of ca 15m occur.

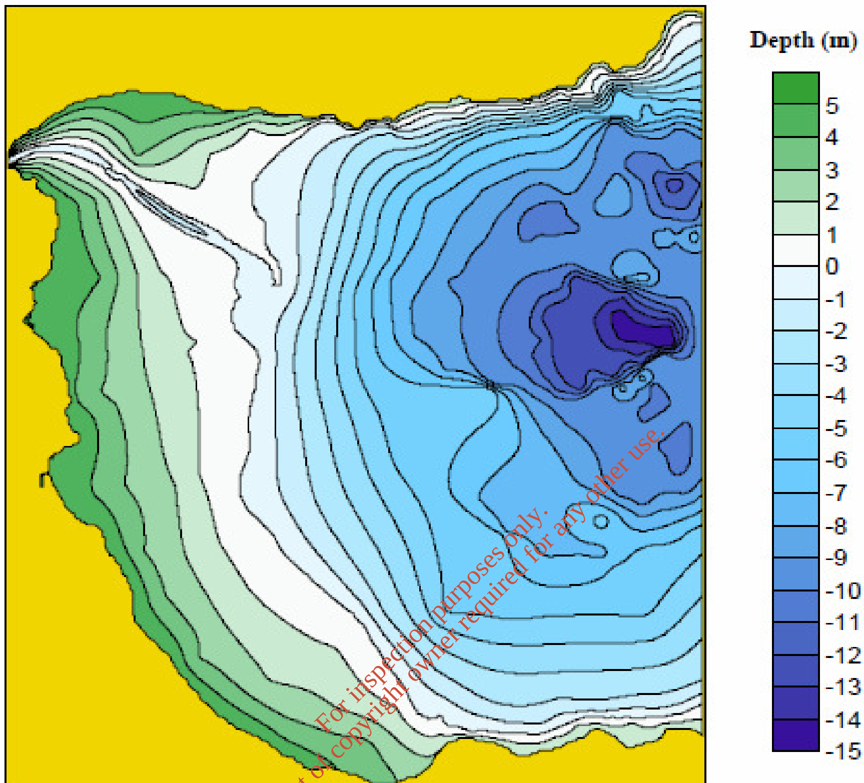


Figure 7.1 - Dundalk Bay – depth contours (m)

Figure 7.2 shows a comparison between modelled tidal heights and computed heights and, as can be seen, there is good agreement between the two.

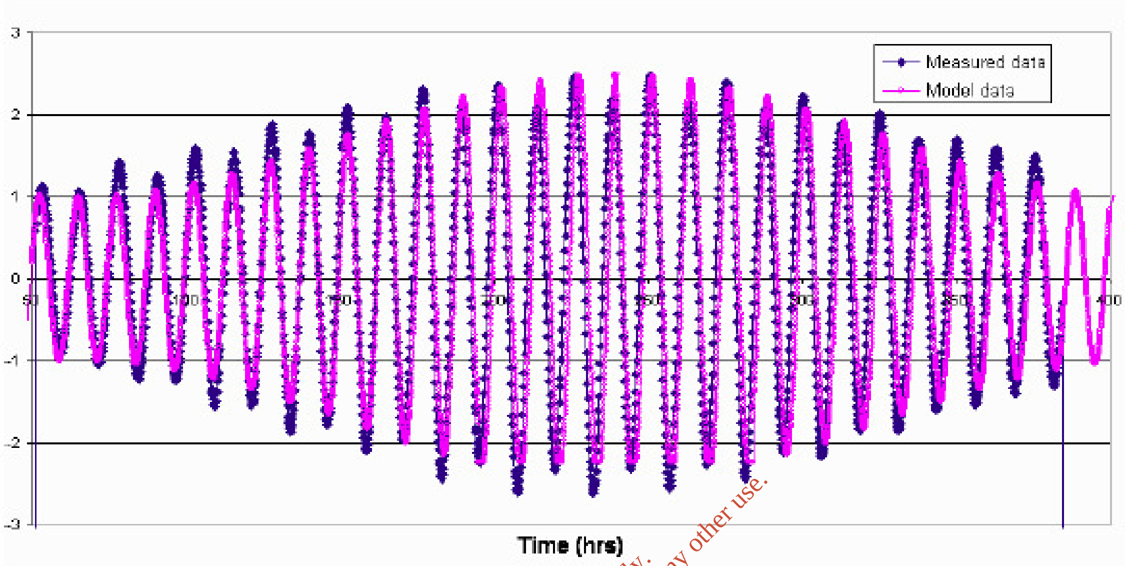


Figure 7.2 – Comparison of field data and output from model

Figures 8.1 – 8.8 show current velocities and directions (as vector plots) predicted by the model.

Figures 8.1 – 8.4 relate to predicted velocities on Neap tides while Figures 8.5 – 8.8 are simulations under Spring tide conditions. As can be expected, highest velocities are predicted for mid-flood and mid-ebb tides during Spring tides (see Figures 8.5 and 8.7) with lower velocities being predicted for Neap tides (see Figures 8.1 and 8.3).

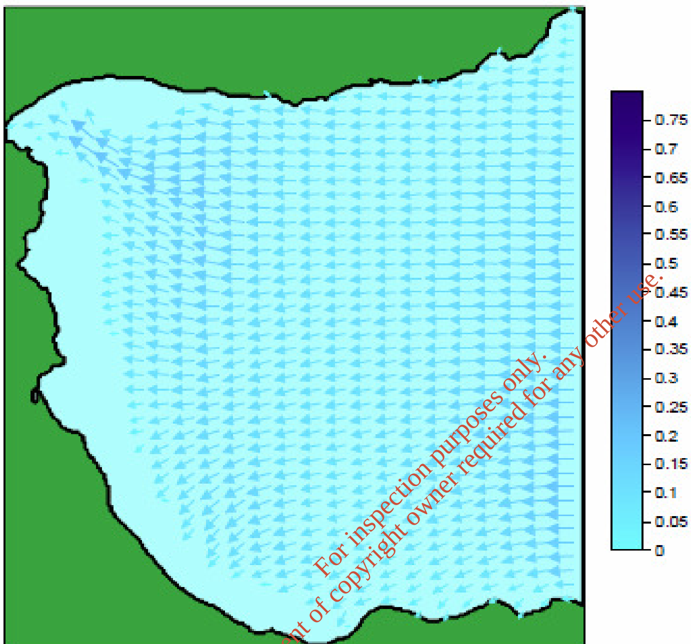


Figure 8.1 – Current velocity vectors (m/sec) calculated at mid-flood on a neap tide.

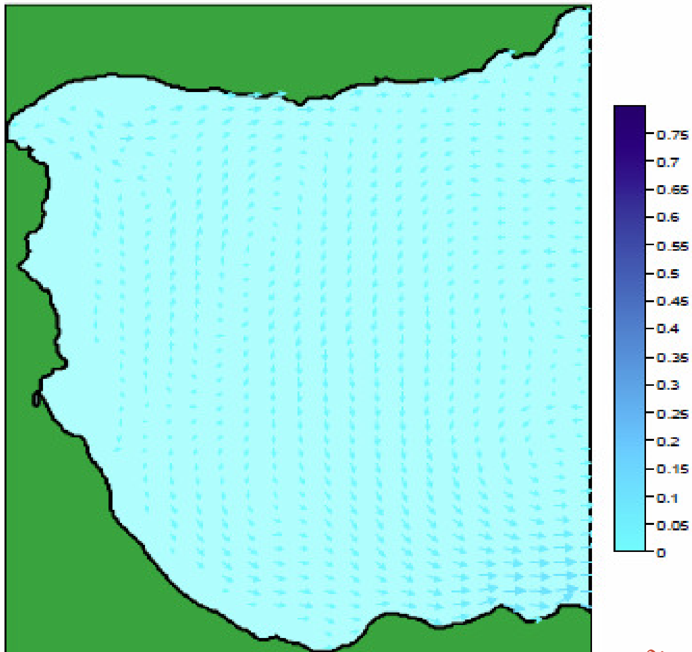


Figure 8.2 – Current velocity vectors (m/sec) calculated at high water on a neap tide.

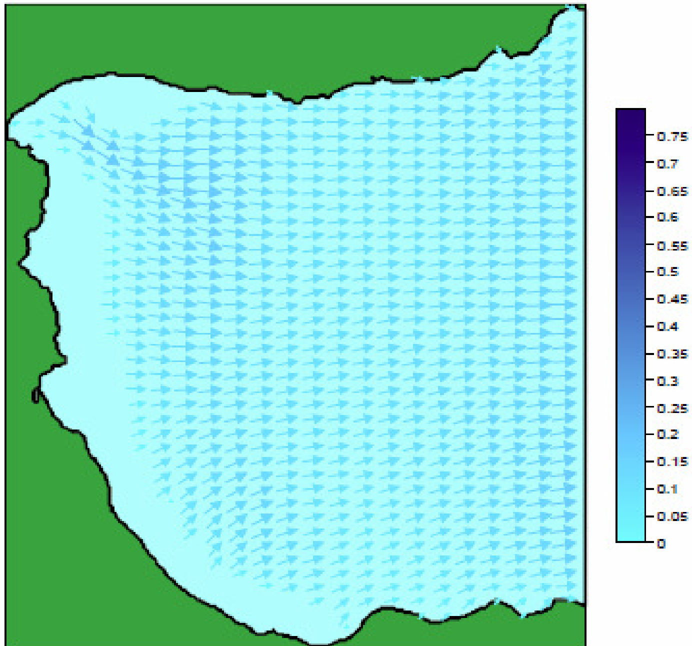


Figure 8.3 – Current velocity vectors (m/sec) calculated at mid-ebb on a neap tide.

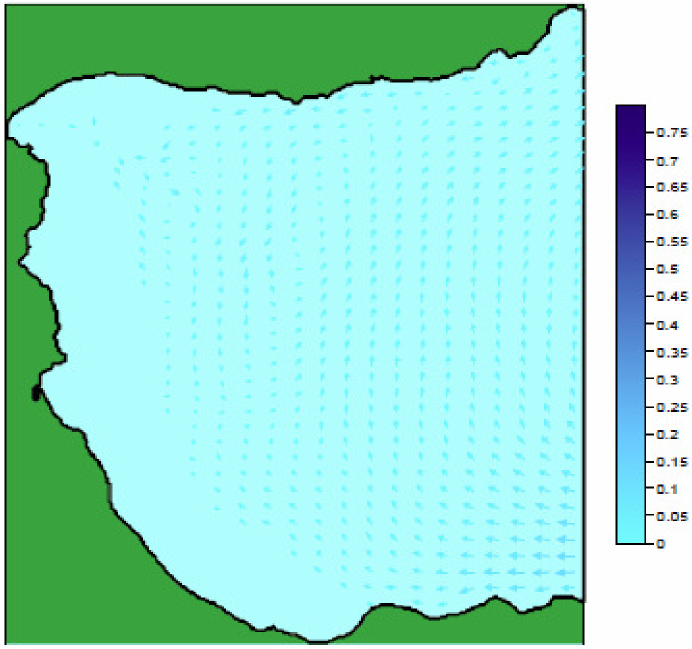


Figure 8.4 – Current velocity vectors (m/sec) calculated at low water on a neap tide.

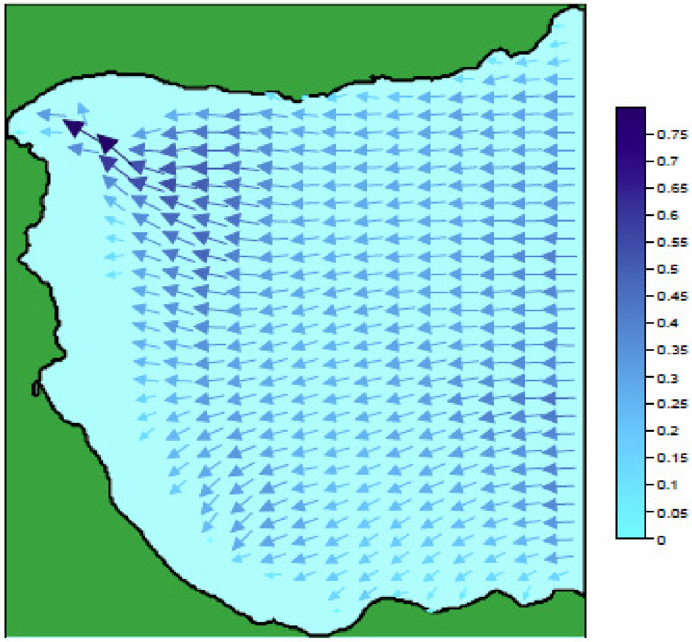


Figure 8. 5 – Current velocity vectors (m/sec) calculated at mid-flood on a spring tide.

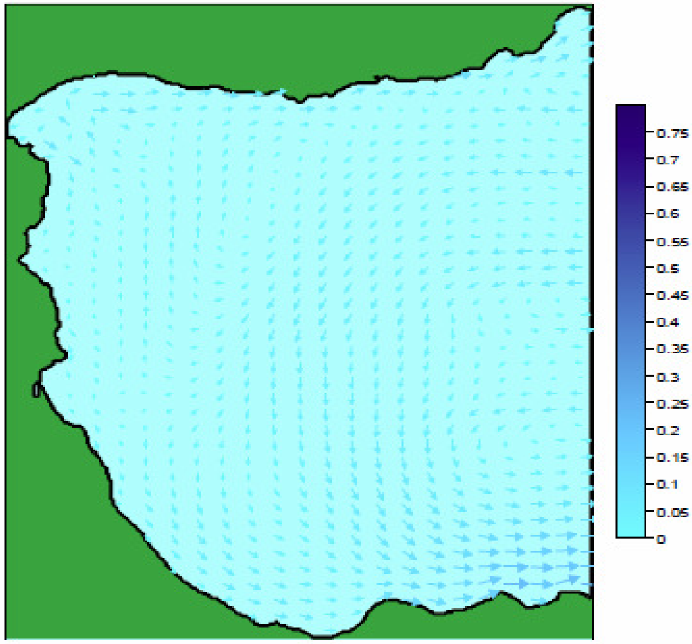


Figure 8.6 – Current velocity vectors (m/sec) calculated at high water on a spring tide.

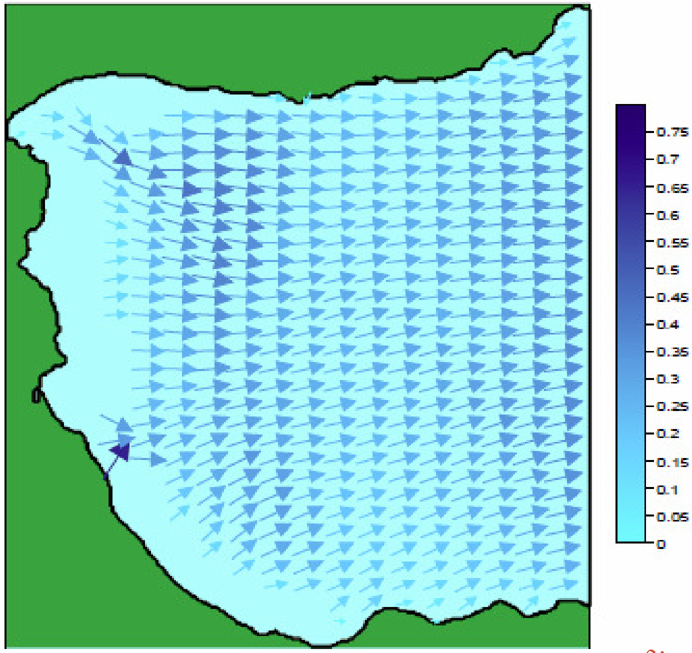


Figure 8.7 – Current velocity vectors (m/sec) calculated at mid-ebb on a spring tide.

