Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Headquarters, PO Box 3000
Johnstown Castle Estate
County Wexford, Ireland

Ceanncheathrú, Bosca Poist 3000
Eastát Chaisleán Bhaile Sheáin
Contae Loch Garman, Éire

T: +353 53 916 0600
F: +353 53 916 0699
E: info@epa.ie
W: www.epa.ie

LoCall: 1890 33 55 99

Ms Patrica Power
Director of Environment
Cork County Council
Inniscara
Cork
Attn: Ms Patricia Power, Director of Environment

7 June 2006 Reg No: W0211-01

Dear Ms Power

I am to advise you that the Agency has received an application for a Waste Licence from AVR-Environmental Solutions Limited, for a facility located at AVR-Environmental Solutions Limited, Foxhole, Youghal, Co Cork .

The applicant proposes, as part of this application, to provide for the discharge of process effluent to a sewer, which the applicant has stated is vested in, or controlled by, your Council. Process effluent includes trade effluent or other matter (other than domestic sewage or storm water). I enclose copy extracts from the application form, which detail proposed discharges. A Section 52 request was initially made by the Agency, letter dated 21/04/05, to which the Council responded on two occasions, letters dated 10/06/05 and 03/02/06.

The provisions of Section 52 of the Waste Management Acts, 1996 to 2005, provides that the Agency shall obtain the consent of the sanitary authority to the proposed discharge from an activity which involves the discharge of trade effluent or other matter (other than domestic sewage or storm water), to a sewer vested in or controlled by a sanitary authority.

In order to expedite the Agency's consideration of this waste licence application, I am to request your authority's consent to the proposed discharge/s. It should be noted that, your authority's consent may be subject to such conditions as your authority considers appropriate as provided for in Section 52 of the Waste Management Acts, 1996 to 2005 and Section 99E(3) of the Environmental Protection Agency Acts, 1992 and 2003. Your attention is drawn to paragraphs (3) and (4) of the attached copy of the relevant section of the Act. For your convenience please find attached a reply form including a list of draft conditions compiled by the Agency.

In accordance with paragraph (2) of this section of the Act, you are requested to forward your response within 5 weeks of the date of this letter. Please note that any decision given after the expiry period shall be invalid and in those circumstances the Agency may proceed to determine the application concerned as if consent was obtained. Ciara Maxwell is dealing with this matter and can be contacted at the Licensing Unit, Office of Licensing & Guidance Dublin(Tel. No. 01-2680100) if you have any queries.

Your co-operation in this matter is appreciated.

Yours sincerely,

Noeleen Keavey
Programme Officer
Licensing Unit
Office of Licensing & Guidance

Section 99E (3) & (4) of the Environmental Protection Agency Acts, 1992 and 2003

(3) Subject to subsection (4), a consent under subsection (1) may be granted subject to or without conditions and if it is granted subject to conditions the Agency shall include in the licence or revised licence concerned conditions corresponding to them or, as the Agency may think appropriate, conditions more strict than them.

(4) The conditions that may be attached to a consent by a sanitary authority under this section are the following and no other conditions, namely conditions-

(a) relating to-

(i) the nature, composition, temperature, volume, level, rate, and location of the discharge concerned and the period during which the discharge may, or may not, be made,

(ii) the provision, operation, maintenance and supervision of meters, gauges, manholes, inspection chambers and other apparatus and other means for monitoring the nature, extent and effect of emissions,

(iii) the taking and analysis of samples, the keeping of records and furnishing of information to the sanitary authority,

(b) providing for the payment by the licensee to the sanitary authority concerned of such amount or amounts as may be determined by the sanitary authority having regard to the expenditure incurred or to be incurred by it in monitoring, treating and disposing of discharges of trade effluent, sewage effluent and other matter to sewers in its functional area or a specified part of its functional area,

(c) specifying a date not later than which any conditions attached under this section shall be complied with,

(d) relating to, providing for or specifying such other matter as may be prescribed.

SANITARY AUTHORITY RESPONSE
re: SECTION 52 OF THE WASTE MANAGEMENT ACTS, 1996 to 2005

Name & Address of Sanitary Authority: **Cork County Council, Inniscara, Cork, Attn: Ms Patricia Power, Director of Environment, .**

Waste Reg. No. **W0211-01**

Waste Facility: **AVR-Environmental Solutions Limited, Foxhole, Youghal, Co Cork,**

Waste Licence Applicant: ***AVR-Environmental Solutions Limited***

Consent: Indicate Yes to one of the following statements:

Consent granted subject to the consent conditions outlined below	
Consent granted without conditions	
Consent refused [Note 1]	

Note 1 ***Where it is proposed to refuse permission the reasons for the refusal should be clearly outlined in the response.***

GENERAL CONSENT CONDITIONS	Condition to be included *(Yes/No)*
1. No specified emission from the installation shall exceed the emission limit value set out in *Schedule B: Emissions Limits to Sewer*. There shall be no other emission to sewer of environmental significance.	
2. The licensee shall carry out such sampling, analyses, measurements, examinations, maintenance and calibrations as out in *Schedule C*.	
3. Monitoring and analytical equipment shall be operated and maintained as necessary so that monitoring accurately reflects the discharge or emission.	
4. The licensee shall permit authorised persons of the Agency and the Sanitary Authority to inspect, examine and test, at all reasonable times, any works and apparatus installed, in connection with the process effluent, and to take samples of the process effluent.	
5. All automatic monitors and samplers shall be functioning at all times (except during maintenance and calibration) when the activity is being carried on unless alternative sampling or monitoring has been agreed in writing by the Agency for a limited period. In the event of the malfunction of any continuous monitor, the licensee shall contact the Agency as soon as practicable, and alternative sampling and monitoring facilities shall be put in place. Prior written agreement for the use of alternative equipment, other than in emergency situations, shall be obtained from the Agency.	
6. The licensee shall record all sampling, analyses, measurements, examinations, calibrations and maintenance carried out in accordance with the requirements of this licence.	
7. The licensee shall provide safe and permanent access to all on-site sampling and monitoring points and to off-site points as required by the Agency.	
8. The licensee shall at no time discharge or permit to be discharged into the sewer any liquid matter or thing which is or may be liable to set or congeal at average sewer temperature or is capable of giving off any inflammable or explosive gas or any acid, alkali or other substance in sufficient concentration to cause corrosion to sewer pipes, penstock and sewer fittings or the general integrity of the sewer.	
9. In the event of any incident which relates to discharges to sewer, having taken place, the licensee shall notify the Agency, Local Authority and Sanitary Authority as soon as practicable after the incident.	

ADDITIONAL GENERAL CONSENT CONDITIONS in respect of discharges or emissions to sewers, in accordance with Section 52 of the Waste Management Acts, 1996 to 2005 *(specify, if required)*

Limit Values for Process Effluent to Sewer

Schedule B: Emission Limits

Waste licence application Register No. **W0211-01**

Emission Point Reference No: ____________________

Emission to *(sewer description):* ____________________

Volume to be emitted: Maximum in any one day: ____________ m^3

Maximum rate per hour: ____________ m^3

Parameter *(delete parameters which are not applicable)*	Emission Limit Value	
	Daily Mean Concentration (mg/l)	**Daily Mean Loading (kg/day)**
BOD		
COD		
Suspended Solids		
PH		
Temperature		
ADDITIONAL PARAMETERS *(if required)*		

Frequency of Monitoring Process Effluent to Sewer

Schedule C

Waste Licence application Register No. **W0211-01**

Emission Point Reference No:___________________

Parameter *(delete parameters which are not applicable)*	**Monitoring Frequency (e.g. monthly, quarterly, annually)**	**Sampling Type** *(grab, composite)*
Flow to sewer		
Temperature		
pH		
BOD		
COD		
Suspended Solids		
ADDITIONAL PARAMETERS *(if required)*		

SANITARY AUTHORITY CHARGES	
Charge per cubic metre of process effluent (per s52 of the Waste Management Acts, 1996 to 2005)	
Payment Frequency	
Annual Monitoring Costs	

Signed on behalf of Cork County Council

______________________________ Date____________________

Waste Licence Application for AVR-Environmental Solutions Ltd., Reg 211-1

Relevant extracts from application documentation to attach to the S52 Consent Notice:

Attachment 1 – Points 1, 6 & 8 from Main Report re. proposed emission of trade effluent (15 pages).

Attachment 2 – Water Quality Study Dec. 2005 (26 pages).

Attachment 3 – Copy of letter to Sanitary Authority, dated 12/05/2006 (1 page).

Attachment 4 – Extract from revised EIS Non-technical Summary (2 pages).

Attachment 5 – Extract from revised waste licence application Non-technical Summary (6 pages).

Attachment 1

Points 1, 6 & 8 of Main Report

Point 1:

Proposed emission of trade effluent. Based on the modeled results submitted in December 05 from the analysis undertaken, the EPA raised a query with respect to the exceedences noted from modeled results. The Agency also requested that cooling water to be included in any additional modeling with respect to potential discharge impact.

Response

The initial modelling results were based on "worst case scenario" results from samples analysed under laboratory conditions which do not accurately simulate real life results of treated condensate. These results were treated as worst case scenario and were provided to the Agency as such. Post submission of these laboratory tested results and discharge modelling to the Agency in December 05 (ref EPA Compliance Response licence Reg. 211-1 Doc 2004-121 Dec 05), it was possible to get condensate from the process analysed under real life conditions via submission of raw sludge samples to the supplier of the sludge drying facility Vomm impresia who have been involved in the sludge drying industry for over 35 years. These give an accurate representation of the proposed discharge prior to pumping to the on site Bord Na Mona Waste Water Treatment Facility where the effluent will be treated to meet limits stipulated by Cork County Council and The Agency prior to discharge.

The condensate analysis suite was therefore provided to the proposed on site Waste Water Treatment provider with a suite of emission limit standards to be adhered to (Table 1) and the effluent discharge was remodelled to determine what impact the discharge would have on the receiving waters. The Environmental Division and the Sanitary Division of Cork County Council were contacted with respect to potential emission limit values. They noted that the discharge must, at a minimum, adhere to the requirements of the Urban Waste Water Treatment Directive and to take account of the Shellfish Directive, to ensure that the effluent does not negatively impact on water quality in the Blackwater Estuary. This was taken into account in stipulating emission limit values to be adhered to by the on site waste water treatment facility.

The discharge from the site waste water treatment plant will be to Youghal estuary and subsequently, when constructed, it is proposed that discharge be to Cork County Council Youghal Waste Water Treatment Facility. The discharge application therefore requires permission for the discharge of trade effluent to be issued from Cork County Council (CCC) to ensure emission limits will meet the requirements of their treatment facility when constructed. CCC were therefore consulted with respect to emission limits and emission parameters. The request for permission for same will be re-issued via the EPA to the Local Authority based on the revised emissions supplied. This treatment plant is currently being designed and anticipated to be in operation in c 5 years. A meeting with the relevant bodies in CCC will also be requested by the developer to ensure that their emission limit requirements are adhered to.