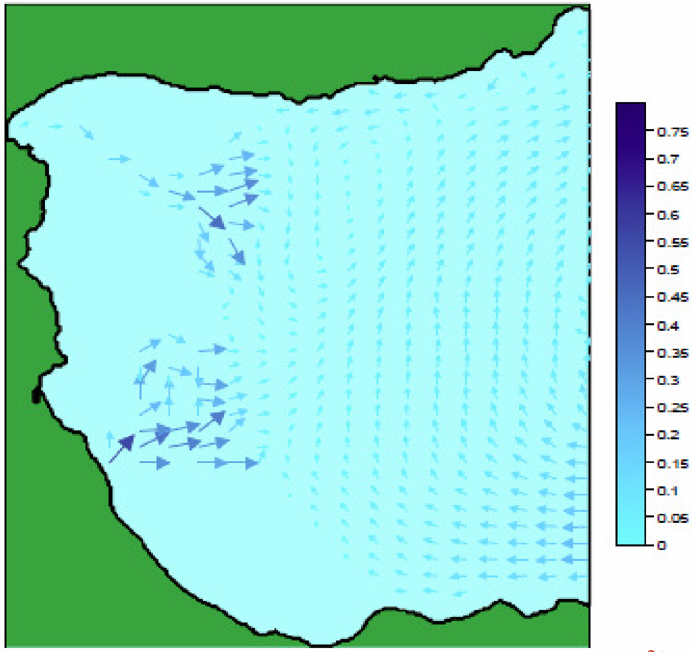


Figure 8.8 – Current velocity vectors (m/sec) calculated at low water on a spring tide.

Model Outputs and Various Effluent Discharge Rates:

The Model was run at 5 different conditions of BOD concentration/effluent discharge flow rates.
These were as follows:

BOD concentration:	mg/l	15	25	25	50	100
Effluent Discharge Rate:	l/sec	5	2.5	5	5	5

The results were as follows:

BOD 15 mg/l and flow rate 5l/sec.

Figures 9.1 – 9.8 refer to a BOD of 15 mg/l and flow rate of 5 l/sec for Neap and Spring tides. In each of the 8 simulations, the outfall pipe can be identified as a small point of high concentration on the figure. Referring first the simulations under Neap tides, the predicted maximum concentrations within the plume are 0.003 mg/l at the end of the pipe at low water. The remaining predicted BOD concentrations range from 0.0022 - 0.00032 mg/l. For Spring tides (Figures 9.5 – 9.8), the maximum value, 0.0032 mg/l, is again predicted at low water. As would be expected, the spatial extent of the plume is greater under Spring tides than under Neap tides (compare Figure 9.2 with Figure 9.6).

Figure 9a presents time trace data for BOD at this concentration and this flow rate at Giles Quay.

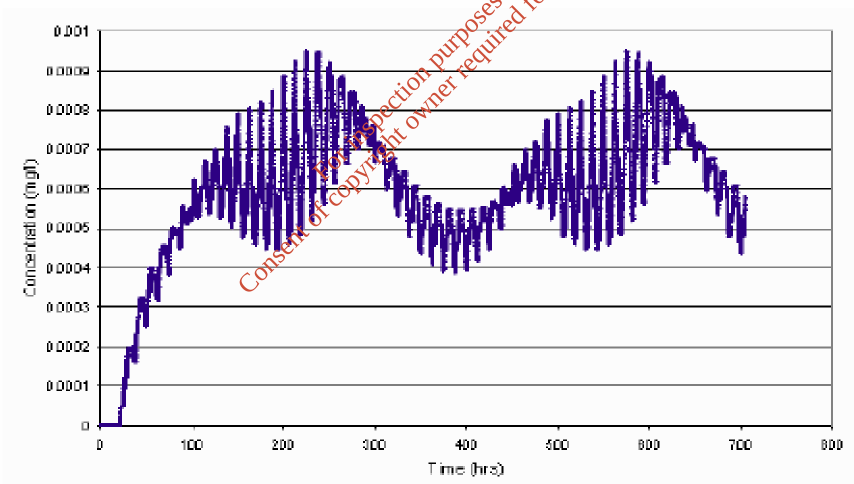


Figure 9a: ***Time-trace of BOD concentrations at Giles Quay (mg/l) for flow rate of 15mg/l at 5l/sec***

BOD 25 mg/l and flow rate 2.5l/sec

Figures 9.9 – 9.16 predict concentrations based on a BOD of 25mg/l and a flow rate of 2.5 l/sec. In each of the 8 simulations, the outfall pipe can be identified as a small point of high concentration on the figures, the highest BODs are predicted for Neap and Springs at low water (0.0021 and 0.0022 mg/l respectively). As for the previous simulation the spatial extent of the plume is greater at Spring tides than at Neaps (compare Figure 9.10 and 9.14).

Figure 9b presents time trace data for BOD at this concentration and this flow rate at Giles Quay.

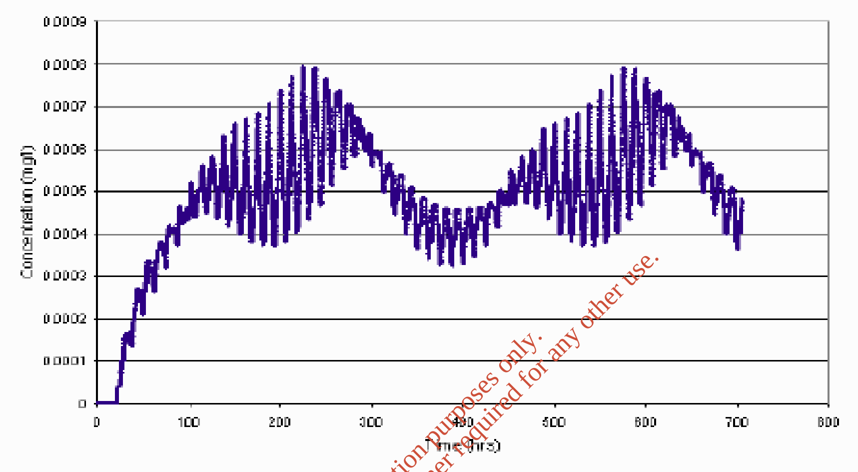


Figure 9b : ***Time-trace of BOD concentrations at Giles Quay (mg/l) for flow rate of 25mg/l at 2.5l/sec***

BOD 25 mg/l and flow rate 5l/sec

Output for model runs using these characteristics are presented in Figures 9.17 – 9.24 with Figs 9.17 – 20 reflecting conditions under Neap tides at mid-flood, High water mid-ebb and Low water and Figs 9.21 – 24 for the same periods of the tide during Spring tides. End of pipe values are highest (ca. 0.005 mg/l) at HW and LW at Neap tides

Figure 9c presents time trace data for BOD at this concentration at Giles Quay.

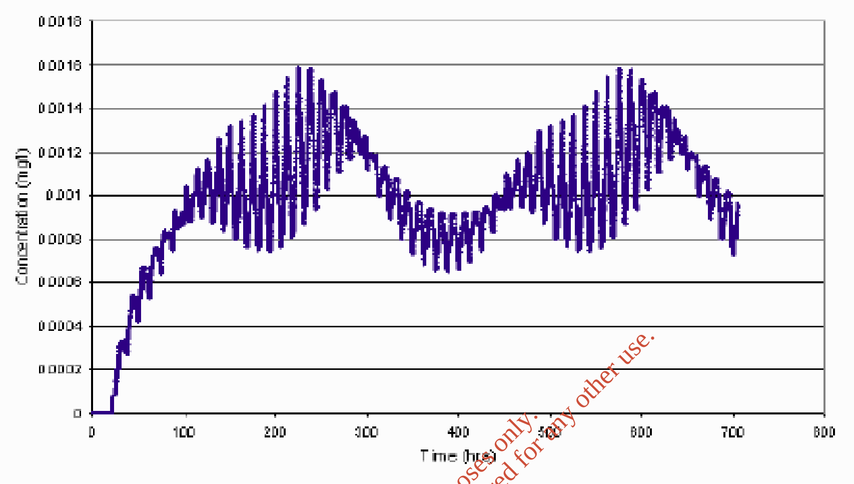


Figure 9c : ***Time-trace of BOD concentrations at Giles Quay (mg/l) for flow rate of 25mg/l at 5l/sec***

BOD 50 mg/l and flow rate 5l/sec

Output for model runs using 50 mg/l BOD and a flow rate of 5 l/sec are shown in Figures 9.25– 9.32. Figures 9.25 – 9.28 relate to predictions for 50mg BOD at mid-flood, HW , mid-ebb and Low water for Neap tides and Figures 9.29 – 9.32 to the same stages of the tide for Spring tides. Maximum predicted values (ca. 0.01mg/l) are recorded at the end of the pipe at HW and LW at Neap tides.

Figures 9c (see above p.38) presents time trace data for BOD at this concentration and this flow rate at Giles Quay.

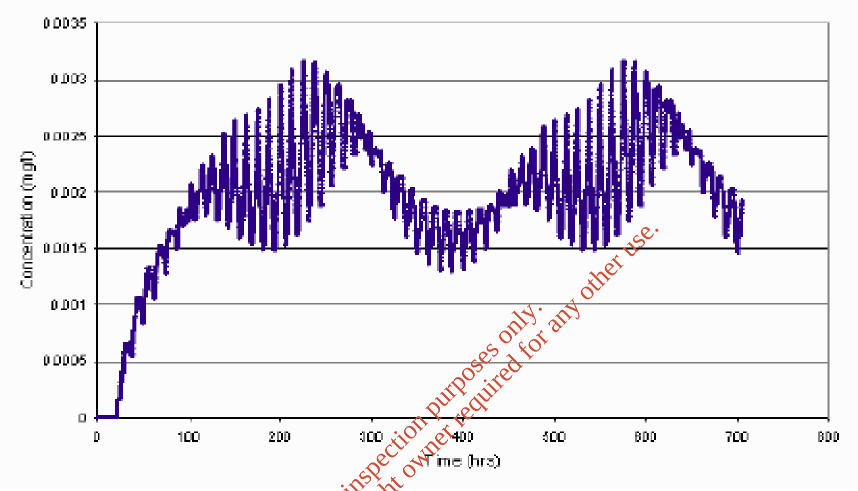


Figure 9d : ***Time-trace of BOD concentrations at Giles Quay (mg/l) for flow rate of 50mg/l at 5l/sec***

BOD 100 mg/l and flow rate 5l/sec

Output for model runs based on 100mg/l BOD and 5/l sec is presented in Figures 9.25 – 9.32. Figures 9.25 – 9.28 relate to predictions for 100mg BOD at mid-flood, HW , mid-ebb and Low water for Neap tides and Figures 9.29– 9.32 to the same stages of the tide for Spring tides. Maximum predicted values (ca. 0.01mg/l) are recorded at the end of the pipe at HW and LW at Neap tides. Maximum values of ca 0.01mg/l are recorded at HW and LW Neaps and Springs again at the end of the pipe.

Figures 9e presents time trace data for BOD at this concentration and this flow rate at Giles Quay.

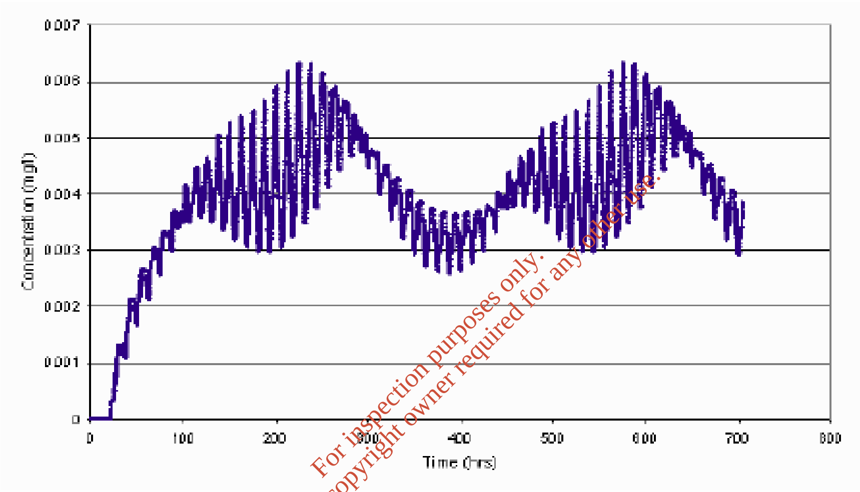


Figure 9e : ***Time-trace of BOD concentrations at Giles Quay (mg/l) for flow rate of 100mg/l at 5l/sec***

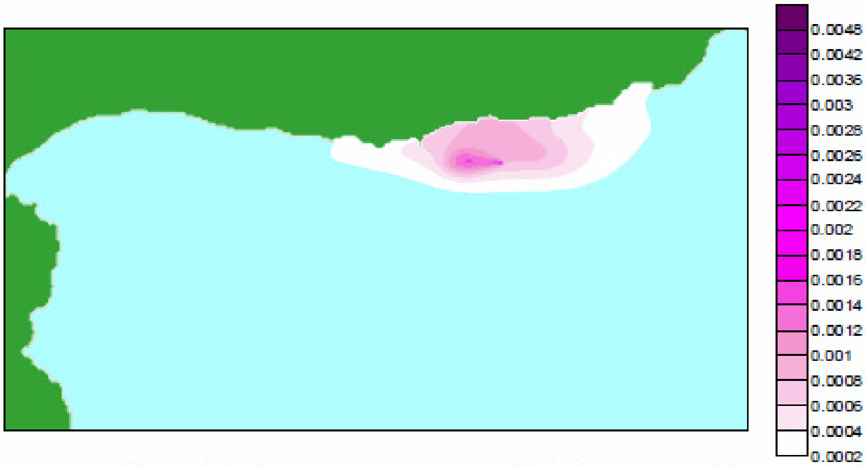


Figure 9.1 : ***BOD concentrations at mid-flood on a neap tide 15mg/l @ 5l/sec***

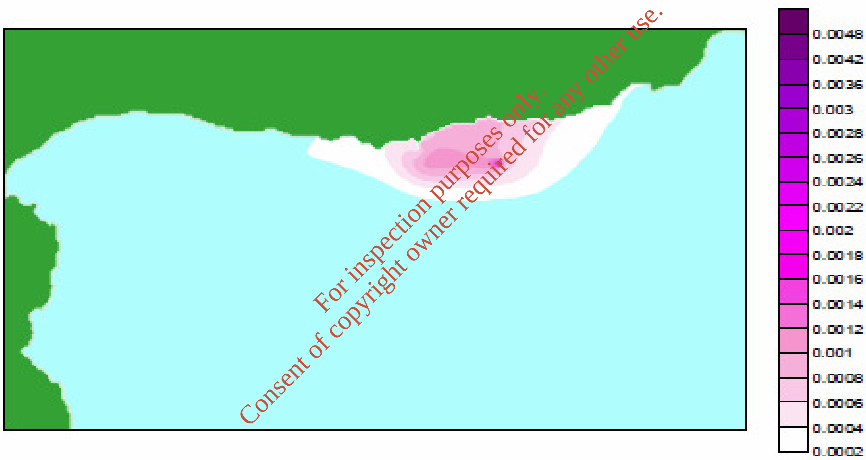


Figure 9.2 : ***BOD concentrations at high water on a neap tide 15mg/l @ 5l/sec***

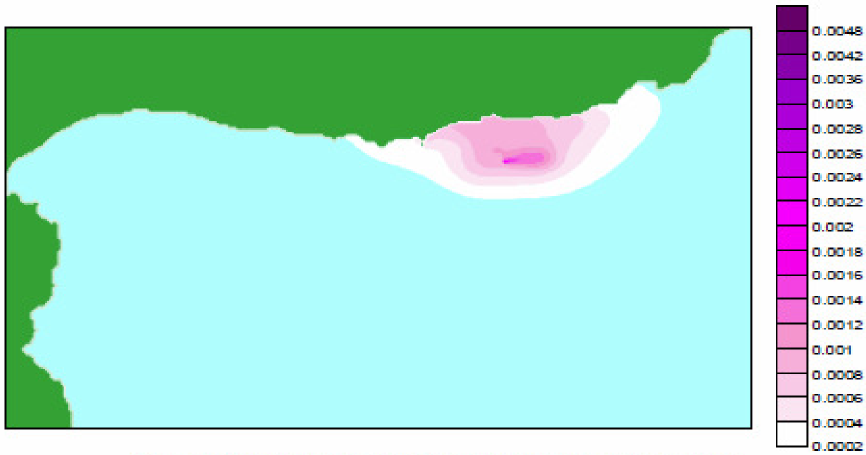


Figure 9.3 : *BOD concentrations at mid ebb on a neap tide 15mg/l @ 5l/sec*

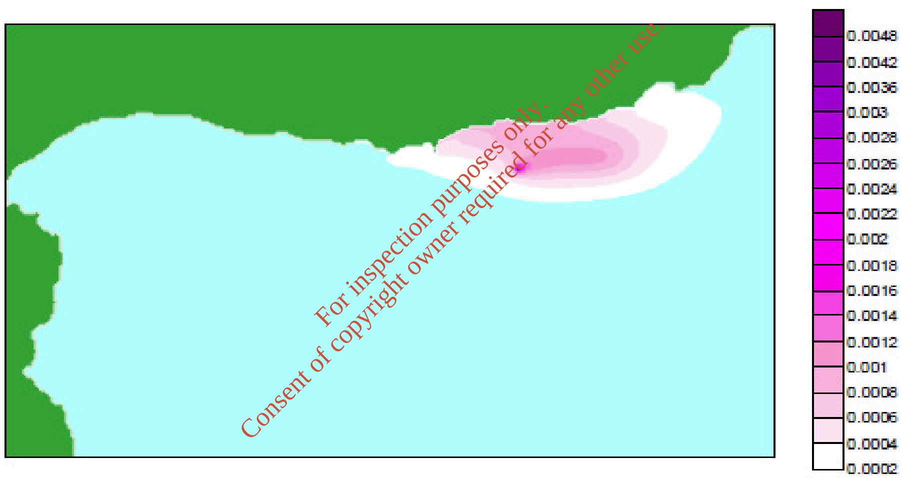


Figure 9.4 : *BOD concentrations at low water on a neap tide 15mg/l @ 5l/sec*

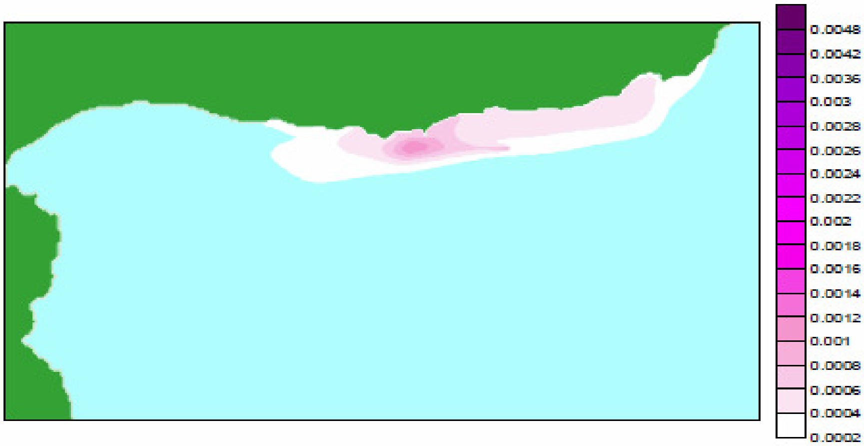


Figure 9.5 : *BOD concentrations at mid-flood on a spring tide 15mg/l @ -5l/sec*

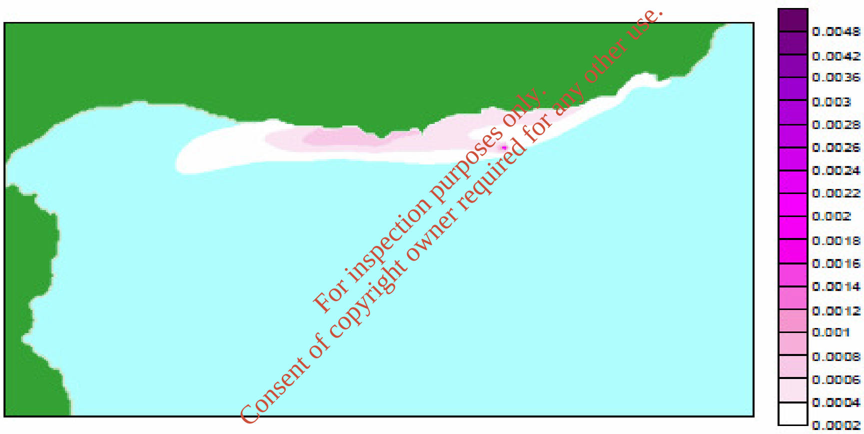


Figure 9.6 : *BOD concentrations at high water on a spring tide 15mg/l @ 5l/sec*

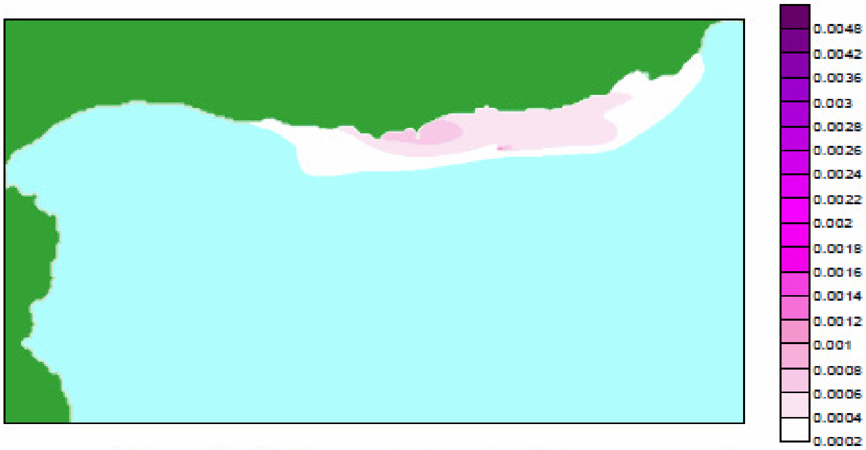


Figure 9.7 : ***BOD concentrations at mid ebb on a spring tide 15mg/l @ 5l/sec***

Figure 9.8 : ***BOD concentrations at low water on a spring tide 15 mg/l @ 5l/sec***

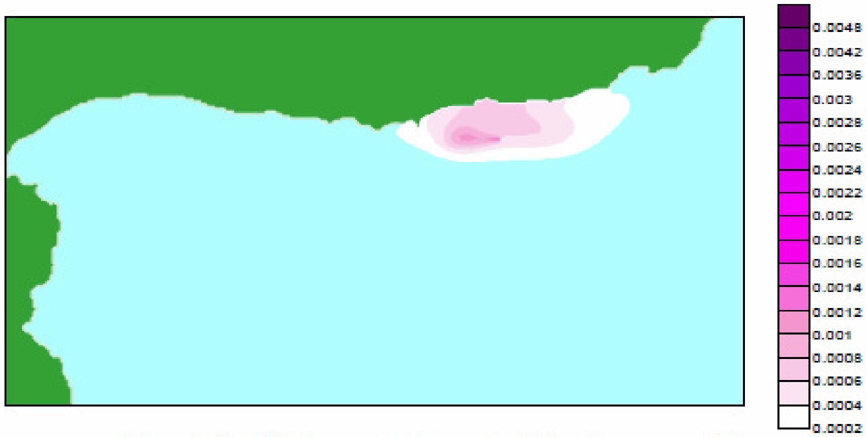


Figure 9.9 : ***BOD concentrations at mid-flood on a neap tide 25mg/l@ 2.5l/sec***

Figure 9.10 : ***BOD concentrations at high water on a neap tide 25mg/l @ 2.5l/sec***

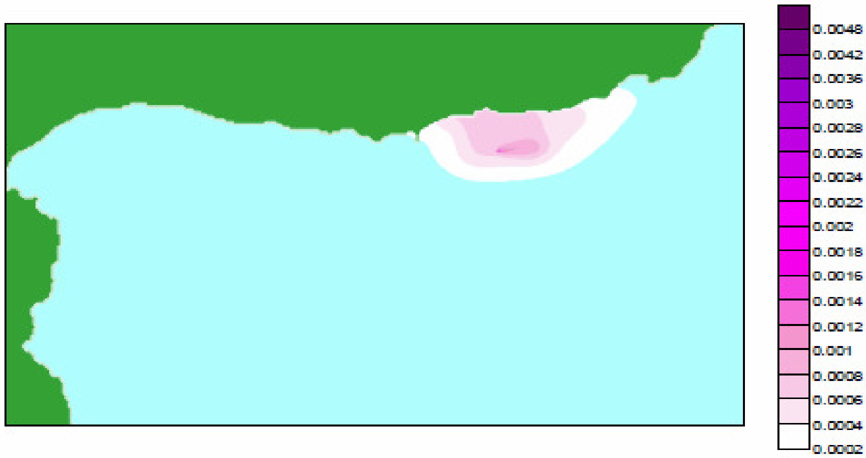


Figure 9.11 : ***BOD concentrations at mid ebb on a neap tide 25mg/l @ 2.5l/sec***

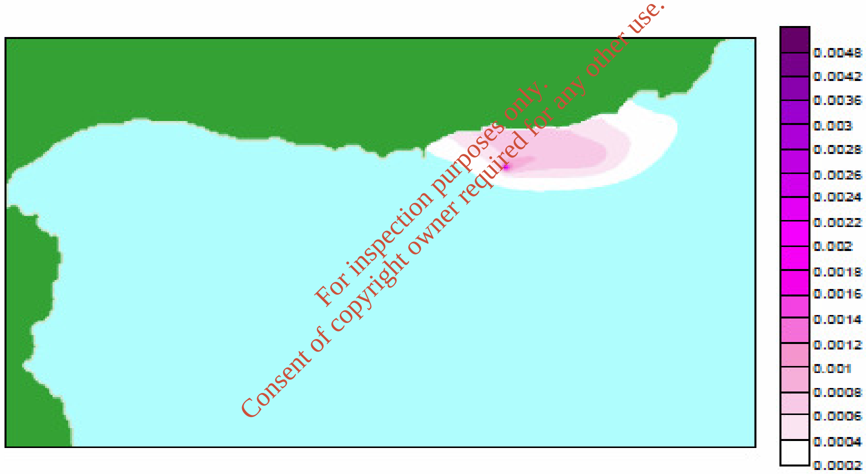


Figure 9.12 : ***BOD concentrations at low water on a neap tide 25mg/l @ 2.5l/sec***

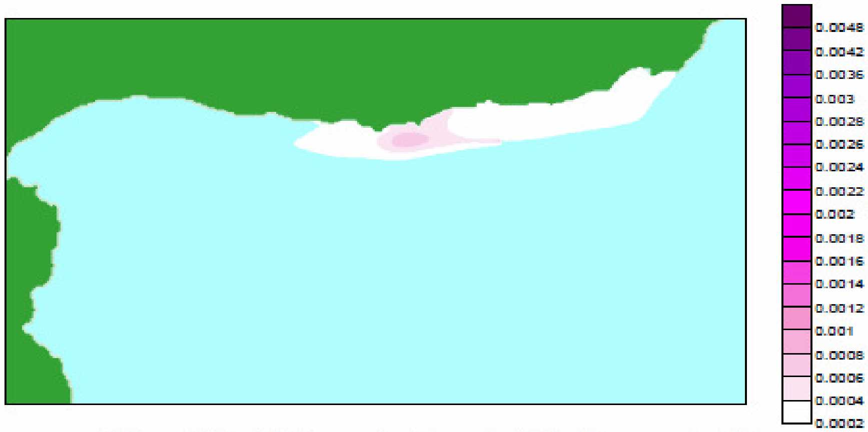


Figure 9.13 : ***BOD concentrations at mid-flood on a spring tide 25mg/l @ 2.3l/sec***

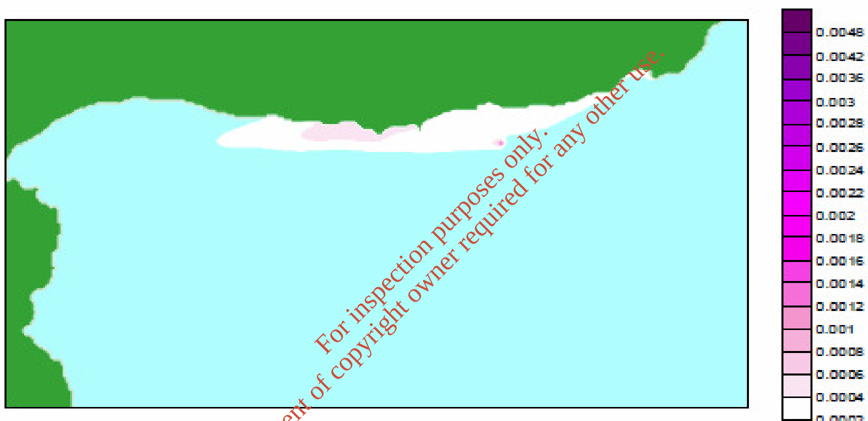


Figure 9.14 : ***BOD concentrations at high water on a spring tide 25mg/l @ 2.5l/sec***

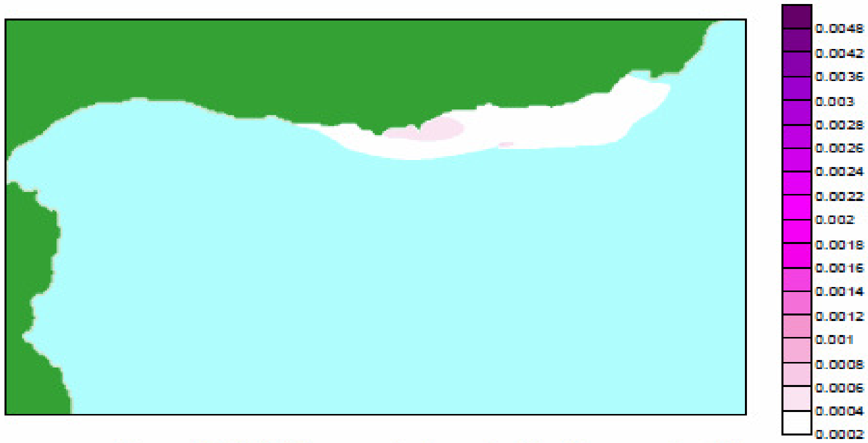


Figure 9.15 : *BOD concentrations at mid ebb on a spring tide 25mg/l @ 2.5l/sec*

Figure 9.16 : *BOD concentrations at low water on a spring tide 25mg/l @ 2.5l/sec*