With respect to site foul effluent, it is now proposed that this would be treated separately to trade effluent with a small, biological membrane bioreactor package plant which will discharged via SE1 emission point. This treatment system is designed for treatment of light commercial wastewater with a 99.9% reduction in faecal coliforms. The site foul effluent system will treat on site effluent for up to 8 persons (maximum) with an average 2 person/daily load.

A specification for this proposed treatment system is attached for reference in appendix 1. Microbiological analysis of condensate from sludge was not undertaken as one of the benefits of using a thermal treatment system such as the VOMM drying system is that it is a proven technology in the field of industrial, pharmaceutical and municipal sludge drying nationally (sewage sludge) and internationally (all sludge types) and produces a pathogen-free, sterile product.

Results of the proposed trade effluent were modelled utilising a solute transport model to determine what impact this discharge would have on the receiving environment and results are presented in appendix 1. Additional parameters were also modelled as requested by the Agency (thermal discharge modelling based on cooling water impact on receiving environment). These results indicate that the proposed discharge will not negatively impact on the receiving environment. Table E 3(i) is resubmitted on the basis of the revised information.

Table 1: Suite of Condensate Analysis

Youghal AVR Results

Condensate Analysis - prior to waste water treatment and discharge modelling

Analysis Suite provided to Waste Water Treatment Provider

Comparison of condensate with Relevant Standards

Apr-06

Parameters	Units	Condensate raw water quality Results	Waste Water Treatment System - discharge limits to be adhered to at point of discharge	Urban Waste Water Treatment 91/271/EC	Shellfish Directive 91/692/EC SI 200 1994	Dangerous substances 76/464/EC SI 12/2001	EQS Surface Water	Drinking Water Standard
BOD	mg/l	<2	25	25				
Mercury	ug/l	<0.05	<0.05				1	1
Potassium	mg/l	4.8					-	12
Sodium	mg/l	42.5					-	150
SVOCs	ug/l	<1						
VOCs	ug/l	<1	10					

Total Solids	mg/l	286						
Total Suspended Solids	mg/l	119	35	35	no greater rise than 20%		-	-
Total Phosphorous	mg/l	0.8		1			-	-
Disolved Aluminium low level	mg/l	0.083					0.2	0.2
Disolved Arsenic low level	ug/l	2				20	25	10
Disolved Boron low level	ug/l	14					2000	1000
Disolved Calcium low level	mg/l	38.8					-	200
Disolved Cadmium low level	ug/l	<1					5	5
Disolved Chromium low level	ug/l	6				15	30	50
Dissolved Cobalt low level	ug/l	<1					-	-
Dissolved Copper low level	ug/l	<1				5	30	2000

Dissolved Iron low level	ug/l	103					1000	200
Dissolved Lead low level	ug/l	18				5	10	10
Dissolved Magnesium low level	ug/l	8.297					300	50
Dissolved Nickel low level	ug/l	10				25	50	20
Dissolved Selenium low level	ug/l	<1						10
Dissolved Zinc low level	ug/l	47				50	100	5000
TOC	mg/l	5						No abnormal change
Chloride	mg/l	28	28				250	250
Fluoride	mg/l	0.2	0.2				5	1
Orthophosphate (PO4)	mg/l	1.72	0.03				-	0.03
Sulphate	mg/l	17					200	250
Total Oxidised Nitrogen (as N)	mg/l	<0.3						

pH	pH units	8.13	7-9		7-9.		-	≤ 6.5 and ≥ 9.5
Total Dissolved Solids	mg/l	273					-	1000
Turbidity	NTU	1.5	1.5				-	No abnormal change
Kjeldahl Nitrogen	mg/l	15	2				-	-
Ammoniacal Nitrogen NH_3 (as N)	mg/l	8.5					0.02	0.3
COD	mg/l	199	125	125				
Free Cyanide	mg/l	<0.05				10	0.01	0.05
Total Nitrogen as N	mg/l	24		10			-	-
Total Alkalinity as $CaCO_3$	mg/l	210	210					No abnormal change
Temperature					no greater rise than 3°			

*Note: Surface Water Regulations limits in Phosphates: 0.22 to 0.3 mg/l P

Ortophosphates 1.72 mg/l as PO4 = 0.56 mg/l as P

TABLE E.3 (i): EMISSIONS TO SEWER (One page for each emission)

Emission Point:

Emission Point Ref. Nº:	SE 1
Location of connection to sewer :	Exact location to be agreed with Youghal Town Council but in close proximity to waste water treatment plant and storm water retention tank
Grid Ref. (10 digit, 5E,5N):	20973E 07986N
Name of sewage undertaker:	Sanitary Authority Youghal Town Council

Emission Details:

(i) Volume to be emitted			
Normal/day	$132m^3$	Maximum/day	168 m^3
Maximum rate/hour	$7m^{3*}$		

* this includes for any additional cooling water required - modelling and discharge calculations carried out on worst case scenario discharge. Thermal impact discharge takes account of impact of cooling/dilution water

(ii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations *(start-up /shutdown to be included)*:

Periods of Emission (avg)	60 min/hr 24 hr/day 350day/yr

TABLE E.3(ii): EMISSIONS TO SEWER - Characteristics of the emission (1 table per emission point)

Emission point reference number : SE1

Parameter	Prior to treatment				As discharged				% Efficiency
	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	Max. hourly average (mg/l)	Max. daily average (mg/l)	kg/day	kg/year	
BOD	<2		0.264	92.4	<2		0.264	92.4	NR
Mercury	<0.00005		0.0000066	0.0231	<0.00005		0.0000066	0.0231	NR
Potassium	4.8		0.6336	221.76	4.8		0.6336	221.76	NR
Sodium	42.5		5.61	1974	42.5		5.61	1974	NR
sVOC's	<0.001		0.000132	0.462	<0.001		0.000132	0.462	NR
VOC's	<0.001		0.000132	0.462	<0.001		0.000132	0.462	NR
Total Solids	286		37.752	13213	286		37.752	13213	NR
Total Suspended Solids	119		15.708	5497.8	35		4.62	1617	95
Total Phosphorous	0.8		0.1056	36.96	0.8		0.1056	36.96	*
Dissolved Aluminium	0.083		0.010956	3.8346	0.083		0.010956	3.8346	NR
Dissolved Arsenic	0.002		0.000264	0.0924	0.002		0.000264	0.0924	NR
Dissolved Boron	0.014		0.001848	0.6468	0.014		0.001848	0.6468	NR
Dissolved Calcium	38.8		5.1216	1792.56	38.8		5.1216	1792.56	NR
Dissolved Cadmium	<0.001		0.00132	0.462	<0.001		0.00132	0.462	NR
Dissolved Cobalt	<0.001		0.00132	0.462	<0.001		0.00132	0.462	NR

Dissolved Chromium	0.006		0.000792	0.2772	0.006		0.000792	0.2772	NR
Dissolved Cobalt	<0.001		0.00132	0.462	<0.001		0.00132	0.462	NR
Dissolved Copper	<0.001		0.00132	0.462	<0.001		0.00132	0.462	NR
Dissolved Iron	0.103		0.013596	4.7586	0.103		0.013596	4.7586	NR
Dissolved lead	0.018		0.002376	0.8316	0.018		0.002376	0.8316	NR
Dissolved magnesium	0.008297		0.001095204	0.3833214	0.008297		0.001095204	0.3833214	NR
Dissolved nickel	0.01		0.00132	0.462	0.01		0.00132	0.462	NR
Dissolved selenium	<0.001		0.00132	0.462	<0.001		0.00132	0.462	NR
Dissolved zinc	0.047		0.006204	2.1714	0.047		0.006204	2.1714	NR
TOC	5		0.66	231					NR
Chloride	28		3.696	1293.6	28		3.696	1293.6	0
Flouride	0.2		0.0264	9.24	0.2		0.0264	9.24	0
Orthophosphate	1.72		0.22704	79.464					
Sulphate	17		2.244	785.4	17		2.244	785.4	0
Total oxidized nitrogen (N)	<0.3		0.0396	13.86					
pH	8.13					No change unless pH correction is required			
Total dissolved solids	273		36.036	12612.6					

Turbidity	1.5		0.198	69.3						
Kjeldhal nitrogen	15		1.98	693	10					
Ammoniacal nitrogen NH3	8.5		1.122	392.7						
COD	199		26.268	9193.8	125					95
Free cyanide	<0.05		0.0066	2.31	<0.05			0.0066	2.31	
Total nitrogen as N	24		3.168	1108.8	10					
Total alkalinity	210		27.72	9702	210			27.72	9702	Assuming no pH correction
*Micro	Not relevant									NR
Temperature	25°C				25°C					NR

- MRB is not designed to remove metals. Metals associated with suspended solids in the feed will be removed by the process dissolved metals are not removed by process. Therefore, no metal reduction was assumed and figures are provided as worst case scenario data

** no assumption made for reduction in P as emission are lower than emission limit requirements and therefore no while greater removal can be achieved by the addition of ferric chloride or ferric sulphate for P removal, none is considered necessary

System is designed to steralise so is pathogen free and foul water is treated separately.

Point 6:

Section L of Application Form – details of how the proposed facility will meet the requirements of Section 40(4)[(a) to (i)] of the WMA 1996 to 2005 and describe how the facility will meet BAT, making particular reference to the considerations referred to in Annex IV of the IPPC Directive

Response

As discussed at our meeting of 16th March 2006, the only outstanding item in this regard was in reference to discharge (ref SE1) from the on site waste water treatment facility and compliance with required discharge parameters. As per point 1 additional analysis and additional modelling were undertaken to ensure that this could be achieved. A meeting with the Environmental Division and Sanitary Division of Cork County Council was also requested to discuss any discharge requirements required to meet emission limit standards of Cork County Council. At the verbal request of Cork County Council (V. Hannon Environmental Division CCC pers comms), this meeting would take place post receipt of the results of the proposed discharge and modelling results to the Authority via the EPA.

It was noted by CCC that, at a minimum, emission limits should meet limits set under the Urban Waste Water Treatment Directive (91/271/EC amended by 98/15/EC) and the Quality of Shellfish Waters Regulations. Emissions were also compared with other relevant standards including the Dangerous Substances Regulations 2001 (SI 12 2001) and EPA 2000 Water Quality in Ireland 1998-2000. Results of the modelling undertaken demonstrate that the discharge will not adversely impact on the receiving environment and will therefore meet the requirements of Section 40(4)[(a) to (i)] of the WMA 1996 to 2005 and will also meet the requirements of BAT.

Where:

2. The Waste Management Act Section 40 (4 (a- i) states as follows:

Section 40

(a) any emissions from the recovery or disposal activity in question ("the activity concerned") will not result in the contravention of any relevant standard, including any standard for an environmental medium, or any relevant emission limit value, prescribed under any other enactment,

(b) the activity concerned, carried on in accordance with such conditions as may be attached to the licence, will not cause environmental pollution, As noted in point 8 response to additional information, ESP air abatement technology will be replaced with filter technology which will conform to the requirements of BAT and will meet air emission standards with Authomatic cleaning with compressed air in counter current. A specification for same is provided in appendix 2.

Point 8: AOB

i) Emission Monitoring Schedule Proposal

At the request of the Agency at our recent meeting for the licencee to propose emission monitoring requirements the licencee has reviewed the proposal with respect to emissions and timing of same and proposes the following emission monitoring programme be applied.

The following emission points have been identified:

- SE 1 – emission to sewer including foul water
- MW 1- Groundwater monitoring well - permanent
- MW 2 – Groundwater monitoring well – permanent
- SW 1 - Surface Water Discharge Point (flow, pH)
- A1 – Stack emission - boiler
- A2 – fugitive emission biofilter
- Dust monitoring
- Noise monitoring

The following emission monitoring programme is proposed:

Monitoring Point Ref	Monitoring Parameters Proposed	Monitoring schedule Proposed	Continuous Monitoring
A1	NOx	Quarterly	
	CO	Quarterly	
	Particulates	Quarterly	
	Oxygen		
A2	H^2S	Biannual	
	VOC	Biannual	
	Acetone	Biannual	
SE1	pH, temperature, flow, Conductivity		√

	P, PO4, Total N, NH3, BOD, COD, SS, TOC, VOC, sVOC	Monthly	
	Zn, Fe, Al.	Monthly	
	Micro	biannual	
SW 1	Temp		√
	pH, Conductivity		√
	Visual	Daily	
	TSS, BOD, COD. TOC	Quarterly	
MW1 and MW 2	pH,	Biannual	
	Conductivity	Biannual	
	DRO	Biannual	
	Iron	Biannual	
	Mg	Biannual	
	Mn	Biannual	
	Nitrate	Biannual	
	Chloride	Biannual	
	NH4	Biannual	
	Sulphate	Biannual	
	Arsenic	Biannual	
	PRO	Biannual	
Dust Sensitive locations	Four locations	Biannual	
Noise	NSL and boundary noise monitoring	Annual	

Subsequent to the meeting of 16th March 06, the following additional points are also included

1. submission of Groundwater quality results from monitoring wells MW 1 and MW 2
2. Replacement of ESP with bag filter technology for abatement of particulate emissions – appendix 2.
3. Non technical summaries revised to reflect above – appendix 4
4. Air model utilization justification - appendix 5

Attachment 2

Water Quality Study Dec. 2005

ADDENDUM TO REPORT

WATER QUALITY STUDY

December, 2005

MODEL STUDY OF
YOUGHAL HARBOUR.
CO. CORK

For: SWS Energy Enterprises,
Cork

By: Aqua-Fact International Services Ltd.,
12 Kilkerrin Park,
Liosbaun,
Galway.
www.aquafact.ie

Introduction

Following the site investigation carried out in the main report, further model runs were conducted which contained more accurate and up to date concentrations for the various substances to be discharged into Youghal Harbour. Of particular concern in the last report was the high concentration of Volatile Organic Compounds and phosphates. The two dimensional model DIVAST was again used to predict the solute transportation. The modelled area is identical and also the location of the discharge point. All relevant boundary conditions including tidal boundaries and river inputs remained the same. Since the Kjeldahl nitrogen value was different to the last study, this parameter was considered again. Two new parameters (i.e. the temperature and the ammoniacal nitrogen concentration) were also modelled. The background water temperature was assumed to be 10°C for the thermal discharge simulations.

This document presents the model results predicting concentrations of phosphates, Kjeldahl nitrogen, VOC's, ammoniacal nitrogen, and temperature variation throughout the model domain. These results are discussed in accordance with the same water quality standards used in the first site investigation together with the relevant standards for the new parameters modelled. The conclusions regarding the suitability of the current site are drawn based on the possible impact which the proposed discharge will have on the surrounding marine environment.

Solute Transport

The dispersion-diffusion terms summaries all non-advective transport processes, such as molecular diffusion, turbulent diffusion and dispersion due to the shear flow. The transport-dispersion model uses Elder's [1] dispersion equation:

$$D_L = k_L V_L H \qquad (1) \qquad\qquad D_T = k_T V_T H \quad (2),$$

where D_L and D_T are the longitudinal and transverse depth averaged dispersion coefficients (m^2/s), V the shear velocity, H the water depth and k_L and k_T are the longitudinal and transverse empirical dispersion constants. Assuming a logarithmic velocity distribution, the theoretical values for these constants are 5.93 and 0.23 respectively. Based on our own previous dye studies around the Irish coast it has been observed that the measured values of these dispersion constants are often significantly higher than the theoretical ones mentioned above. However, in the interest of conservatism it was decided to use the theoretical values in the simulations. These are the same values which were used in the last study and as such they represent a 'worst case scenario'. The simulations did not include any effects of diffusion due to wind which would tend to lower the concentrations. Again this was in the interest of conservatism and was consistent with the previous simulations.

Solute Transport Results

Using the flow rate and effluent concentrations specified in Table A.1 the model was run for a full spring - neap tidal cycle (i.e. 350hrs). Snapshots of the VOC, phosphate, nitrogen, ammonia, and temperature plumes within the study area were output by the model at four different stages of the tide, namely, high water, mid-ebb, low water and mid-flood, for both neap and spring tide conditions. The neap solute plumes were output by the model at approximately 175 hours into the simulation while the spring plumes were output after approximately 350 hours of the simulation. These solute plumes are illustrated in Figures A.1 – A.40. A table of the maximum concentrations predicted at each stage of the tide is presented below (table A.2). These maximum values occurred within a 25m grid square surrounding the outfall pipe.

Rate of discharge (l/s)	Conc. of Phosphate (mg/l)	Conc. of VOC's (mg/l)	Conc. of nitrogen (mg/l)	Temperature of effluent degrees C°	Conc. of Ammonia (mg/l)
1.5	0.56	1.0	15	25	8.5

Table A.1: Characteristics and flow rate of effluent from at discharge point

Tidal stage	VOC conc. [µg/litre]	Phosphate conc. [µg/litre]	Nitrogen conc. [mg/litre]	Ammonia conc. [mg/litre]	Temperature Degrees oC
Neap mid flood	8.5	4.7	0.13	0.08	10.1
Neap high water	5.8	3.3	0.095	0.05	10.04
Neap mid ebb	7.0	3.7	0.1	0.06	10.04
Neap low water	8.5	4.5	0.13	0.07	10.06
Spring mid flood	4.5	2.9	0.07	0.04	10.04
Spring high water	2.5	1.4	0.04	0.025	10.01
Spring mid ebb	2.9	1.7	0.05	0.03	10.01
Spring low water	10.05	6.4	0.165	0.095	10.15

Table A.2: Maximum VOC, phosphate, nitrogen, and ammonia concentrations and temperatures at different periods in the tidal cycle

Discussion of Results

Looking at the maximum values predicted at the discharge point for the different stages of the tide it is evident that, in general, higher solute concentrations occur during the neap tidal cycle due to a smaller tidal range and hence lower current velocity values which tend to inhibit rapid dilution of the effluent during this period. Conversely, dilution of the effluent plumes is greatest on the spring tide at periods of relatively high current velocity i.e. at mid-ebb and mid-flood tide, when the volume of water entering or leaving the bay is at a maximum. However, the absolute highest concentrations for each substance occurred at low water on the *spring* tide and are 10.05µg/l, 6.4µg/l, 0.165mg/l, and 0.095mg/l for VOC's, phosphates, Kjeldahl nitrogen, and ammoniacal nitrogen respectively. These will now be compared with the relevant water quality standards outlined in chapter 5 of the previous report. A summary of the standards presented in that chapter as well as relevant standards for temperature and ammoniacal nitrogen are as follows:

1. The EPA overview of water quality in Ireland [2] specifies that the median value of Kjeldahl nitrogen in estuarine and coastal waters should not exceed 2mg/l.

2. An EC Directive on Surface Water Regulations gives values between 0.22 and 0.3mg/l as the limiting values for phosphate concentration.
3. The environmental quality standard for VOC's set down by the EPA is 10µg/l.
4. The EU Directive on water quality associated with freshwater fisheries, 78/659/EEC, stipulates that the maximum permissible levels of total ammonia, as N, is 0.3 mg/litre, which is considered to be that which would contain the limiting amount of un-ionised ammonia which is most harmful to freshwater aquatic life.
5. The EU Directive on water quality associated with freshwater fisheries, 78/659/EEC states that the temperature measured downstream of a point of thermal discharge (at the edge of the mixing zone) must not exceed the unaffected temperature by more than 1.5°C for salmonid waters, and by 3°C for Cyprinid waters.

Conclusions

The maximum Kjeldahl nitrogen concentration is less than ten times the allowable limit while the maximum ammoniacal nitrogen concentration is approximately three times lower than the limit specified in the above standards. Hence the discharging of these substances should have no adverse effects on the surrounding water quality.

The phosphate levels predicted by the model are very low, 6.4µg/l (i.e. 0.0064mg/l), when compared with the allowable levels, 0.22mg/l – 0.3mg/l, and so will not cause any problems in relation to eutrophication. Similarly discharging the effluent at a temperature of 25°C will have a negligible impact on the temperature of the surrounding waters with a maximum rise in temperature of approximately 0.15°C.

The highest VOC level (i.e. 10.05µg/l) is practically the same as the allowable level of 10µg/l. However, this level is only reached for a few hours around low water on a spring tide and the high concentration is confined to a small area in the immediate vicinity of the discharge pipe i.e. within 25m which would be considered quite a small 'mixing zone'. The concentrations decrease rapidly with distance from the discharge point. Furthermore, given the conservative nature of the modelling exercise it is unlikely that as high a concentration would be found in reality. For these reasons it is unlikely that there would be any impact on the water quality resulting from the proposed discharge of these substances.

REFERENCES

[1] Elder, J.W. 1959. "The Dispersion of Marked Fluid in Turbulent Shear Flow", J. Fluid Mech, Vol.5 544-560

[2] E.P.A., 2000. "Water Quality in Ireland 1998 – 2000".