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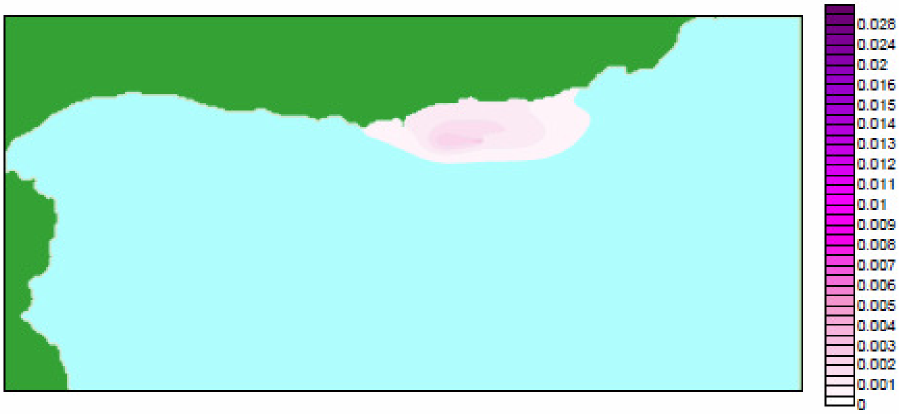

Figure 9.17 : ***BOD concentrations at mid-flood on a neap tide***
25mg/l @ 5l/sec

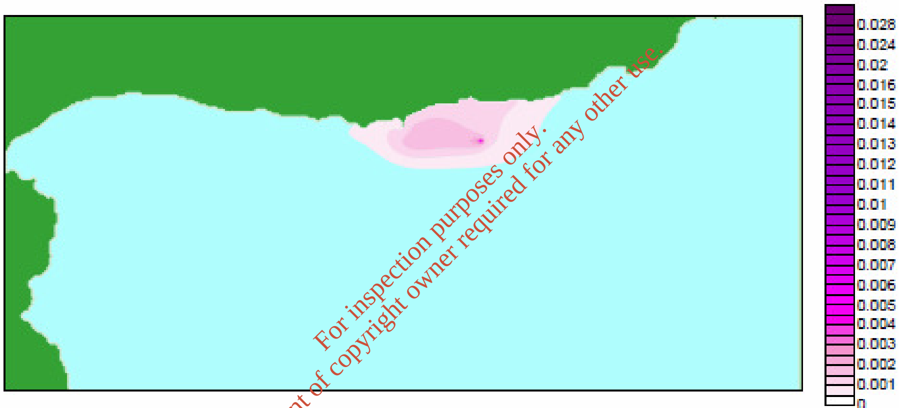

Figure 9.18 : ***BOD concentrations at high water on a neap tide***
25mg/l @ 5l/sec

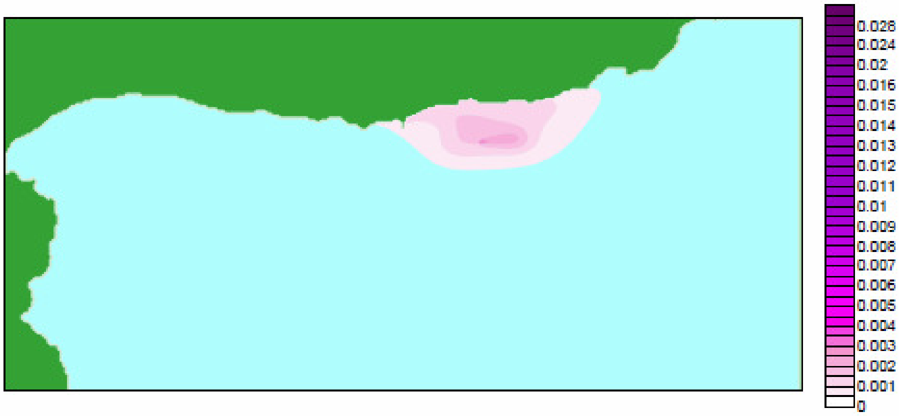

Figure 9.19 : *BOD concentrations at mid ebb on a neap tide 25mg/l @ 5l/sec*

Figure 9.20 : *BOD concentrations at low water on a neap tide 25mg/l @ 5l/sec*

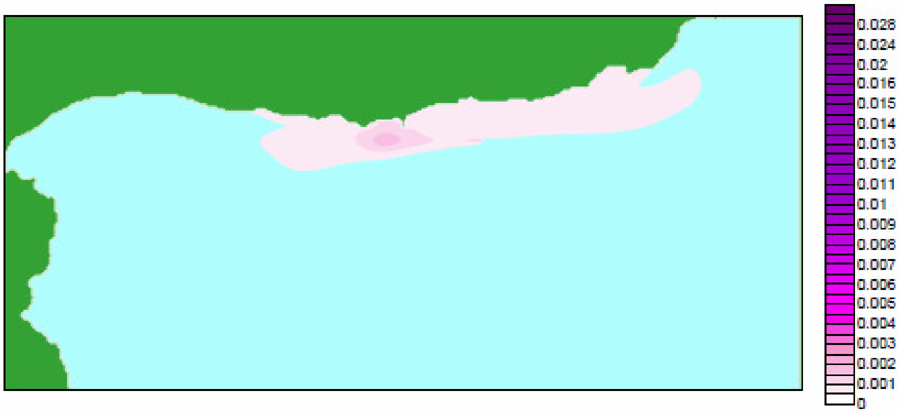

Figure 9.21 : ***BOD concentrations at mid-flood on a spring tide***
25mg/l @ 5l/sec

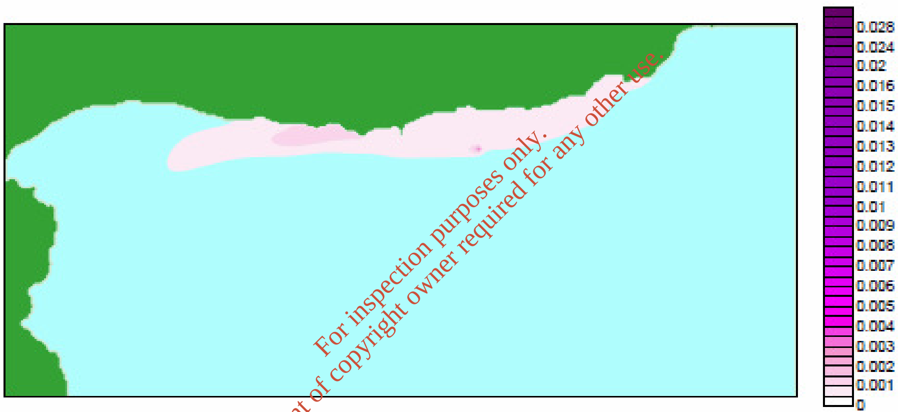

Figure 9.22 : ***BOD concentrations at high water on a spring tide***
25mg/l @ 5l/sec
)

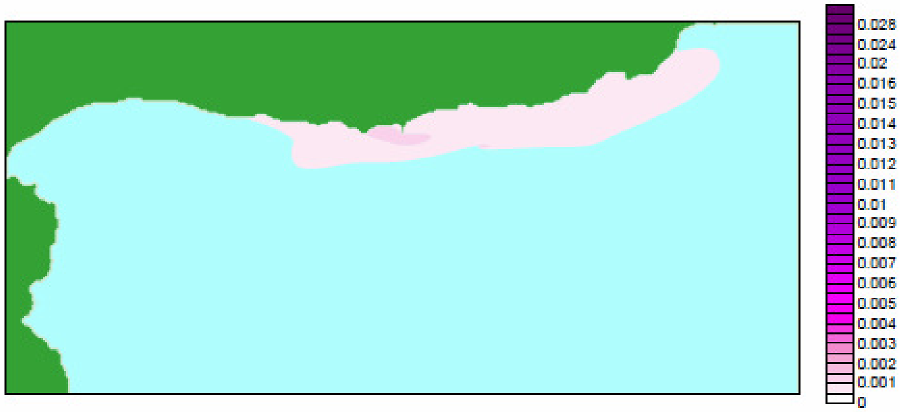

Figure 9.23 : *BOD concentrations at mid ebb on a spring tide 25mg/l @ 5l/sec*

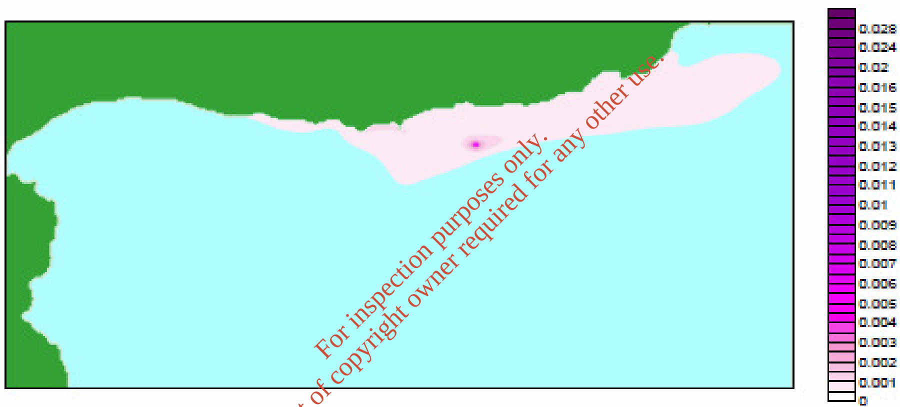

Figure 9.24 : *BOD concentrations at low water on a spring tide 25mg/l @ 5l/sec*

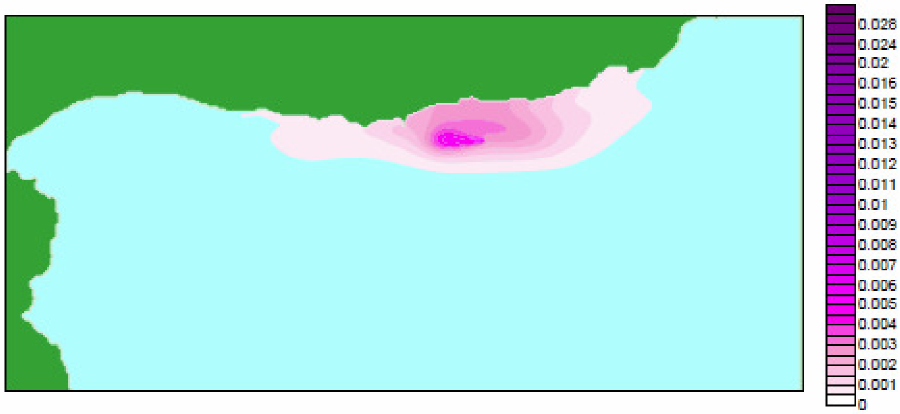

Figure 9.25 : *BOD concentrations at mid-flood on a neap tide 50mg/l @ 5l/sec*

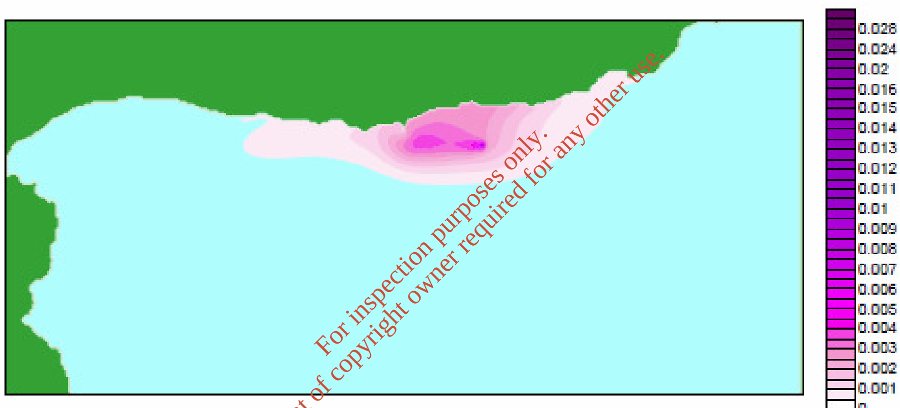

Figure 9.26: *BOD concentrations at high water on a neap tide 50mg/l @ 5l/sec*

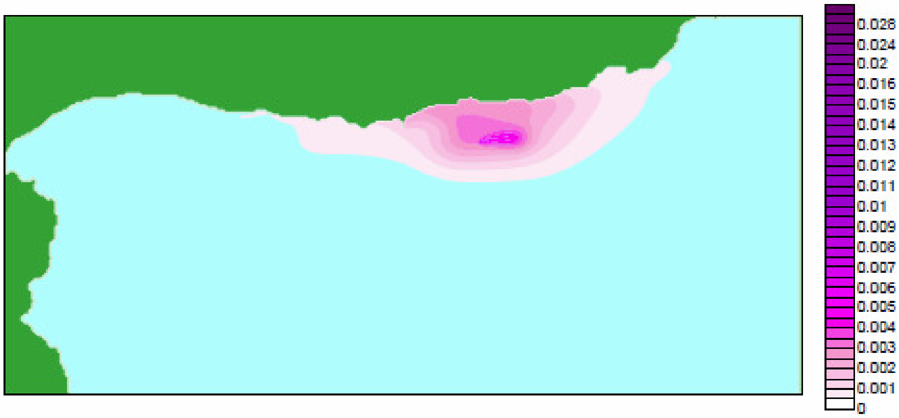

Figure 9.27 : *BOD concentrations at mid ebb on a neap tide 50mg/l @ 5l/sec*

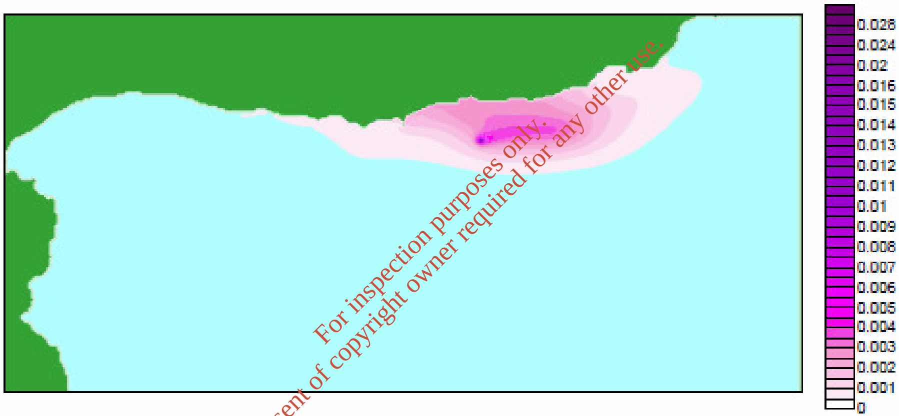

Figure 9.28 : *BOD concentrations at low water on a neap tide 50mg/l @ 5l/sec*

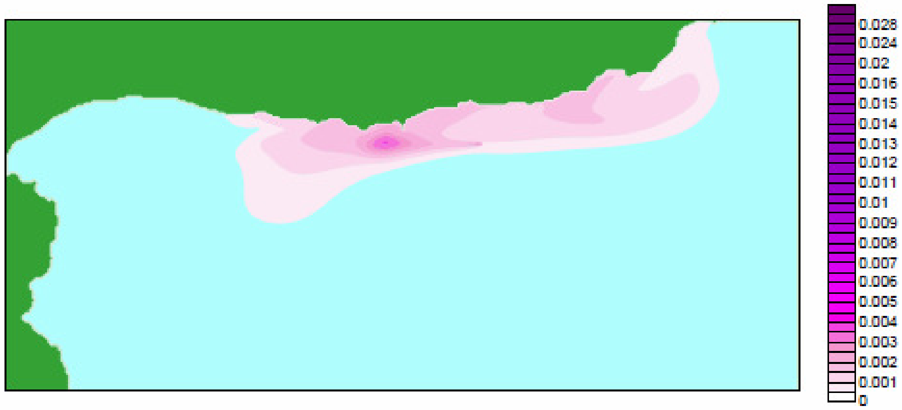

Figure 9.29 : ***BOD concentrations at mid-flood on a spring tide 50mg/l @ 5l/sec***