Figure A.25: VOC concentrations at mid-flood on a neap tide (µg/l)

Figure A.26: VOC concentrations at high water on a neap tide (µg/l)

Figure A.27: VOC concentrations at mid ebb on a neap tide (µg/l)

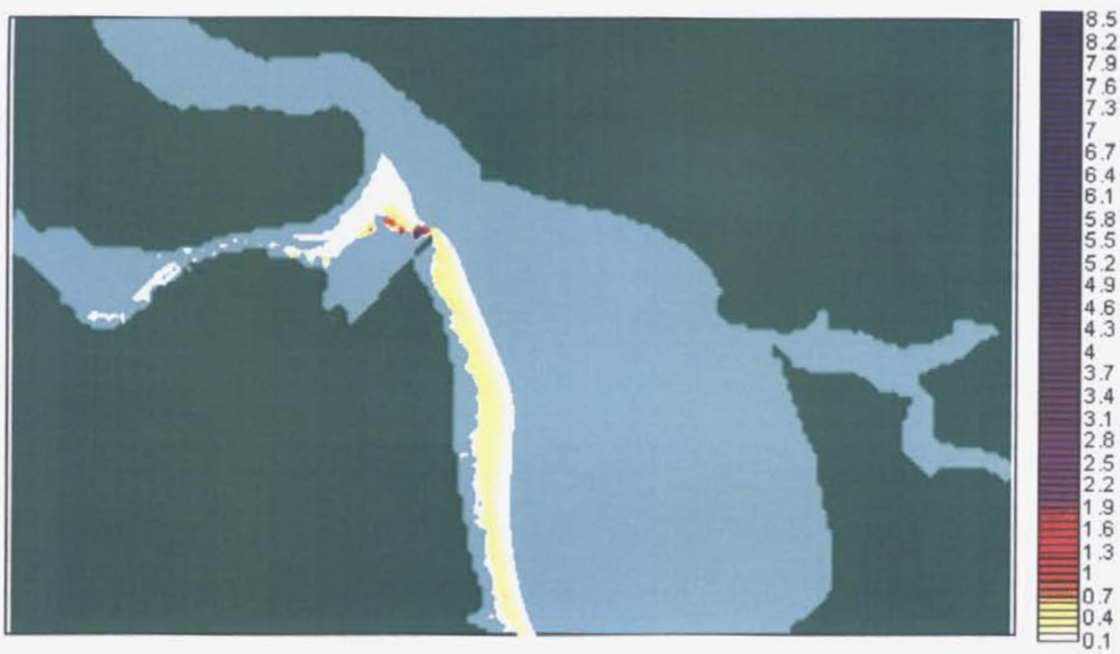

Figure A.28: VOC concentrations at low water on a neap tide (µg/l)

Figure A.29: VOC concentrations at mid-flood on a spring tide (µg/l)

Figure A.30: VOC concentrations at high water on a spring tide (µg/l)

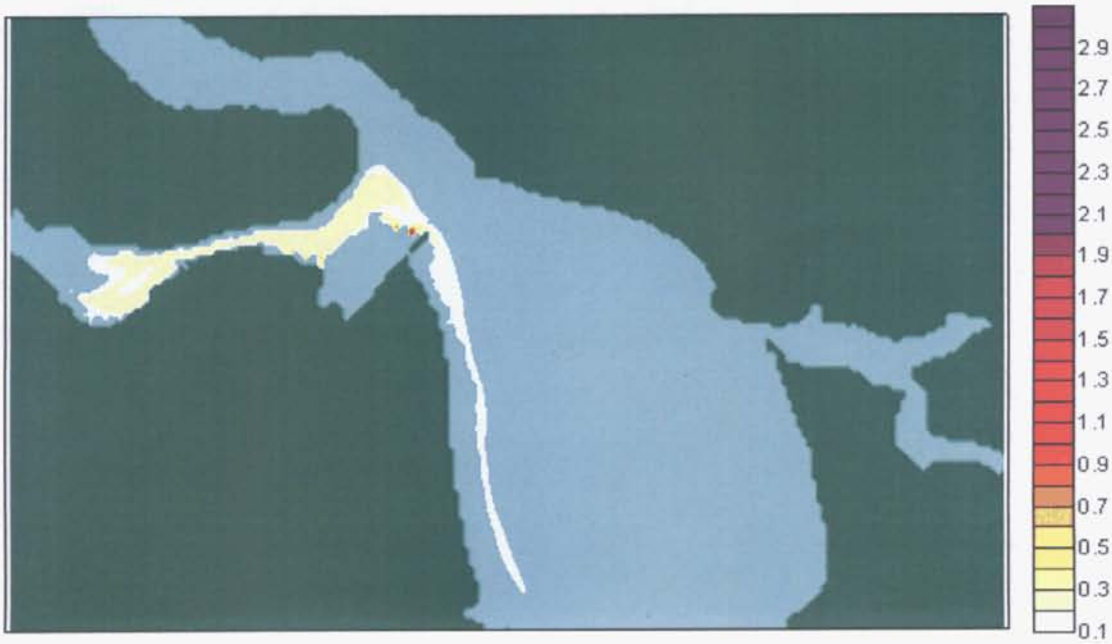

Figure A.31: VOC concentrations at mid ebb on a spring tide (µg/l)

Figure A.32: VOC concentrations at low water on a spring tide (µg/l)

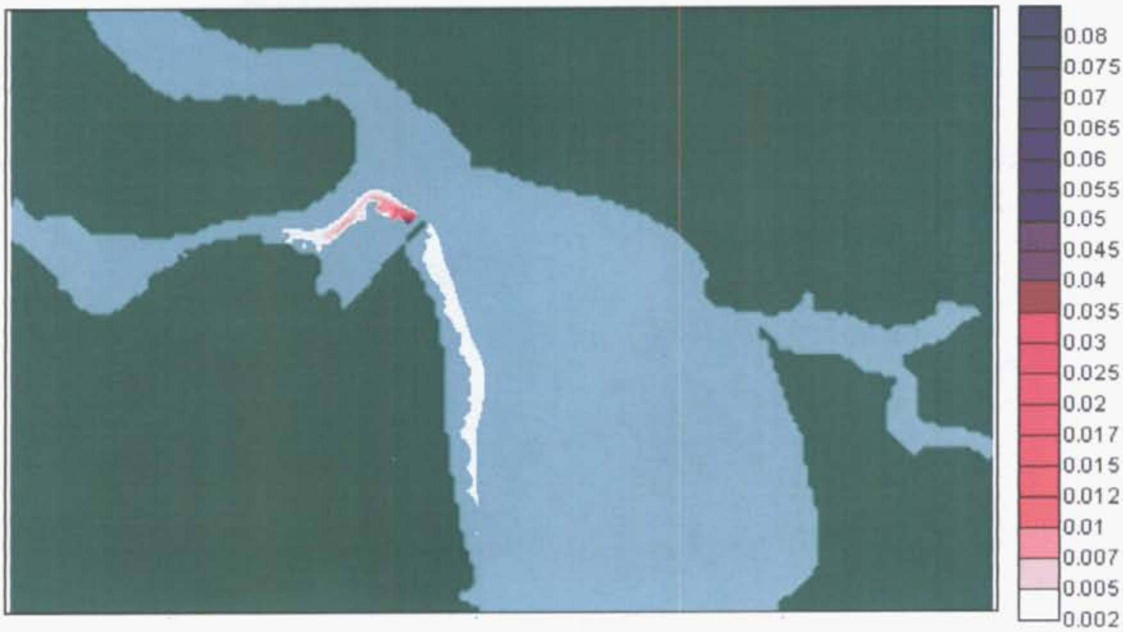

Figure A.17: Ammoniacal nitrogen concentrations at mid-flood on a neap tide (mg/l)

Figure A.18: Ammoniacal nitrogen concentrations at high water on a neap tide (mg/l)

Figure A.19: Ammoniacal nitrogen concentrations at mid ebb on a neap tide (mg/l)

Figure A.20: Ammoniacal nitrogen concentrations at low water on a neap tide (mg/l)

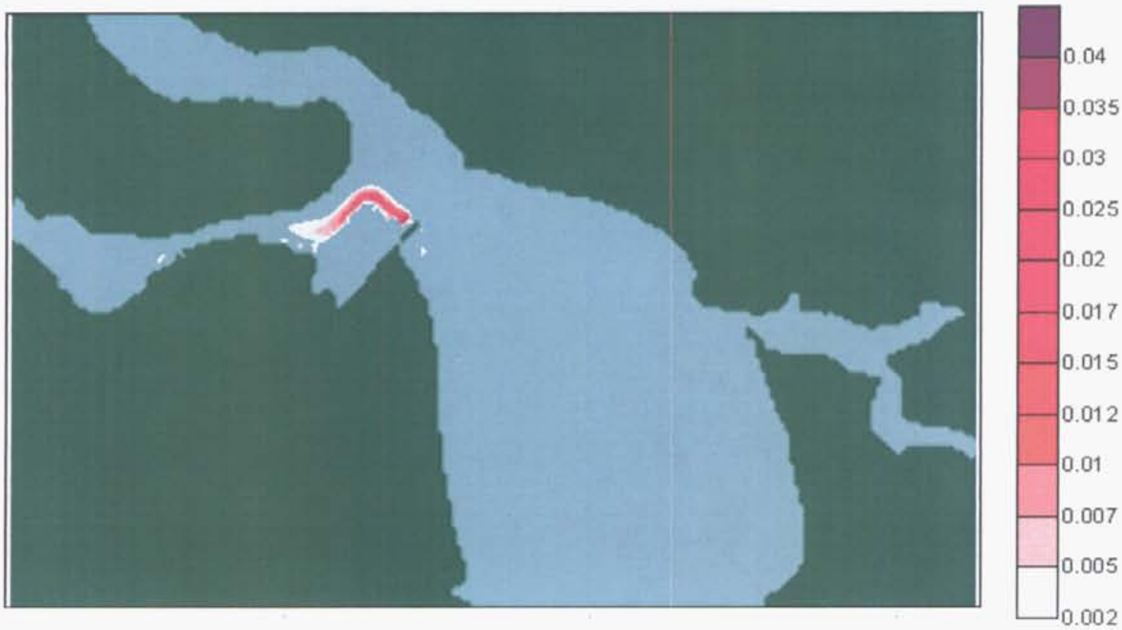

Figure A.21: Ammoniacal nitrogen concentrations at mid-flood on a spring tide (mg/l)

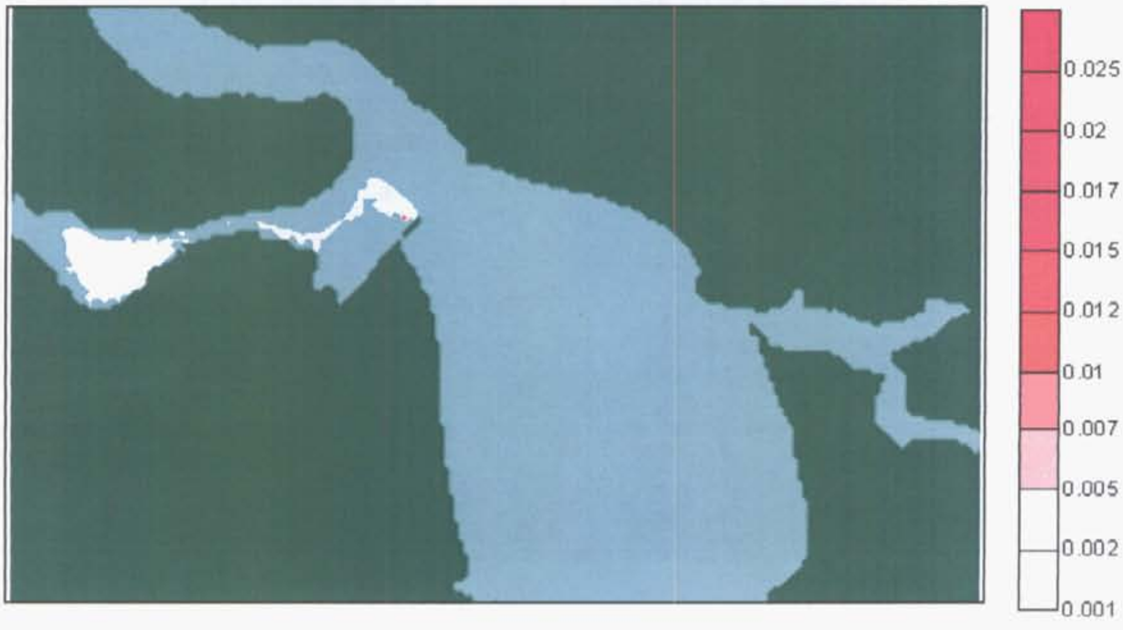

Figure A.22: Ammoniacal nitrogen concentrations at high water on a spring tide (mg/l)