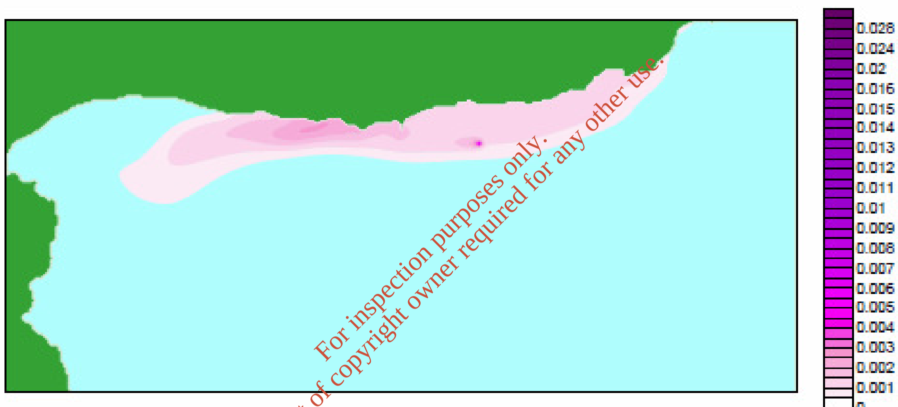

Figure 9.30 : ***BOD concentrations at high water on a spring tide 50mg/l @ 5l/sec***

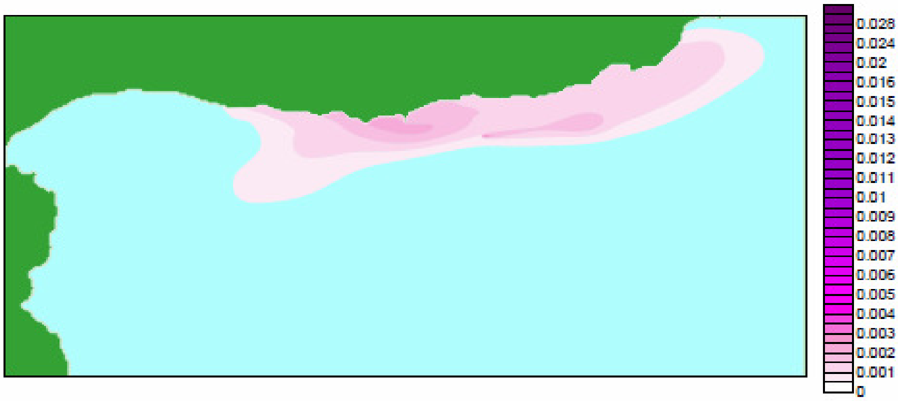

Figure 9.31 : ***BOD concentrations at mid ebb on a spring tide 50mg/l @ 5l/sec***

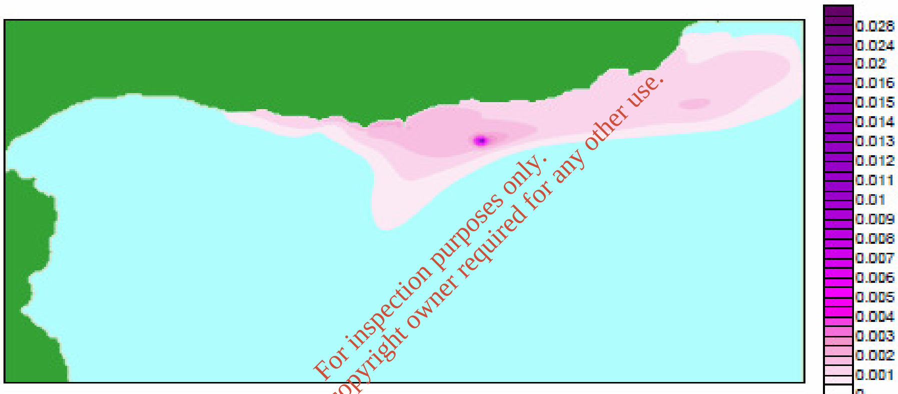

Figure 9.32 : ***BOD concentrations at low water on a spring tide 50mg/l @ 5l/sec***

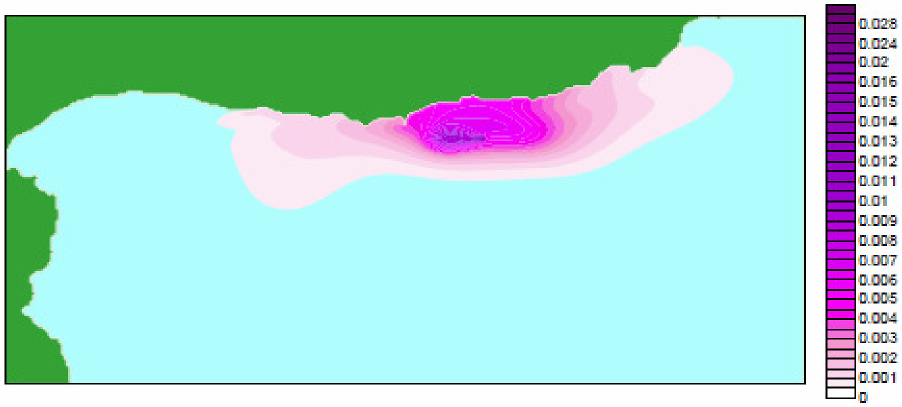

Figure 9.33 : *BOD concentrations at mid-flood on a neap tide 100mg/l @ 5l/sec*

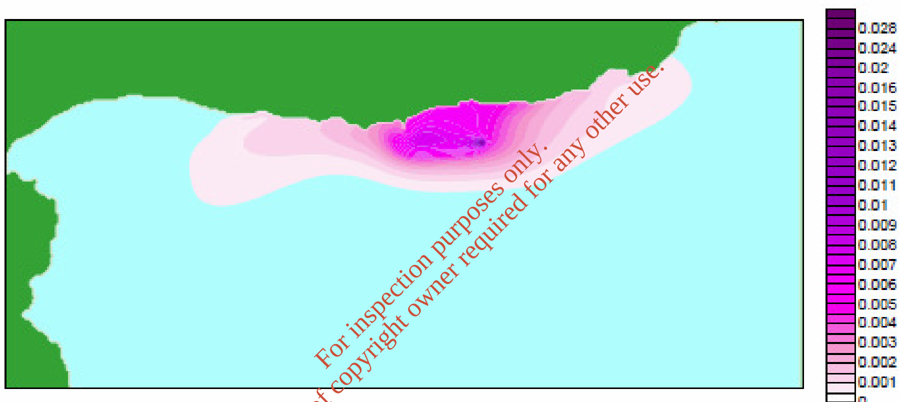

Figure 9.34 : *BOD concentrations at high water on a neap tide 100mg/l @ 5l/sec*

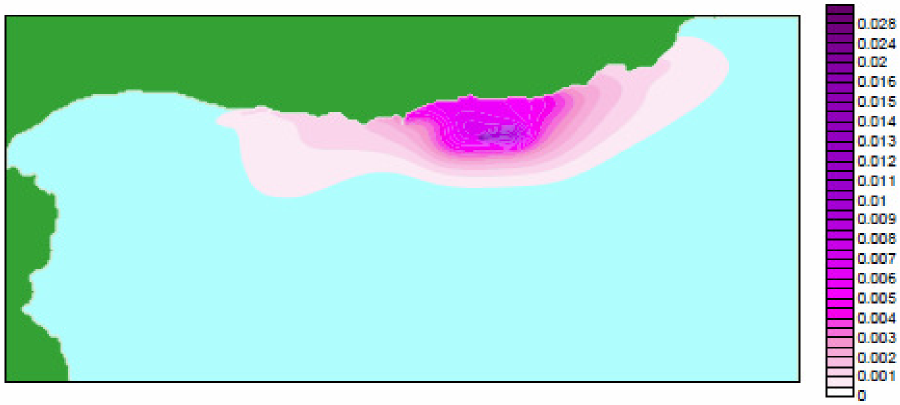

Figure 9.35 : *BOD concentrations at mid ebb on a neap tide (100mg/l @ 5l/sec*

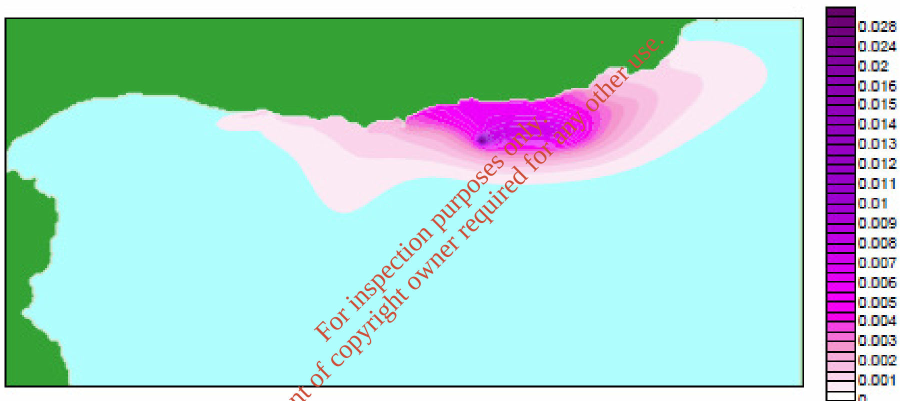

Figure 9.36 : *BOD concentrations at low water on a neap tide 100mg/l @ 5l/sec*

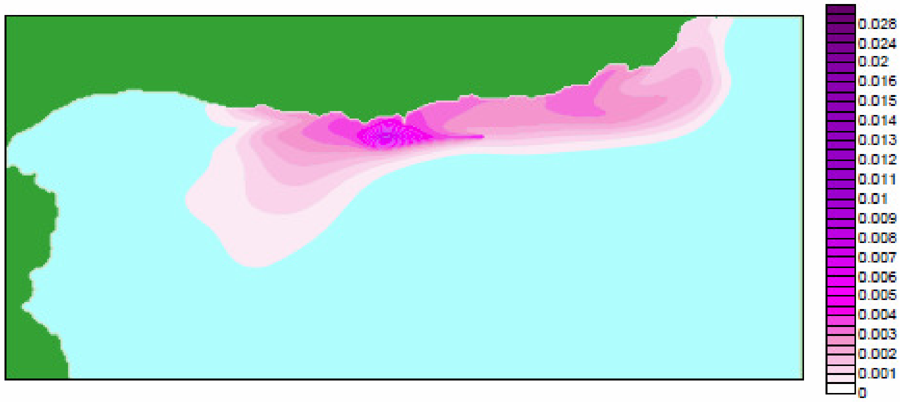

Figure 9.37 : ***BOD concentrations at mid-flood on a spring tide 100mg/l @ 5l/sec***

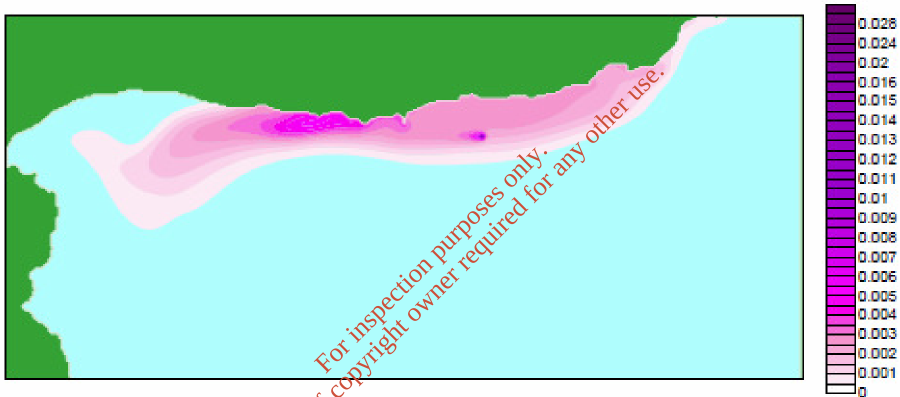

Figure 9.38 : ***BOD concentrations at high water on a spring tide 100mg/l @ 5l/sec***

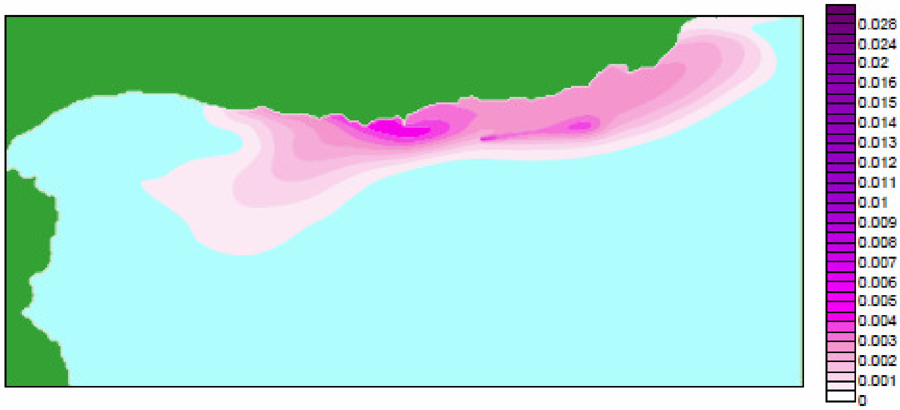

Figure 9.39 : *BOD concentrations at mid ebb on a spring tide 100mg/l @ 5l/sec*

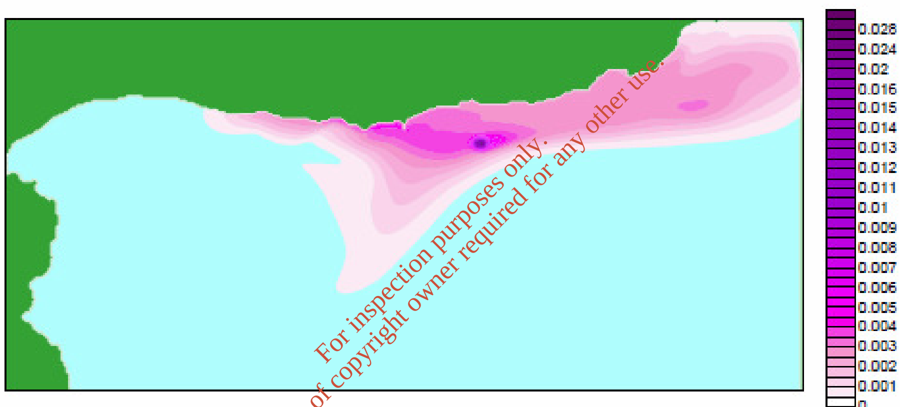

Figure 9.40 : *BOD concentrations at low water on a spring tide 100mg/l @ 5l/sec*

4. DISCUSSION

4.1 Water Chemistry

The Castletown River estuary, which includes inner Dundalk Bay, has been designated by the EPA as a Sensitive Area under the Urban Waste Water Regulations, S.I. No. 254 of 2001. On a national scale, levels of organic pollution and associated oxygen disturbance observed at this site are considered elevated (EPA, 2001).