Figure A.23: Ammoniacal nitrogen concentrations at mid ebb on a spring tide (mg/l)

Figure A.24: Ammoniacal nitrogen concentrations at low water on a spring tide (mg/l)

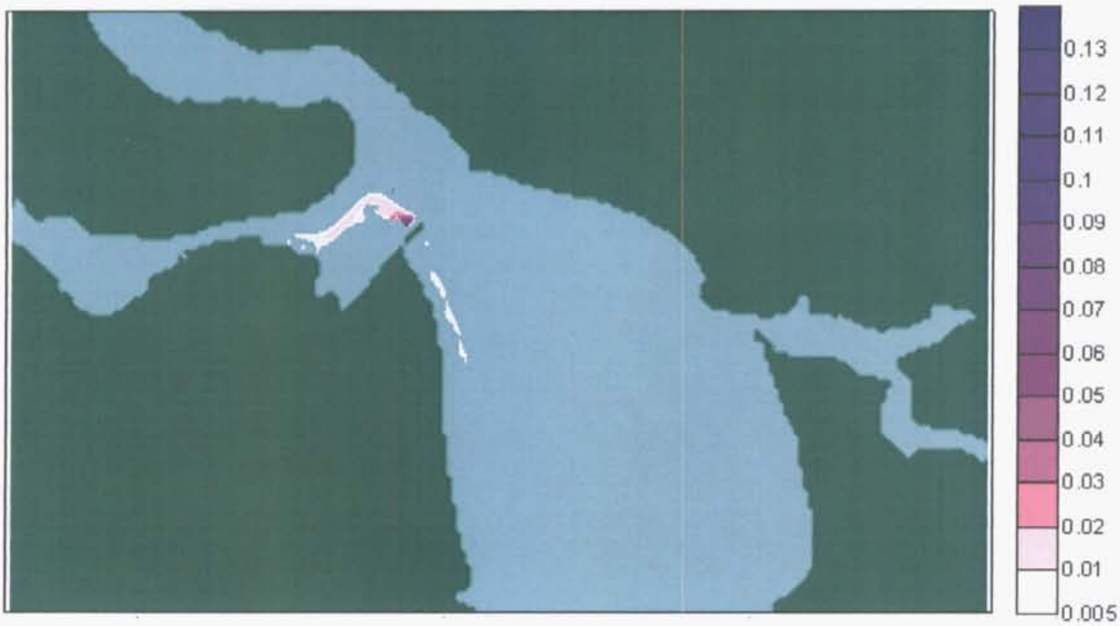

Figure A.9: Kjeldahl nitrogen concentration (mg/l) at mid-flood on a neap tide

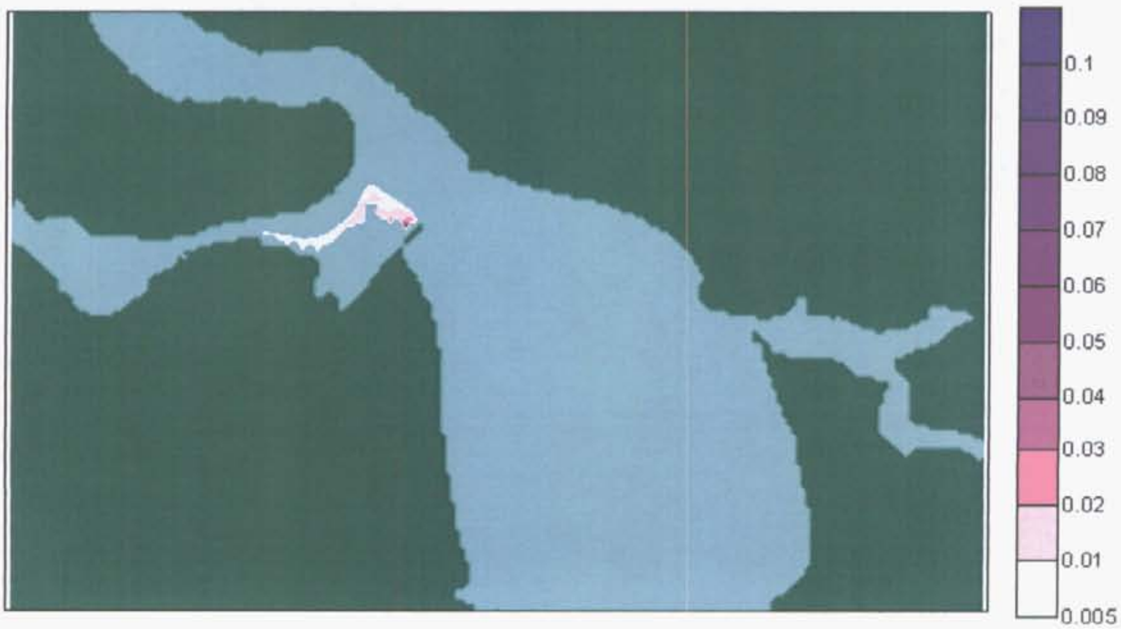

Figure A.10: Kjeldahl nitrogen concentration (mg/l) at high water on a neap tide

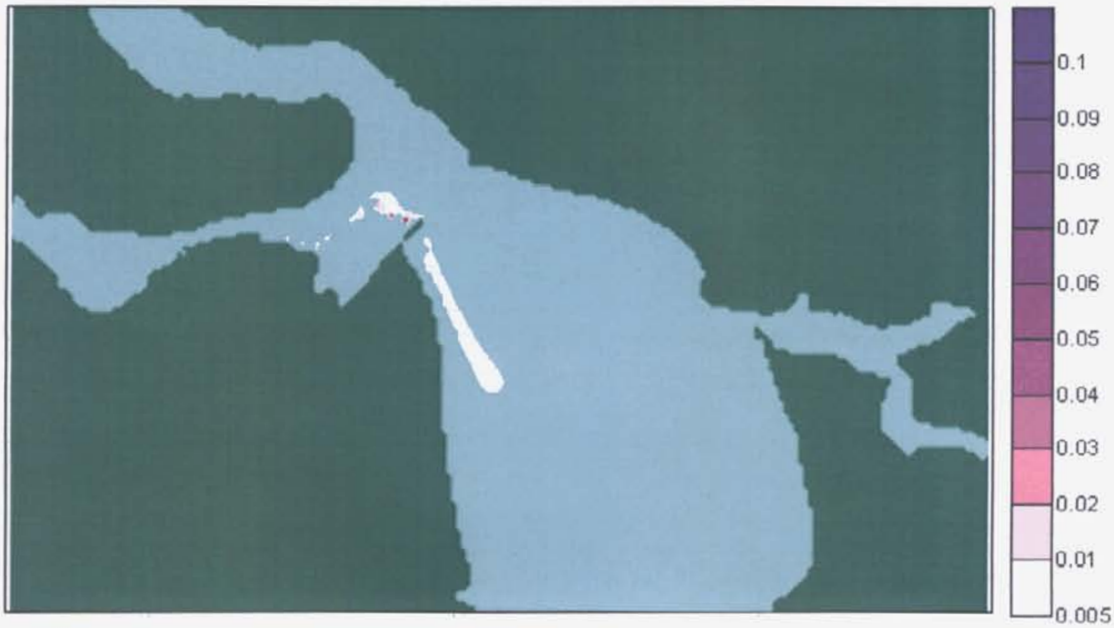

Figure A.11: Kjeldahl nitrogen concentration (mg/l) at mid-ebb on a neap tide

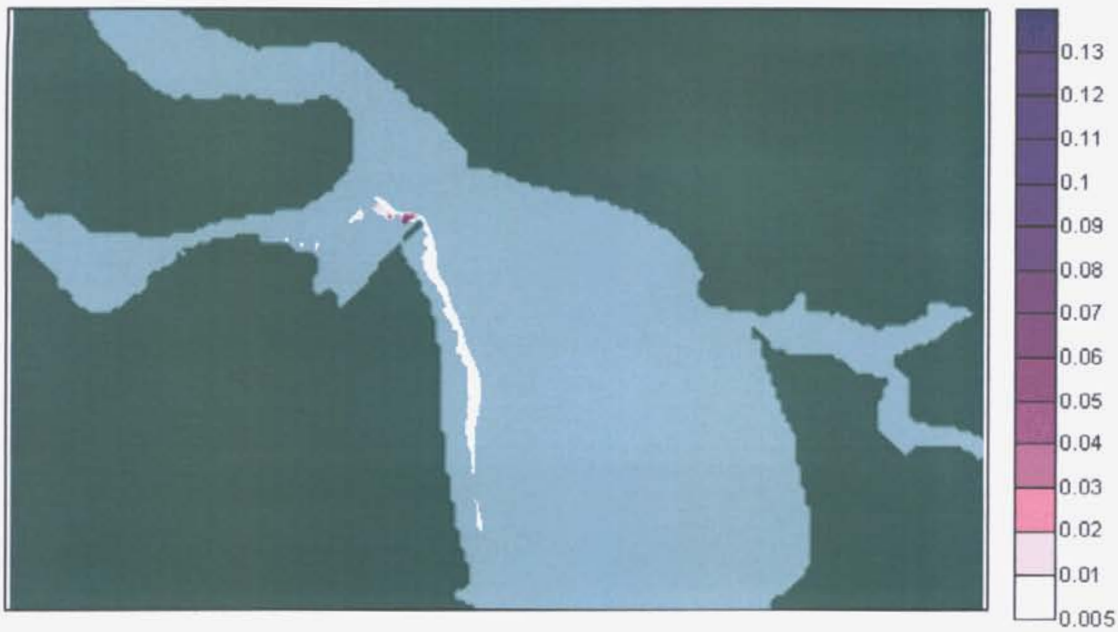

Figure A.12: Kjeldahl nitrogen concentration (mg/l) at low water on a neap tide

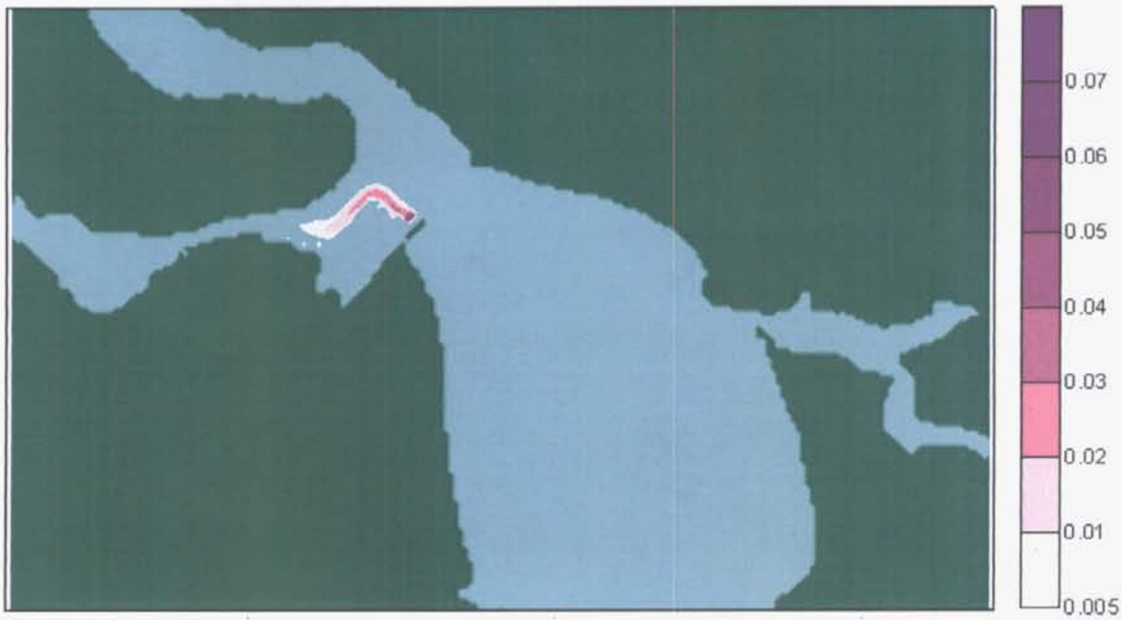

Figure A.13: Kjeldahl nitrogen concentration (mg/l) at mid-flood on a spring tide

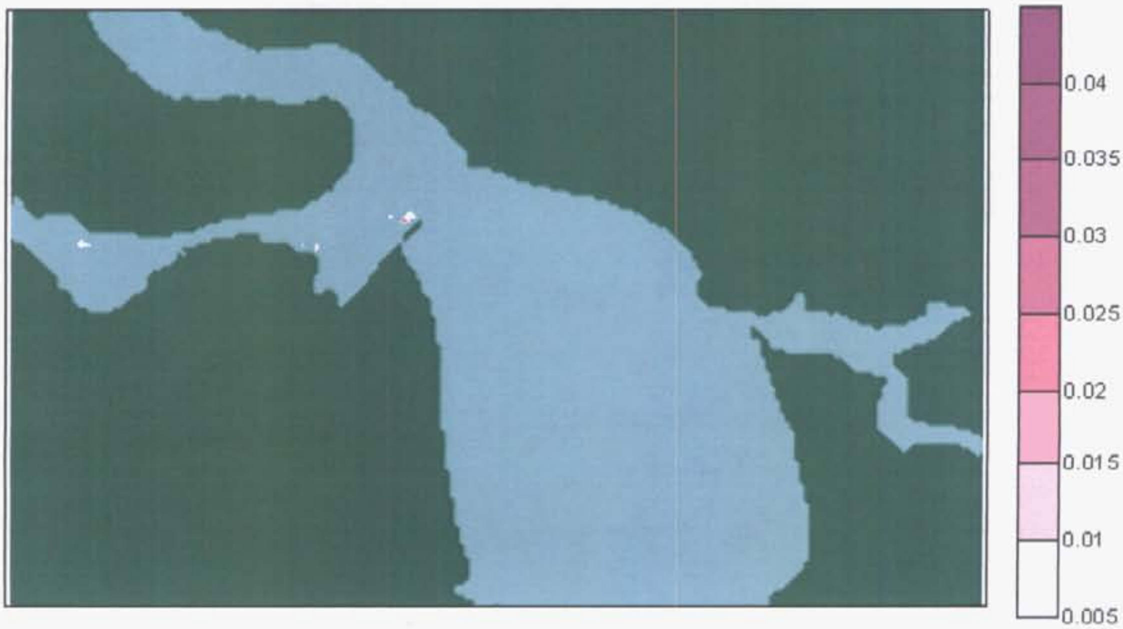

Figure A.14: Kjeldahl nitrogen concentration (mg/l) at high-water on a spring tide

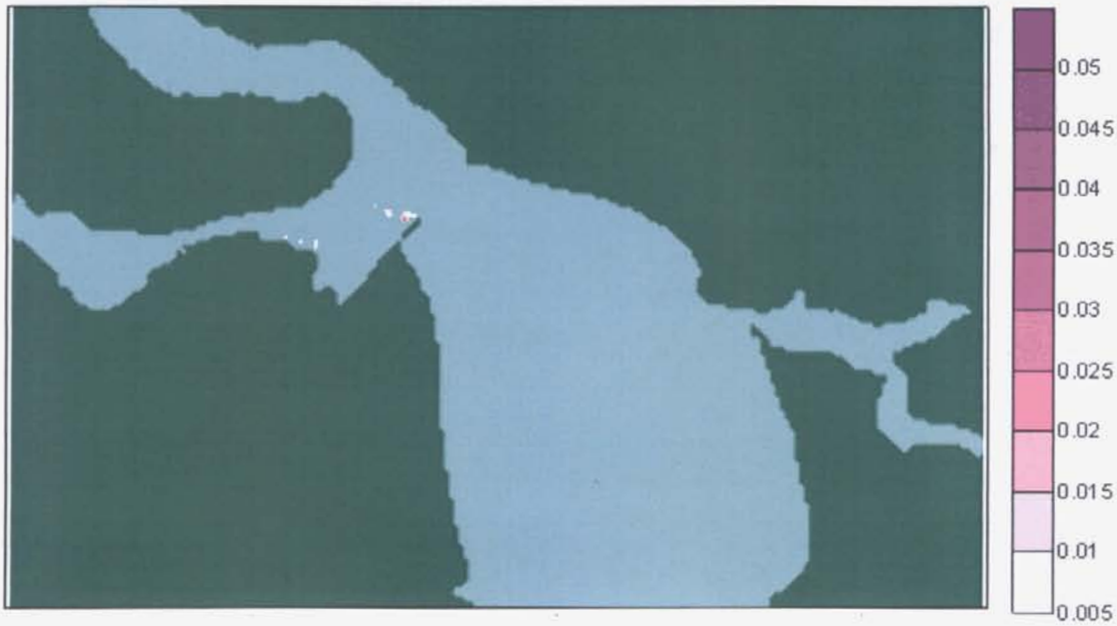

Figure A.15: Kjeldahl nitrogen concentration (mg/l) at mid ebb on a spring tide

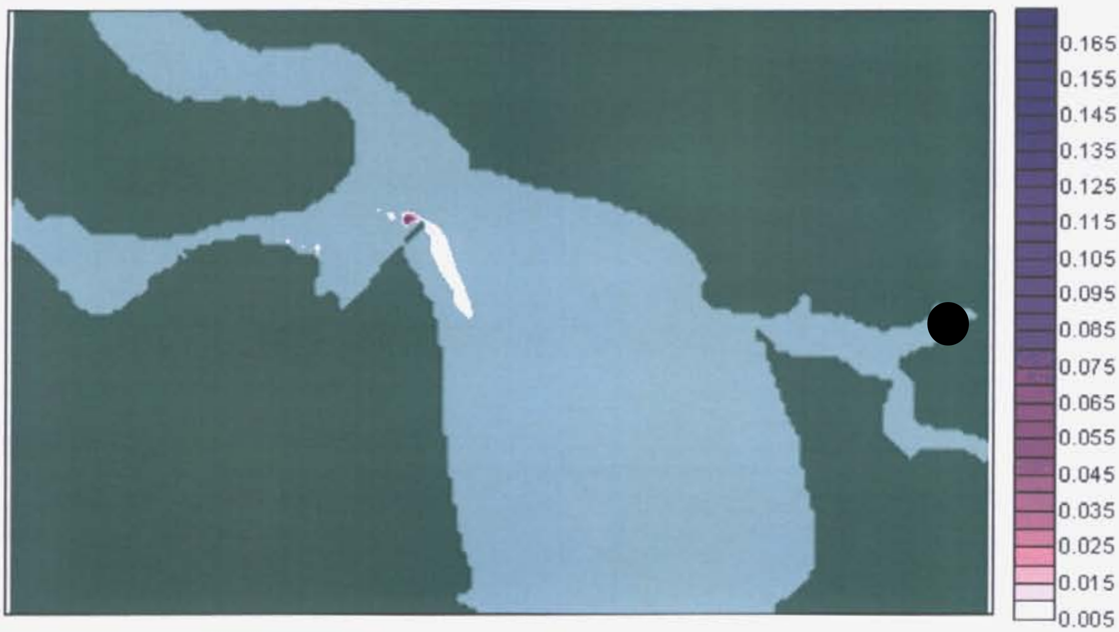

Figure A.16: Kjeldahl nitrogen concentration (mg/l) at low water on a spring tide

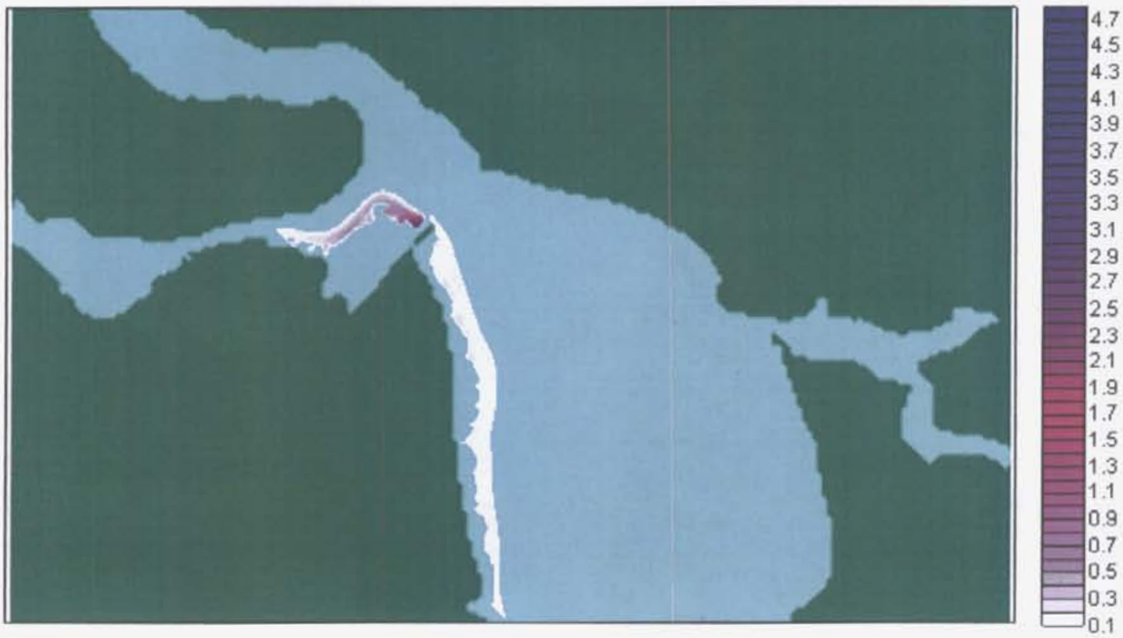

Figure A.1: Phosphate concentrations at mid-flood on a neap tide (μg/l)