Douglas (1988) carried out 2 sets of analyses on water samples and reported the following mg/l values of B.O.D., NO3, P and suspended solids for samples collected at the discharge location in October 1988: 8.1 – 9.4, 0.177 - 0.35, 0.005, 40.9 – 58.4. For samples collected at the same sites in November, Douglas (1988) recorded the following mg/l values for the same 4 parameters: 1.6 – 2.9, 0.003 – 0.346, 0.009 – 0.014 and 37.4 – 39.7 respectively.

Hydrographic Surveys (1989), in a report to Tobins Consulting Engineers, record the following mg/l nitrate, nitrite and phosphorous ranges close to the outfall location: 0.0001 – 0.07, 0.00008 – 0.008 and 0.03 – 0.018 respectively. The 0.07 mg/l NO3 value should be regarded cautiously as it is very high.

Douglas (1992) records the following mg/l values of B.O.D., NH3, NO3, P and suspended solids: 7.2 – 10.8, 0.297 – 0.615, 0.031 – 0.043 and 32.6 – 85.5. The values for ammonia are extremely high and should be read with caution.

ERU (1989) record the following range of mg/l values for NH3, NO3, NO2 and P for Cork Harbour: <0.01 – 0.07, 0.009 – 0.06, 0.003 – 0.06 and 0.010 – 0.28.

The values for nutrients recorded during this study were generally lower than those recorded by Douglas (1988 and 1992). Suspended solids levels were considerably lower in this study and this may be related to the fact that weather conditions were calm during this study while samples were collected in early Winter and during stormy conditions (Douglas, 1988; 1992).

4.2 Sediment Biology

Douglas (1988 and 1992) carried out sublittoral sample analyses on 5 and 4 samples respectively. In 1988, he recorded 31 invertebrate species of which 1 was a nemertean, 12 were polychaetes, 5 were arthropods, 9 were molluscs, 2 were echinoderms and there was 1of both bryozoans and urocords. In 1992 he recorded 21 taxa represented by 1 hydrozoan, 7 polychaetes, 4 arthropods, 6 molluscs, 1 bryozoan and 1 urochord. These results are in stark contrast with the 122 taxa recorded during this survey and the reasons for these very significant differences are difficult to explain. It can, however, be quite categorically stated that the effluent from Cooley Distillery is not having any noticeable negative impacts on the benthic assemblages on Dundalk Bay.

4.3 Model Output

The current velocity and direction data agree well with both the measured data collected as part of this study and with existing data: velocities in Dundalk Bay are low and rarely exceed speeds of 20 cm/sec. And there is a very strong east-west component to the direction of the flow.

The predicted BOD concentrations for both simulations indicate that levels will be exceedingly low and are so low as not to be capable of being measured. As a rule of thumb, a background BOD level for marine water would be 2 mg/l and from the measured data it can be seen that levels were ca 2 orders of magnitude below this level.

As may be expected, the highest BOD values (0.028mg/l) were recorded at the out fall pipe during neap tides when BOD concentrations of the effluent were 100mg/l. Except for the values at low water, spring tide values were lower. This is to be expected given the greater flow of water in and out of Dundalk Bay during spring tides. Examining the output figures based on a BOD concentration of 50 mg/l highest values (ca 0.01 mg/l) were again recorded during neap tides at the end of the pipe at low water. Spring tide values for the same concentration were an order of magnitude lower except at the end of the pipe and again at low water where a predicted value of ca 0.01 mg/l as indicated. Examining the Figures based on a concentration of 25mg/l, it can be seen that none of the values exceed 0.01 mg/l.

Additional information on the maximum levels of BOD which were likely to be found in the vicinity of Giles Quay was also provided. For this purpose time-traces of the BOD concentrations throughout two Spring-Neap tidal cycles were plotted for all simulations. Using a concentration from of 15mg/l B.O.D at 5 l/sec., the time trace figures shows that the highest concentration of BOD at Giles Quay is approximately 0.00095mg/l. Similarly, it was found that a maximum concentration of roughly 0.0016mg/l was observed for the second discharge level of 25mg/l at 5 1/sec. These represent very low values of BOD.

The discharge level which would result in a background BOD concentration of 2mg/l at the mouth of the outfall was also investigated. It was found that a discharge of 15,000mg/l at 5l/s would result in a maximum concentration of approximately 2mg/l at mid-flood on a neap tide increasing to 4mg/l at low water. It should be remembered however that these concentrations are directly dependent on the grid size of the model which limits calculations to a 50m cell size. Closer to the mouth of the outfall, actual concentrations would be higher. Given an existing background value of 2mg/l the discharge of 15,000mg/l would exceed the ERU level of 5mg/l by 1mg/l.

From the measured field data e.g. sediment and water chemistry, sediment biology and also from the modelled output, it is clear that the current discharge of effluent from Cooley Distillery into Dundalk Bay is having a very limited impact on the receiving marine environment.

5. REFERENCES

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Douglas, D. 1988. A report of analysis of water and sediment samples at and around the proposed effluent discharge point for Cooley Distillery, plc.

Douglas, D. 1992. Analysis of water and biota found at and around the proposed effluent discharge point for Cooley Distillery, plc.

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Orren, M., Furey, T. and Coyne, J. Water Quality Report for Giles Quay, Dundalk. Report to Hydrographic Surveys.

Appendix I. Faunal data.

			Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
CNIDARIA								
ANTHOZOA								
Anthozoa sp.	D	583	2		1			
ACTINIARIA								
Stomphia coccinea	D	695	1					
Edwardsia sp.	D	764					4	2
PLATYHELMINTHES								
TURBELLARIA	F	2						
NEMERTEA								
Nemertea sp.	G	1	2					1
SIPUNCULA								
GOLFINGIIFORMES								
Golfingia sp.	N	12				2	3	3
Phascolion strombus	N	37	1					
ANNELIDA								
PHYLLODOCIDA								
Harmothoe sp.	P	50				1		1
Harmothoe andreapolis	P	51	1					
Harmothoe imbricata	P	64			1			
Harmothoe lunulata	P	67					1	
Harmothoe marphysae	P	68						1
Pholoe sp.	P	91		1				
Pholoe inornata	P	92	3			1	2	
Pholoe synophthalmica	P	94	3	1	2	2	5	3
Sthenelais boa	P	107		1	3			
Sthenelais limicola	P	109	5				2	3
Eteone sp.	P	115				1		
Eteone longa	P	118	2		2	2	2	1
Phyllodocinae sp.	P	138		1				
Anaitides longipes	P	143	2			1	1	3
Anaitides mucosa	P	145			1	1		
Anaitides rosea	P	146	5		1	6	3	4
Eumida bahusiensis	P	164	4	12	2	4	10	11
Eumida sanguinea	P	167	1					1
Glycera sp.	P	255	2			3	1	17
Glycera alba	P	256				1		
Glycera lapidum	P	260					14	
Glycera tridactyla	P	265	6		10			4
Goniada maculata	P	271	1		1			
Kefersteinia cirrata	P	305		2				
Exogone hebes	P	421					1	
Nereis sp.	P	473	1					

Nephtys sp.	P	494				5	1	1
Nephtys hombergii	P	499	25		2	12	14	9
Nephtys kersivalensis	P	502			13	1		
ORBINIIDA								
Scoloplos armiger	P	672	4		1	2		
SPIONIDA								
Minuspio cf. multibranchiata	P	746						1
Minuspio cirrifera	P	747	1		5	5		1
Polydora ciliata	P	752	1					
Spio filicornis	P	790				2		
Spiophanes bombyx	P	794	17		7	16	20	28
Magelona sp,	P	803						1
Magelona minuta	P	806	1					2
Magelona mirabilis	P	807	2		2		5	4

			Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
Aphelochaeta sp.	P	823	2		1	1		
FLABELLIGERIDA								
Diplocirrus glaucus	P	878					1	
CAPITELLIDA								
Capitomastus minimus	P	912	2					
Notomastus latericeus	P	921	3		1	1		
Euclymene oerstedii	P	964	1			2		3
Euclymene sp.	P	965	1		1		1	
OPHELIIDA								
Ophelina acuminata	P	1014			3	1	1	2
Scalibregma inflatum	P	1027	3				1	
OWENIIDA								
Owenia fusiformis	P	1098	7			2		1
TEREBELLIDA								
Lagis koreni	P	1107	2		2	2	1	
Melinna palmata	P	1124	5			3		1
Ampharete sp.	P	1133					2	
Ampharete finmarchica	P	1136			5			
Ampharete lindstroemi	P	1139	16	1	2	3	6	10
Eupolymnia nebulosa	P	1189		1				
Lanice conchilega	P	1195	6	2	1		3	
Polycirrus n. sp.	P	1246			1			
SABELLIDA								
Branchiomma bombyx	P	1263	9	291	9			
Laonome kroyeri	P	1292		11				
Pomatoceros lamarcki	P	1340	10	7	1		2	1
CHELICERATA								
PYCNOGONIDA								
Phoxichilidium femoratum	Q	48						1

			Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
Pycnogonum littorale	Q	51	1					
CRUSTACEA								
AMPHIPODA	S	97						
Harpinia antenaria	S	254						1
Orchomene humilis	S	320			3			
Ampelisca sp	S	423	15		9	8	13	20
Melita sp.	S	522		2				
Isaeidae sp.	S	537					2	
Photis longicaudata	S	552	5	1	1	2	7	11
Jassa sp.	S	568				1		
Aora gracilis	S	579		1				
Microdeutopus sp.	S	592			1			
Corophium volutator	S	616	3			2	4	1
Siphonoecetes kroyeranus	S	618	1		4			
Caprella linearis	S	646	10			4	20	16
Pariambus typicus	S	651	7		1	5	16	13
Phtisica marina	S	657	1				1	
ISOPODA	S	790						
Gnathia oxyuraea	S	796						1
TANAIDACEA	S	1099						
Tanaidae sp	S	1102	3					
CUMACEA	S	1183						
Iphinoe trispinosa	S	1203			1			
Pseudocuma longicornis	S	1236					7	11
Diastylis rugosa	S	1254	1		3	2	14	4
DECAPODA	S	1276						
Pisidia longicornis	S	1482			1			
Liocarcinus depurator	S	1588		1			2	1
MOLLUSCA								
POLYPLACOPHORA	W	46						
MESOGASTROPODA								
Aporrhais pespelecani	W	430		1				
NEOGASTROPODA								
Buccinum undatum	W	708		1				
CEPHALASPIDEA								
Philine aperta	W	1038	14		4	2	4	
NUCULOIDA								
Nucula nitidosa	W	1569	57	1	12	34	59	20
Nucula nucleus	W	1570			1			
MYTILOIDA								
Modiolula phaseolina	W	1708					5	
VENEROIDA								
Thyasira flexuosa	W	1837	3			6	3	

Mysella bidentata	W	1906				8	47	
Acanthocardia aculeata	W	1942						1
Spisula elliptica	W	1975			2	8	56	
Ensis ensis	W	1999	1					
Phaxas pellucidus	W	2006	8		3	1	11	
Fabulina fabula	W	2019		1	4	8	20	
Moerella pygmaea	W	2020					29	
Abra alba	W	2059	69	2	19	22	41	
Circomphalus casina	W	2091					54	92
Chamelea gallina	W	2098	7		1	27	52	
Venerupis senegalensis	W	2124		6	3			
MYOIDA								
Mya arenaria	W	2149				1	2	
Corbula gibba	W	2157				2		
PHOLADOMYOIDA								
Thracia phaseolina	W	2231	42		5	44	42	
ECHINODERMATA								
COMATULIDA								
Antedon bifida	ZB	10		2				
ASTEROIDEA	ZB	18						
Luidia sp	ZB	21						
FORCIPULATIDA								
Marthasterias glacilis	ZB	104		2				
OPHIUROIDEA	ZB	105						
OPHIURIDA								
Amphiura juvenile	ZB	149	1			32		70
Amphiura filiformis	ZB	154	1					
Amphipholis squamata	ZB	160			1			2
Ophiura sp. juvenile	ZB	166	17		1	121		
Ophiura ophiura	ZB	170				4		
Ophiura robusta	ZB	171			1			
SPATANGOIDA								
Echinocardium sp post larva	ZB	222						
Echinocardium cordatum	ZB	223			5	6		
CHORDATA								
TUNICATA								
Ascidiella aspersa	ZD	84			1			
Ascidiella scabra	ZD	85	32	484	5			

Attachment Nº D.1.1 assessment of impact on the receiving waters

Attachment D.1.1 (B) Assimilative Capacity Study of River Big to accept cooling water

Cooley Distillery

Rowan Engineering Consultants Ltd.

Attachment D.1.1 (b)- Assessment of Impact of Cooley Distillery Cooling Water Discharge to the River Big

Location:

Castletowncooley
Riverstown
Dundalk
Co. Louth

IPPC Register Review Number:

P0826-02

Date of Report:

27th February 2012

Consultants:

Tom Rowan
BE CEng MIEI DipOSH GradIOSH HDipBS

&

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1. Introduction

1.1 Background information

Rowan Engineering Consultants (REC) were contracted to carry out a waste assimilative capacity (WAC) study on behalf of Cooley Distillery who discharge cooling water to the River Big (Piedmont). Cooley Distillery obtained their IPPC licence No. P0826-01 from the Agency in 2008 for *'Distilling in installations where production capacity exceeds the equivalent of 1,500 tonnes per year measured as pure alcohol'*.

Water abstracted from the River Big (Piedmont) as it passes through on the west side of the distillery site. Some of this water is used as non-contact cooling water for process units, particularly those, such as spirit cooling, which require process cooling below 20°C.

Non-contact cooling water is discharged to the River Big (also known as the Piedmont River) via a cascade system, at emission point reference number SE-1. This system is designed to cool and aerate the water prior to discharge to the river. Condition 5.4.4 of the sites IPPC stipulates that *'the volume of non-contact cooling water which can be discharged to the River Big shall not exceed 1920 m^3/day and the maximum rate of discharge shall not exceed 22.5 litre/second'*.

Furthermore, a small portion of the cooling water is discharged to the long sea outfall in order to maintain sufficient flow velocity in the pipeline to prevent seawater ingress. Condition 5.5 of the sites IPPC stipulates that *'The volume of non-contact cooling water which can be mixed with the treated effluent prior to emission point SE-3 shall not exceed 200m^3/day and the maximum rate of discharge shall not exceed 2.5 litres/second'*.