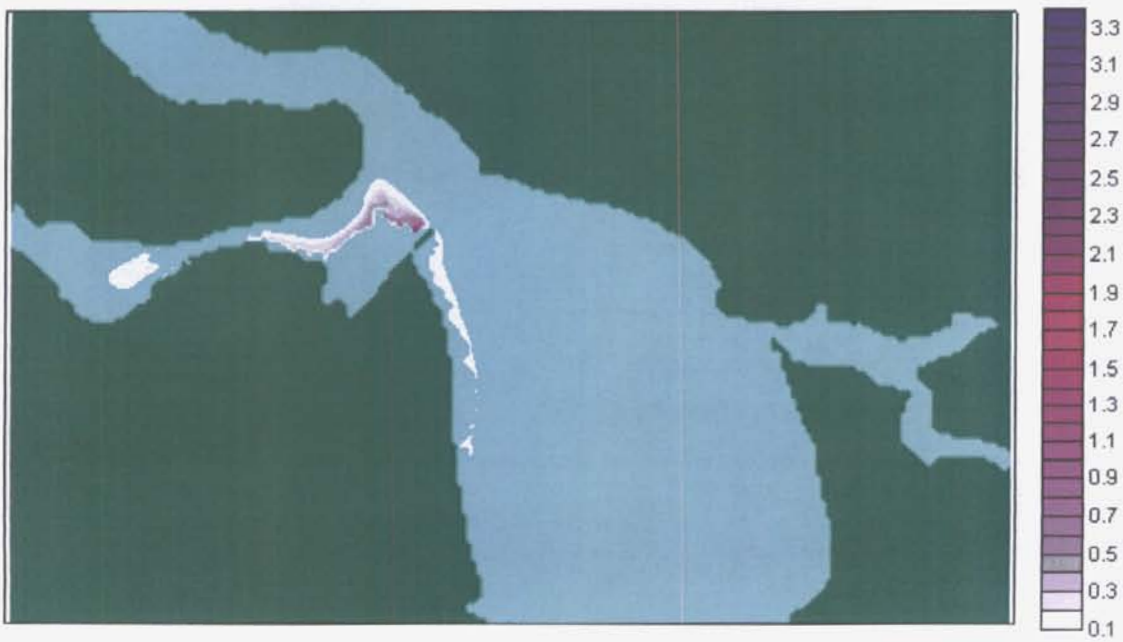

Figure A.2: Phosphate concentrations at high water on a neap tide (μg/l)

Figure A.3: Phosphate concentrations at mid ebb on a neap tide (µg/l)

Figure A.4: Phosphate concentrations at low water on a neap tide (µg/l)

Figure A.5: Phosphate concentrations at mid-flood on a spring tide (μg/l)

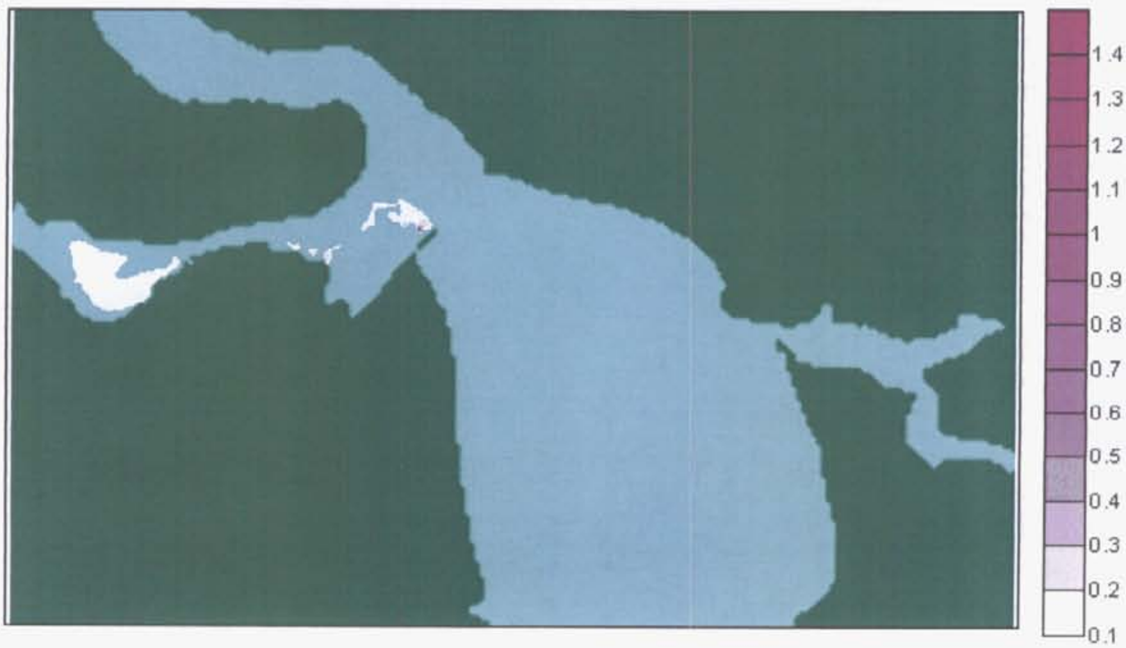

Figure A.6: Phosphate concentrations at high water on a spring tide (μg/l)

Figure A.7: Phosphate concentrations at mid ebb on a spring tide (μg/l)

Figure A.8: Phosphate concentrations at low water on a spring tide (μg/l)