1.2 Methodology of Waste Assimilation Capacity (WAC)

The WAC has been carried out in accordance with the following legislation and guidelines:

- WSTG – 'Guidance to Application for a Licences to Discharge to Surface Waters'.
- European Communities Environmental Objectives (Surface Waters) Regulations 2009.

The monthly ambient data upstream 2011 on the River Big (monitoring location TM2 - 316574E, 306392N) and the cooling water discharge monitoring data 2011 (SE1 – 316581E, 306391N) was used for the WAC. Also flow data at TM2 upstream of the cooling water discharge was used for the WAC.

2. River Big Water Quality

4.1 Background

The River Big (Piedmont) is located in the Neagh Bann River Basin District.

4.2 River Flow

Cooley Distillery has a flow meter on the River Big (Piedmont) upstream of their cooling water discharge (ambient monitoring location TM2). The range and average river flow recorded in 2011 is provided in the table below.

TM2 Upstream	m^3/hr	m^3/sec
Flow Range 2011	253-24,392	0.07-6.77
Average Flow 2011	6,073	1.69

Table 1 Flow at TM2 2011

The lowest flow of 0.07m^3/sec recorded at TM2 in 2011 was used for the WAC calculations.

4.3 Existing River Quality

A monitoring station- River Big Bridge (06B010100) is situated on the River Big c.4km upstream of the Cooley Distillery discharge location to the river. Furthermore there is a downstream monitoring- River Big (06B010300) is situated on the River Big c.500m downstream of the Cooley Distillery discharge location to the river. The current water quality is '*High Status*' (Q4-5) at both monitoring stations.

4.4 The Nearest Downstream Water Dependent Protected Area

The nearest water dependant protected area is Dundalk Bay Special Protection Area (SPA) - Site Code 004026 which is adjacent to the mouth of the River Big and the sea outfall. Dundalk Bay is also categorised as a proposed Natural Heritage Area (pNHA) - Site Code 000455 and Special Area of Conservation (SAC) - Site Code 000455 c.1km north west of the mouth of the River Big.

3. Required Water Quality as part of S.I. No. 272 2009

The most recent Irish legislation set down as part of the Water Framework Directive to provide guidelines for river water quality in Ireland is SI No. 272 of 2009 known as The European Communities '*Environmental Objectives (Surface Waters) Regulations 2009*'.

Part III of the regulations sets the Environmental Objectives for water bodies in Ireland-

'(1) A surface water body whose status is determined to be high or good (or good ecological potential and good surface water chemical status as the case may be) when classified by the Agency in accordance with these Regulations shall not deteriorate in status.

(2) A surface water body whose status is determined to be less than good (or good ecological potential and good surface water chemical status as the case may be) when classified by the Agency in accordance with these Regulations shall be restored to at least good status (or good ecological potential and good surface water chemical status as the case may be) by not later than 22 December 2015 unless otherwise provided for by these Regulations'.

The Surface Water regulations provide targets for water quality on 22nd December 2015, based on the existing water quality. These target values are included in Schedule 5 of the regulation and include:

- Biological quality elements
- Oxygenation conditions (BOD)
- Copper

Given that the River Big is achieving 'High Status' there is a requirement for the river not to deteriorate in status under the '*Environmental Objectives (Surface Waters) Regulations 2009*'.

4. Required Water Quality of River Big

Schedule 5 of the Surface Water Regulations 2009 is included as Table 2, Table 3 and Table 4 below, with the appropriate targets for the River Big highlighted in orange.

Oxygenation Conditions (Biological Oxygen Demand)	
Oxygenation Conditions	**River Water Body**
BOD mg O_2/l	**High Status <1.3 (mean) or <2.2 (95%ile)**
	Good Status <1.5 (mean) or <2.6 (95%ile)

Table 2: Oxygenation Conditions

Nutrient Conditions	
Nutrient Conditions	**River Water Body**
Total Ammonia (mg N/l)	**High Status <0.040 (mean) or <0.090 (95%ile)**
	Good Status <0.065 (mean) or <0.140 (95%ile)

Table 3: Nutrient Conditions

Metal Conditions	
Metal Conditions	**River Water Body**
Copper (ug/l)	**5 (where the water hardness measured in mg/l CaCO3 is less than or equal to 100)***
	30 (where the water hardness exceeds 100 mg/l CaCO3)

Table 4: Metal Conditions

*EPA alkalinity monitoring upstream at Ballygoly station indicates alkalinity of less than or equal to 100.

The above tables and the EPA classification of the river (high status at present) informs us that if the River Big is to have a river quality of '*High Status*' and it will require to have the following conditions as detailed in Table 5 below for the waterbody.

Parameter	High Status
BOD mg O_2/l	<2.2
Total Ammonia (mg N/l)	<0.09
Copper (mg/l)	0.005

Table 5: High Status limits for waterbody

5. Waste Assimilation Capacity (WAC)

7.1 WAC Methodology

The definition of assimilative capacity, as used by the Environmental Protection Agency (EPA), is *'the ability of a body of water to cleanse itself; its capacity to receive waste waters or toxic materials without deleterious effects and without damage to aquatic life or humans who consume the water'.*

Guidance issued by the EPA and Water Services Training Group on the assessment of assimilative capacity was used in this study. The guidance details the following:

a. Assess the assimilative capacity with respect to BOD, Ammonia and Orthophosphate (P), in accordance with S.I. No. 272 of 2009 (Surface Water Regulations) using the following calculation.

Assimilative capacity = (Cmax - Cback) x F95 x 86.4kg/ day

Where Cmax = maximum permissible concentration (mg/l)
Cback = background upstream concentration (mg/l)
F95 = 95%ile flow in river/ stream (m^3/s)

b. Assess the impact of the treated effluent on the River using the mixing calculation:

$$\text{Downstream } C = \frac{(\text{Upstream flow} \times \text{upstream } C) + (\text{discharge flow} \times \text{discharge } C)}{\text{Upstream flow} + \text{discharge flow}}$$

7.2 Assimilation Capacity & Mixing Calculations of existing river quality

An assimilative capacity assessment was carried out for the current maximum discharge of 1,920m^3/day and current licensed ELV's to determine if the River Big had the assimilative capacity to accept the discharge in accordance with SI No. 272 of 2009. The lowest flow rate of 0.07m^3/sec recorded in 2011 upstream of the discharge at TM2 was used for the ammonia and BOD calculations while the average flow rate in 2011 at TM2 was used for the copper calculations.

The waste assimilation capacity and mixing calculations can be seen in Appendix B & C. The results are summarised in Table 6 below.

Parameter	Proposed discharge (kg/day)	Existing River Quality (mg/l)	Predicted Downstream quality (mg/l)	Surface Water High Quality Standards (mg/l)
BOD	3.84	1.4	1.55	2.2
Ammonia	0.0134	0.024	0.0197	0.09
Copper	0.0095	0.00495	0.00495	0.005

Table 6: Waste Assimilation Capacity & Mixing Calculations of River Big

Based on the cooling water analysis 2011 and the lowest flow of 0.07 m^3/s (recorded at TM2 upstream) the mixing capacity of the River Big is sufficient to meet the water quality targets for BOD, Ammonia and Copper to ensure the River Big can attain High Quality status by 2015 in accordance with the Surface Water Regulations 2009.

6. Conclusion

The Cooley Distillery lowest recorded flow rate in 2011 on the River Big was used for WAC. The combined Cooley Distillery chemical analysis at TM2 and EPA analysis c.800m upstream of the discharge was used for the WAC.

The nearest water dependant protected area is Dundalk Bay Special Protection Area (SPA) - Site Code 004026 which is adjacent to the mouth of the River Big and the sea outfall. Dundalk Bay is also categorised as a proposed Natural Heritage Area (pNHA) - Site Code 000455 and Special Area of Conservation (SAC) - Site Code 000455 c.1km north west of the mouth of the River Big.

It was found that the current cooling water discharge is sufficient to meet the water quality targets for BOD, Ammonia and Copper to ensure the River Big can attain High Quality status by 2015 in accordance with the Surface Water Regulations 2009.

Signed: ______________ ______________ Dated: 27th February 2012

Tom Rowan
BE CEng MIEI DipOSH GradIOSH HDipBS

John Lynch
BSc MSc AIEMA

References

Ref	Description
1.	Water Services Training Group. (2010) Applicant Guidance – Application for a Licence to Discharge to Surface Waters.
2.	European Communities. Environmental Objectives (Surface Waters) Regulations 2009. S.I. No. 272 of 2009.
3.	EPA. IPPC/Waste Licensing Review Form and Guidance Note for the purposes of EC Environmental Objectives (Surface Waters) Regulations 2009.
4.	Higgins, B. (2006) Assimilative Capacity and Licence Conditions presented at EPA National Water Conference 13th June 2006. Office of Licensing and Guidance, Environmental Protection Agency
5.	IPPC Licence No. P0826-01
6.	www.epa.ie Environmental Protection Agency website

Appendix A River Big Chemical Analysis & Flow Data for WAC

Sample Date	Location	Sampler	Ammonia (N) mg/l	BOD mg/l	Copper mg/l
Jan-11	TM2 upstream	Cooley Distillery	0.029	2	0.003185
Feb-11	TM2 upstream	Cooley Distillery	0.01	2	-
Mar-11	TM2 upstream	Cooley Distillery	0.01	2	-
Apr-11	TM2 upstream	Cooley Distillery	0.012	2	0.009569
May-11	TM2 upstream	Cooley Distillery	0.018	2	-
Jun-11	TM2 upstream	Cooley Distillery	0.017	2	-
Jul-11	TM2 upstream	Cooley Distillery	0.01	2	-
Sep-11	TM2 upstream	Cooley Distillery	0.038	2	-
Oct-11	TM2 upstream	Cooley Distillery	0.015	2	-
Nov-11	TM2 upstream	Cooley Distillery	0.024	2	0.0021
Dec-11	TM2 upstream	Cooley Distillery	0.071	2	-
Mean-2007-2009	EPA Monitoring Station Code RS06B010200 c.800m upstream	EPA	0.031	1.4	-
Average			**0.024**	**1.95**	**0.005**
Note 1		**< Results**			
Note 2	EPA BOD result of 1.4 due to lower limit of detection.				

Flow Data 2011

TM2 lowest Flow 2011	**0.07m3/sec**
TM2 highest Flow 2011	**6.77m3/sec**
TM2 Average Flow 2011	**1.687m3/sec**

Appendix B – WAC calculations for existing River Big

Parameters used in calculations	Units	Ammonia mg/l	BOD mg/l	Copper mg/l
Cooling Water Concentrations (2011 max NH3 & BOD results, average copper)	mg/l	0.007	2	0.005
Effluent Volume	m^3/day	1,920	1,920	1,920
Effluent Volume	m^3/s	0.0222	0.0222	0.0222
Weight of parameter discharged per day	**kg/day**	**0.0134**	**3.84**	**0.0095**
Regulation requirement	mg/l	0.09	2.2	0.005
River Concentration as per laboratory analysis	mg/l	0.024	1.4	0.004951
River Flow	m^3/s	0.07	0.07	0.07

WAC of River	Units	Ammonia mg/l	BOD mg/l	Copper mg/l
C max	mg/l	0.09	2.2	0.00500
C back	mg/l	0.02	1.40	0.00495
F 95	m3/sec	0.07	0.07	0.07
Multiplying factor		86.4	86.4	86.4
WAC = (Cmax- C back) * F 95 x 86.4kg/day)	kg/day	0.40	4.84	0.00029
Maximum Flow permitted at expected concentration	**m3/day**	**57,240**	**2,419**	**59.4458**
% of capacity to be assimilated at proposed discharge rate		**3%**	**79%**	**N/A**

Note 1: *EPA- Alkalinity upstream at Ballygoly <100, therefore 0.005mg/l copper requirement applied*
Note 2: *River Flow based on lowest flow recorded in 2011 at TM2.*
Note 3: *BOD in Cooling water (SE-1) results were <2mg/l, 2mg/l taken as worse case scenario.*
Note 4. *BOD in river taken as 1.4mg/l (EPA analysis) due to other BOD results at TM2 <2mg/l.*

Appendix C – Mixing calculations for existing River Big

River Quality after Mixing Calculation				
Using 95%ile Flow	**Units**	**Ammonia mg/l**	**BOD mg/l**	**Copper mg/l**
$\frac{(Effl_{conc} * Effl_{vol}) + (Median\ River_{conc} \times River\ Flow_{95\%})}{River\ flow + Effl_{vol}}$		0.0018181 / 0.0922	0.142444 / 0.0922	0.000457 / 0.0922
Permitted under appropriate Regulations	**mg/l**	**0.09**	**2.2**	**0.005**
Existing River Concentration as per laboratory analysis	mg/l	0.02	1.40	0.004951
Final River Concentration	mg/l	0.0197	1.5446	0.004951
Change in river concentration	mg/l	-0.0040	0.1446	0.000000

Note 1: *EPA- Alkalinity upstream at Ballygoly <100, therefore 0.005mg/l copper requirement applied*
Note 2: *River Flow based on lowest flow recorded in 2011 at TM2.*
Note 3: *BOD in Cooling water (SE-1) results were <2mg/l. 2mg/l taken as worse case scenario.*
Note 4. *BOD in river taken as 1.4mg/l (EPA analysis) due to other BOD results at TM2 <2mg/l.*

Attachment D.2 Environmental Considerations and Best Available Techniques (BAT)

D.2.1 Environmental Considerations and Best Available Techniques (BAT)

D.2.2 Emergency Response Procedure & Accident Prevention

Attachment D.2 Cooley Distillery Environmental Considerations and Best Available Techniques (BAT)

Cooley Distillery utilises the best available technologies to prevent or eliminate, or where that is not practicable, reduce the emissions from the activity.

Describe, in outline, the main alternatives, if any, to the proposals contained in the Review Form.

There are no alternatives proposed to the retention of the existing operations at the current site.

Describe any environmental considerations which were made with respect to the use of cleaner technologies, waste minimisation and raw material substitution.

Cooley Distillery utilises the best available technologies to prevent or eliminate, or where that is not practicable, reduce the emissions from the activity. To this end, the existing surface water discharges from the site complies with the emission limit values specified in the '*BAT Guidance Note on Best Available Techniques for the Brewing, Malting & Distilling Sector'.*

Describe the measures proposed or in place to ensure that:

(a) the best available techniques are or will be used to prevent or eliminate or, where that is not practicable, generally reduce an emission from the activity;

The best available techniques are in place at the facility for air emissions and water emissions.

(b) no significant pollution is caused;

Cooley Distillery has been operating under an IPPC Licence since 2008, and the Environmental Management System (EMS) controls and monitoring systems are in place to ensure that no significant pollution is caused by the activities at the site.

(c) waste production is avoided in accordance with Council Directive 75/442/EEC of 15 July 1975 on waste; where waste is produced, it is recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment;

Waste production is avoided in accordance with Council Directive 75/442/EEC of 15th July 1975 on waste; where waste is produced, it is recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment.

(d) energy and other resources are used efficiently;

Energy efficiency is a prime consideration at the facility for both environmental and economic reasons. The site monitors its energy usage and implements energy conservation opportunities across the site. Raw materials (e.g. chemicals, packaging) conservation is also a key consideration at the facility. The site is committed to auditing its raw material usage, minimising wastage and reducing consumption insofar as possible.

(e) the necessary measures are taken to prevent accidents and limit their consequences; and,

There are a number of controls and monitoring systems in place at Cooley Distillery as part of the facilities Environmental Management System (EMS). Cooley Distillery has an accident prevention procedure to assist in preventing any accidents. Furthermore, Cooley Distillery has emergency procedures in place to implement appropriate control measures in the event of an emergency. A copy of the Cooley Distillery accident prevention procedure and emergency response procedure are included below.

(f) the necessary measures are taken upon definitive cessation of activities to avoid any pollution risk and return the site of operation to a satisfactory state.

Cooley Distillery is committed to providing required finances and sufficient resources to fully decommission the site in the unlikely event of closure. Cooley Distillery has submitted a Decommissioning Management Plan to the Agency. Cooley Distillery will adhere to the EPA 'Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision' 2006, in the event of closure or partial closure of site operations and will engage fully with the EPA on all aspects of decommissioning operations.

This section should present a statement on energy efficiency at the site to include, where appropriate, an energy audit with reference to the *EPA Guidance document on Energy Audits*. Licensees should have regard to Section 5 of the *EPA Acts 1992 and 2003* in selecting BAT and in particular the following:

- **The use of low-waste technology;**
- **The use of less hazardous substances;**
- **The furthering of recovery and recycling of substances generated and used in the process and of waste where appropriate;**
- **Comparable processes, facilities or methods of operation, which have been tried with success on an industrial scale;**
- **Technological advances and changes in scientific knowledge and understanding;**
- **The nature, effects and volume of the emissions concerned;**
- **The commissioning dates for new or existing facilities;**
- **The length of time needed to introduce the BAT;**
- **The consumption and nature of raw materials, including water, used in the process and their energy efficiency;**
- **The need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it;**
- **The need to prevent accidents and to minimize the consequences for the Environment; and,**
- **The information published by the Agency in the form of sectoral BAT Guidance documents and the relevant BREF documents published by the EC**

(available for download at http://eippcb.jrc.es/ and at www.epa.ie).

Energy sources utilised at the facility include electricity and the medium fuel oil. Cooley Distillery is committed at a site level to energy conservation. Cooley Distillery monitors its energy usage and where necessary to implement any energy conservation opportunities across the site.

D.2 Cooley Distillery Emergency Response Procedure & Accident Prevention

Cooley Distillery Emergency Response Procedure

1.0 Purpose:

To ensure that emergencies (and potential emergencies) are dealt with efficiently:

- To avoid or at least minimise any injury or damage that might be threatened by an emergency;
- To minimise or avoid impacts on the environment and to minimise disruption to operations that might follow.
-

2.0 Scope:

This procedure covers all aspects of emergency situations such as spillages and fire.

3.0 Responsibilities:

It is the responsibility of the Environmental Team to ensure that this emergency procedure is complied with.

4.0 References:

-Cooley Distillery IPPC licence

-Emergency Management Plan

-EPA, 'Guidance to Licensees on the Notification, Management and Communication of Environmental Incidents'

-Section 11 Incident Response Procedure

5.0 Responsibilities:

The Environmental Team are charged with the responsibility of operating an effective emergency plan and for ensuring that it is kept up to date through:

- Adequate testing of fire equipment.
- By organising emergency exercises, evacuation drills and fire fighting practices.
- Establishing fire evacuation routes and assembly points.
- Maintenance of spillage kits at designated locations.

All Cooley Distillery employees, contractors and others visitors are required to co-operate fully in order to ensure that the company meets their legal obligations as regards emergency planning and emergency action.

6.0 Containment-General:

A: <u>Emergency Response for Spillage:</u>

In the event of a large spillage of oil, chemical or other hazardous materials due to leakage, human error, tanker collapse, vehicle collision etc. the following procedure must be adhered to:

- The Operations Manager is responsible for taking control of the incident. In his absence the Plant Manager or Laboratory Manager is the responsible person in charge.
- The local area should be evacuated. In the event of a large spillage the person controlling the incident will decide whether to evacuate the site.
- Ensure there is no potential source of ignition present.
- The designated person will investigate the source of the spillage in an effort to stop it.
- Consult relevant material data sheet in the case of chemical/liquid emissions and respond accordingly.
- If possible, the spillage will be restricted to the local area using sand or booms or other absorbent material in spill kits.
- Prevent ingress to surface water drains by sealing off with an impervious membrane or other suitable device such as a drain cover.
- Notify the relevant authorities (see below) and follow the incident response procedure in Section 11 of the EMS.

<u>Notification of Large Spillage</u>

- In the event of a large spillage inform the fire service and obtain advice on the necessary measures to ensure a safe clean up.
- In the event of spillage entering drains, Louth County Council, Environmental Department, County Hall, Tel: 042-9353130- Out of hours Phone: 042-9375305 (Mr. Frank O'Hanlon, Cooley Area).
- The EPA will also be notified; during business hours telephone inspector at Regional Inspectorate, Clonskeagh (01-2680100) or alternatively the EPA Headquarters (053-9160600 or 1890335599). Out of business hours fax details of spillage to the EPA Headquarters Wexford Office of Environmental Enforcement (053-9160699). Telephone and leave a message on the answering service at EPA Headquarters Wexford (053-9160600 or 1890335599). At the start of the next day of business, telephone inspector at Regional Inspectorate, Clonskeagh (01-2680100).
- If the discharge is to water, the Eastern Regional Fisheries Board shall be notified as soon as practicable after the incident Tel: 01-2787022, fax: 01-22787025.

In the event of a small spillage of oil, chemical or other hazardous materials due to leakage or human error, the following procedure must be adhered to;

- The Environmental Team is responsible for taking control any small spillages.
- Ensure there is no potential source of ignition present.
- The designated person will investigate the source of the spillage in an effort to stop it.
- Consult relevant material data sheet in the case of chemical/liquid emissions and respond accordingly.
- A spill kit (with booms, pads, sand etc.) should be used to contain and clean up any small spillages.
- If spillage is in proximity to the surface water drains, the drains should be sealed off with an impervious membrane or other suitable device such as a drain cover.
- Any contaminated sand or absorbent material must be placed into a lidded container and clearly labelled.
- Disposal of this waste must be carried out by an approved contractor familiar with the disposal of hazardous waste.
- The Plant Manager is responsible for ensuring that an adequate stock of spill kits is stored on site at all times.

B-Firewater & Environmental Pollution

- Limit the amount of firewater generated.
- Cover/seal surface water drains.
- Use booms or sand to contain contaminated water and divert firewater to the foul drains where possible.

6.2 Emergency Response (In House-HO/Warehouse):

To ensure that an emergency emission/spillage is properly responded to. The Operations Manager or deputy will take overall control.

The Operations Manager will take overall control.

- The relevant authority (EPA/Local Authority/Fisheries Board as appropriate) must be informed immediately and the appropriate report documented.- (See Section 11-Incident Response Procedure for full contact procedure)
- The reasons for the emergency must be investigated and corrective / preventive action initiated.
- Following any incident; incident report forms should be completed along with corrective action log(s).

6.3 Emergencies outside normal working hours at head office and warehouse (including holidays):

A. A local keyholder(s) will raise the alarm in the event of holidays.
B. They will take immediate action appropriate to the emergency and degree of risk.

Impact on the environment should be minimised by local containment if possible.

C. They will contact the appropriate emergency service (fire brigade, doctor etc) and they will follow the incident response procedure in Section 11 of the EMS.

6.4 Review

This emergency response procedure will be reviewed annually by the Environmental Team.

Emergency Response Officers for Cooley Distillery are the following persons in sequence:

1. ***Gabriel O'Loughlin***
2. ***Richie Dalton***

EPA Headquarters, PO Box 3000, Johnstown Castle Estate, Co. Wexford
Tel: 053-9160600 Fax: 053-9160699. Email: info@epa.ie Lo Call: 1890 335599

Health & Safety Authority, Metropolitan Building, James Joyce Street,, Dublin 1.

Tel: 01-6147000 Fax: 01-6147020

Louth County Council, Environmental Department, County Hall, Millennium Centre, Dundalk, Co. Louth.

Tel: 042-9353130 Out of hours Phone: 042-9375305 (Mr. Frank O'Hanlon, Cooley Area)

Louth County Council, Water Services Department, County Hall, Millennium Centre, Dundalk, Co. Louth.

Tel: 042-9353140 Out of hours Phone: 042-9375305 (Mr. Frank O'Hanlon, Cooley Area

Eastern Regional Fisheries Board, 15a Main Street, Blackrock Co. Dublin

Phone: 01-2787022, Fax: 01-2787025 Email: info@shrfb.com

Department of Marine & Natural Resources, 31 Adelaide Road, Dublin 2.

Tel 01-6782000

Irish Coast Guard, Irish Coast Guard Headquarters, Department of Transport, Leeson Lane, Dublin 2. Tel 01-6782000, Fax 01-6783459

Carlingford Garda Station, Carlingford, Co. Louth

Phone: 042-9373102

Dundalk Fire Station, Dundalk, Co. Louth

Phone: 042-9334666

Lifeboat (RNLI) Clogher Head, Clogher, Co. Louth

Phone: 041-9822600

Harbour Master

Port Oriel Harbour Master: Larry Burke 087-2628777

Health Service Executive

Phone: 1850241850/042-9389170

Cooley Distillery Accident Prevention Procedure

1.0 Purpose:

To ensure that a accident prevention procedure is place to address the hazards on site, particularly in relation to the prevention of accidents with a possible impact on the environment.

2.0 Scope:

This procedure covers all aspects of accident prevention emergency such as spillages and fire.

3.0 Responsibilities:

It is the responsibility of the Environmental Team to ensure that this accident prevention emergency procedure is complied with.

4.0 References:

-Cooley Distillery IPPC licence

-EMS 006 Emergency Response Procedure

-Emergency Management Plan

-EPA, 'Guidance to Licensees on the Notification, Management and Communication of Environmental Incidents'

-Section 011 Incident Response Procedure

-Section 009 Operational Control

5.0 Responsibilities:

The Environmental Team are charged with the responsibility of operating the accident prevention plan and for ensuring that it is kept up to date.

6.0 Accident Prevention:

1. <u>Fire</u>

The Environmental Team will also arrange for all fire detection and extinguishing equipment to be examined/tested by the supplier/ maintenance firm at least once every 12 months and keep a formal record of the check. Emergency procedures for fire will be reviewed annually as part of the Emergency Plan updates.

2. <u>Prevention of rain ingress, contaminated leachate, spillage prevention</u>

- Spill trays and spill kits will be available on site during the delivery of chemicals and hydrocarbons.

- Drain covers will be available to seal drains.
- Chemicals will be stored indoors where practical.
- Fuels and chemicals will be stored in bunded areas at all times.
- All bunds will be regularly visually checked and emptied as required.
- All bunds will be integrity assessed every 3 years.

3. Equipment Maintenance

• All equipment with potential impact on the environment will be maintained as per the preventative maintenance schedule as part of the planned maintenance programmes. Most of this planned maintenance will be carried out during planned summer shutdown.

• All key equipment will be checked regularly internally by maintence staff to ensure it operating effectively e.g. boiler.

• Standard Operating Procedure (S.O.P.) will be maintained for all key environmental equipment e.g. wastewater treatment plant manual, probes and meters.

4. Calibration of monitoring equipment

- All fixed monitoring equipment such as probes and fixed meters will be calibrated internally and externally as required by the manufacturer's specification.
- All lab equipment will be calibrated internally and externally as required by the manufacturer's specification.

7.0 Review

This accident prevention procedure will be reviewed annually by the Environmental Team.

Attachment E.1 Best Environmental Practices – Compliance with Legislation

Demonstrate if the best environmental practices are in place for control of diffuse emissions from the installation/facility as set out in the following legislation:

(a) a specification prepared by the Agency in accordance with Section 5 of the *Environmental Protection Agency Act 1992* as amended by Section 7 of the *Protection of the Environment Act 2003*;

Cooley Distillery utilises the best available technologies to prevent or eliminate, or where that is not practicable, reduce diffuse emissions from the activity.

(b) the *Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001)* as amended by the *Urban Waste Water Treatment (Amendment) Regulations 2004 (S.I. No. 440 of 2004)* or any future amendment thereof;

The Urban Waste Water Treatment Regulations do not apply to Cooley Distillery. Cooley Distillery current IPPC ELV's are well within limit within the Urban Waste Water Treatment Regulations.

(c) the *European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2009 (S.I. No. 101 of 2009)* or any future amendment thereof;

All Wastewater Treatment Plant sludge from Cooley Distillery is landspread on pre-approved landbanks in accordance with a Nutrient Management Plan and the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2010 S.I. No. 610 of 2010.

(d) the *Local Government (Water Pollution) Act, 1977 (Control of Cadmium Discharges) Regulations 1985 (S.I. No. 294 of 1985)*;

Cadmium is not contained in discharges from Cooley Distillery.

(e) the *Local Government (Water Pollution) Act, 1977 (Control of Hexachlorocyclohexane and Mercury Discharges) Regulations 1986 (S.I. No. 55 of 1986)*;

Hexachlorocyclohexane and Mercury are not contained in discharges from Cooley Distillery.

(f) the *Local Government (Water Pollution) Acts, 1977 and 1990 (Control of Carbon Tetrachloride, DDT and Pentachlorophenol Discharges) Regulations 1994 (S.I. No. 43 of 1994)*; and,

Carbon Tetrachloride, DDT and Pentachlorophenol are not contained in discharges from Cooley Distillery.

(g) measures or controls identified in a pollution reduction plan for the river basin district prepared in accordance with Part V of the *EC Environmental Objectives (Surface Waters) Regulations 2009 S.I. No. 272 of 2009* for the reduction of pollution by priority substances or the ceasing or phasing out of emissions, discharges and losses of priority hazardous substances.

The substances detailed in Table 10- Specific pollutants and Table 11- Priority Substances in the Surface Water Regulations 2009 S.I. No. 272 of 2009 are not contained in the discharges from the facility to the river.

Copper and zinc as detailed in Table 10- Specific pollutants in the Surface Water Regulations 2009 S.I. No. 272 of 2009 are contained in the treated effluent discharge (SE-2) to the Irish Sea.. There are licensed ELV's for Copper (0.5mg/l) and Zinc (0.2mg/l) in place. Lead in Table 11- Priority Substances in the Surface Water Regulations 2009 S.I. No. 272 of 2009 is contained in the treated effluent discharge (SE-2) to the Irish Sea.

Attachment F.1 Approved Adjustments & Conditions

Condition No.	Existing Condition	Proposed Wording (where appropriate)	OEE Agreement Reference	Description
Schedule C.6.2	Monitor S1-S4 Biannually	Monitor S1-S6 Biannually and add the following parameters to the monitoring schedule: antimony, cadmium, lead and nickel.	Letter- P0826-01/CL02NH	Revised groundwater schedule
Schedule C.6.1	Monitor TM1	Remove TM1 given its SE-1; the cooling water discharge	N/A- Proposed	Avoid duplication of monitoring schedule

Once off Assessments/Report Completed

Condition No.	Existing Condition	Completed
3.8	Firewater Risk assessment	In 2011
6.13	Groundwater hydrogeological investigation	In 2010
10.2	Historical waste disposal investigation	In 2010
10.3	Decommissioning Management Plan	In 2010
12.2	Environmental Liability Risk Assessment	In 2010