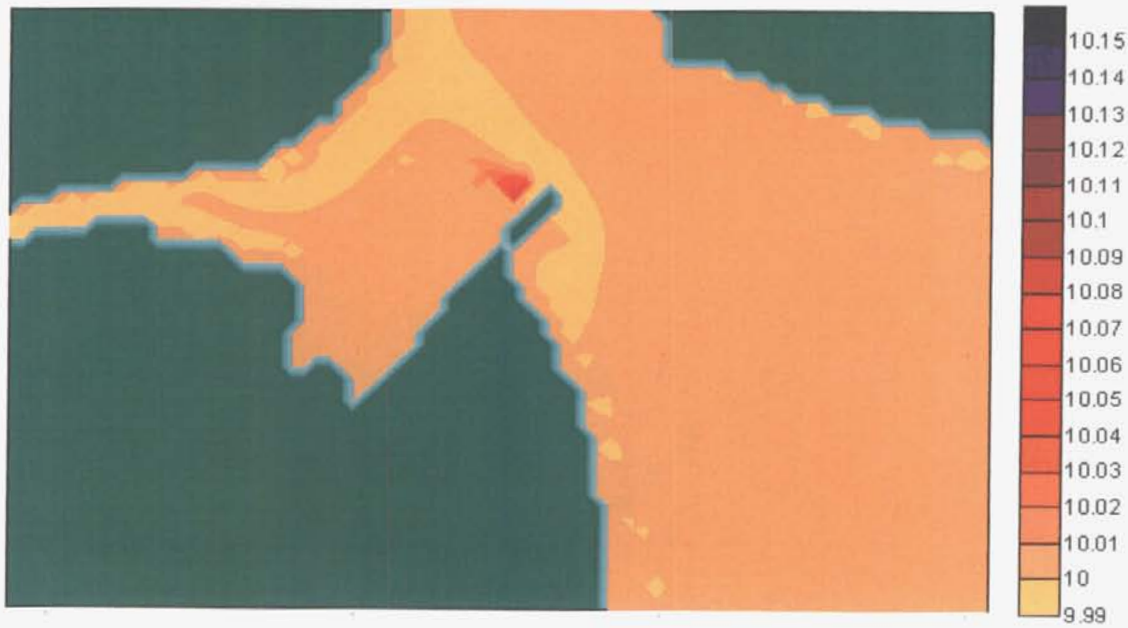

Figure A.33: Water temperature at mid-flood on a neap tide

Figure A.34: Water temperature at high water on a neap tide

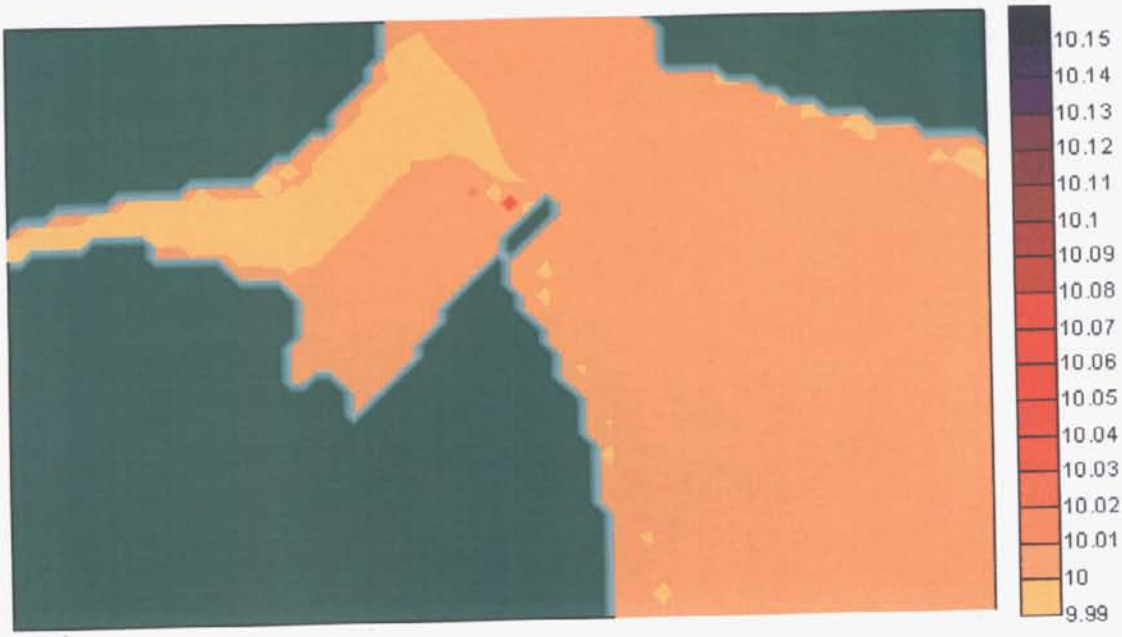

Figure A.35: Water temperature at mid ebb on a neap tide

Figure A.36: Water temperature at low water on a neap tide

Figure A.37: Water temperature at mid-flood on a spring tide

Figure A.38: Water temperature at high water on a spring tide

Figure A.39: Water temperature at mid ebb on a spring tide

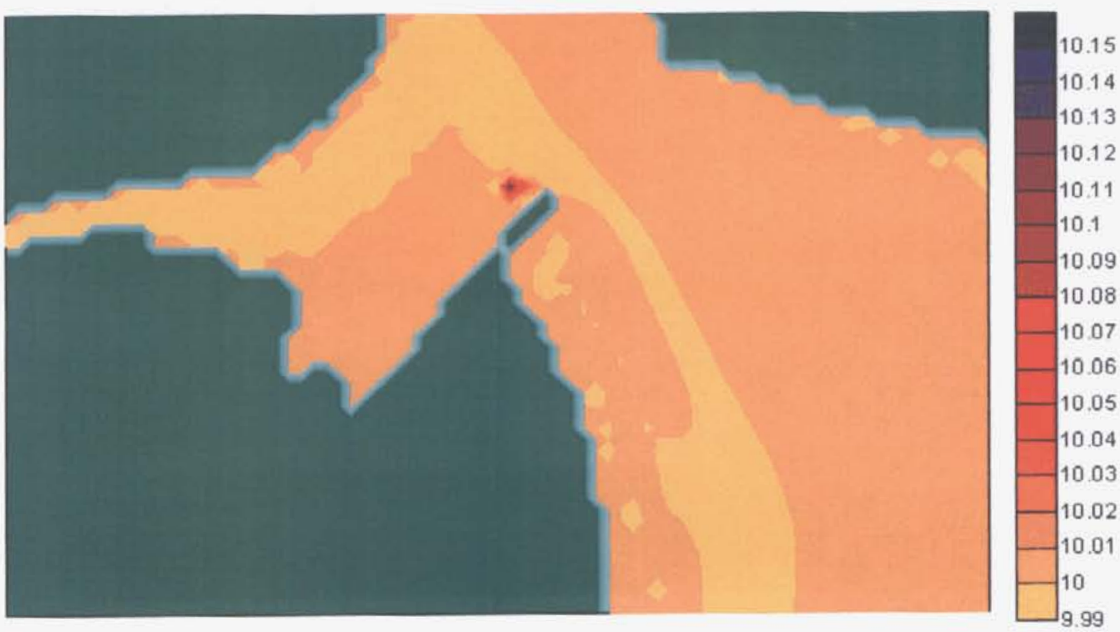

Figure A.40: Water temperature at low water on a spring tide

Attachment 3

Copy of letter to Sanitary Authority, dated 12/05/2006

Ms Valarie Hannon,
Environmental Division
Cork County Council
Inniscarra Laboratories
Inniscarra co Cork

cc. Ken Conroy
Water Services and Infrastructure
Cork County Council

Re: meeting Request AVR Environmental Solutions EPA waste licence Application Reg. 211-1

12th May 2006.

Dear Ms Hannon,

Further to our recent telephone conversations to discuss the above referenced licence and Cork County Councils issue of a Section 52 with respect to emission of effluent we have now re submitted effluent discharge results and modelling results to the Agency taking account of Cork County Councils recommendations regarding same.

We have been advised by Ms Ciara Maxwell, licencing officer with the EPA that results will be resubmitted to yourselves for consideration. When you have had time to review and comment on same we would appreciate if you could facilitate a meeting with representatives of AVR to ensure that all requirements of Cork County Council are taken into consideration with respect to discharge parameter requirements.

We shall contact you in the next few weeks with a view to same. If you require any further information in the interim please do not hesitate to contact the undersigned

Best regards

Sinead Hickey

Attachment 4

Extract from revised EIS Non-technical Summary

WATER

Existing Environment

The Blackwater catchment is one of the largest in the state, draining an area in excess of 2,000km^3. The Upper Blackwater Estuary shows decreased oxygen levels. Below this area, oxygen levels are increased, even though oxygenation is disturbed throughout the lower estuary and it then recovers fully by the Inner Youghal Bay.

Nitrogen and phosphate concentrations are somewhat elevated in the Upper Estuary under freshwater conditions. However, under saline conditions the Lower Estuary concentrations of these parameters are reduced to background coastal levels in Inner Youghal Bay.

Chlorophyll concentrations are overall elevated in both the Upper and Lower sections of the Estuary.

The breaching of these criteria levels classifies both sections of the Blackwater Estuary as eutrophic however; this classification does not appear to extend into the waters of Youghal Bay. Consequently, under the Urban Waste Water Treatment Regulations (S.I No. 254 of 2001 & 91/271/EEC) the Upper and Lower Blackwater Estuary are classified as Sensitive Areas.

Improvements in the municipal waste water treatment schemes, as well as, the reduction in the landspreading of sludge and the introduction of the Nutrient Management Plans in this area, should lead to a reduction in pollution levels in the river and its tributaries in the future.

Impact Assessment and Mitigation Measures

Storm Waters

Surface water runoff from paved and roofed areas will be collected via the site drainage system. The entire site shall be bunded using kerbing to prevent the uncontrolled escape of storm water. Four Class One type oil and grit interceptors or similar will be installed with a 120m^3 Storm Water Retention Tank with a monitoring well so that contaminates and or spilled hydrocarbons.

A sluice valve will control discharge of the storm waters to the outfall via the Youghal Town Council sewer network. Discharges have bene modelled with respect to chemical and biological impact and will not impack on the receiving environment. Emisison limist will eb stipulated by the EPA in agreement with Youghal Town Council. In the event on an incident with potential for contamination of surface waters (e.g. spillage), the sluice valve will close preventing any discharge from the site.

Foul Waters

These waters shall be collected in the site foul water system and treated on site prior to discharge.

Process Waters

The only process water on-site shall be the final effluent from the waste water treatment plant. This effluent shall be monitored so that it is within the emission limit values set by the EPA. Monitoring shall be carried out at a frequency, to be specified by the EPA. The impact of the plant output on the river flow rate is negligible and therefore does not require mitigation.

Fire Waters

In the event of an incident, for example a fire, the potential contaminated waters will be collected through the storm water drainage system with the entire site acting as a large bunded area using the raised kerbing as an extra backup measure. Fire water will be stored in the Firewater Retention Tank. Any spent fire water will then be treated at the waste water treatment plant.

Bunds

There are a number of bunded areas at the proposed development and include the following.

Fuel storage area,

Quarantine area,

Standby generator pad.

All these bunds will be tested for integrity and a discharge valve will be installed to pump out any contaminated water and hydrocarbons to be treated at an EPA approved facility.

Attachment 5

Extract from revised waste licence application Non-technical Summary

12 (1) (e) Nature and Capacity of Facility

The proposed development consists of a Waste Recovery/Sludge Drying Facility on 3.54acres. It is proposed to manage 70,000 tonnes/annum of commercial/enterprise and industrial waste, 30,000 tonnes/annum of non-hazardous biological sludge from waste water treatment plants, 10,000 tonnes/annum of leachate and 500 tonnes/annum of washings.

12 (1) (b) Planning Authority

The proposed development is within the functional area of Cork County Council. The area of the proposed development is zoned Industrial/Enterprise in the Cork County Development Plan, 2003. The project received planning permission for development of a waste recovery/transfer and sludge drying facility vai An Bord Pleanala on 14th July 2005 (PL 211117 PA reg 04/7531)

12 (1) (c) Sanitary Authority

AVR - Environmental Solutions Ltd. propose to discharge treated foul sewage, waste water and storm water to the Youghal Town Council outfall via the Youghal Town Council Sewer for the medium term until the proposed municipal waste water treatment plant is built in Youghal.

12 (1) (g) European Waste Catalogue Codes

It is proposed to treat wastes with the following European Waste Catalogue Codes as presented by the Commission Decision 2000/532/EC of 3 May 2000.

02 Wastes From Agriculture, Horticulture, Aquaculture, Forestry, Hunting And Fishing, Food Preparation And Processing	
02 01 04	Waste plastics (except packaging)
02 01 10	Waste metal
02 02 04	Sludges from on-site effluent treatment
02 03 05	Sludges from on-site effluent treatment
02 04 03	Sludges from on-site effluent treatment
02 05 02	Sludges from on-site effluent treatment
02 06 03	Sludges from on-site effluent treatment
02 07 05	Sludges from on-site effluent treatment

03 Wastes From Wood Processing, and the Production of Panels and Furniture, Paper and Cardboard	
03 01 01	Waste bark and wood
03 01 05	Sawdust, shavings, cuttings, wood, particle board, and veneer other than those mentioned in 03 01 04
03 03 01	Waste bark and wood
03 03 11	Sludges from on-site effluent treatment other than those mentioned in 03 03 10

04 Waste from the Leather, Fur and Textile Industries	
04 01 07	Sludges, in particular from on-site effluent treatment free of chromium
04 02 20	Sludges from on-site effluent treatment other than those mentioned in 04 02 19

05 Waste from Petroleum Refining, Natural Gas Purification and Pyrolytic Treatment of Coal	
05 01 10	Sludges from on-site effluent treatment other than those mentioned in 05 01 09

06 Waste from Inorganic Chemical Processing	
06 05 03	Sludges from on-site effluent treatment other than those mentioned in 06 05 02

07 Wastes From Organic Chemical Processes	
07 01 12	Sludges from on-site effluent treatment other than those mentioned in 07 01 11
07 02 12	Sludges from on-site effluent treatment other than those mentioned in 07 02 11
07 02 13	Waste plastic
07 03 12	Sludges from on-site effluent treatment other than those mentioned in 07 03 11
07 04 12	Sludges from on-site effluent treatment other than those mentioned in 07 04 11
07 05 12	Sludges from on-site effluent treatment other than those mentioned in 07 05 11
07 06 12	Sludges from on-site effluent treatment other than those mentioned in 07 06 11
07 07 12	Sludges from on-site effluent treatment other than those mentioned in 07 07 11

10 Waste Packaging	
10 01 21	Sludges from on site effluent treatment other than those mentioned in 10 01 20
10 12 13	Sludge from on site effluent treatment

15 Waste Packaging	
15 01 01	Paper and cardboard packaging
15 01 02	Plastic packaging
15 01 03	Wooden packaging
15 01 04	Metallic packaging
15 01 05	Composite packaging
15 01 06	Mixed packaging
15 01 07	Glass packaging
15 01 09	Textile packaging

17 Construction and Demolition Wastes	
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 02 01	Wood
17 02 02	Glass
17 02 03	Plastic
17 03 02	Bituminous mixtures containing other than those mentioned in 17 03 01
17 04 01	Copper, bronze, brass
17 04 02	Aluminium
17 04 03	Lead
17 04 04	Zinc
17 04 05	Iron and steel
17 05 06	Tin
17 05 07	Mixed metals

17 04 11	Cables other than those mentioned in 17 04 10
17 05 04	Soil and stone other than those mentioned in 17 05 03
17 05 06	Dredging spoil other than those mentioned in 17 05 05
17 05 08	Track ballast other than those mentioned in 17 05 07
17 06 04	Insulation material other than those mentioned in 17 06 01 and 17 06 03
17 08 02	Gypsum-based construction materials other than those mentioned in 17 08 01
17 09 04	Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03

19 Wastes From Waste Management Facilities, Off-Site Waste Water Treatment Plants And The Preparation Of Water Intended For Human Consumption And Water For Industrial Use	
19 02 03	Premixed wastes composed only of non-hazardous wastes
19 02 06	Sludges from physico/chemical treatment other than those mentioned in 19 02 05
19 06 04	Digestate from anaerobic treatment of municipal waste
19 06 06	Digestate from anaerobic treatment of animal and vegetable waste
19 07 03	Landfill leachate other than those mentioned in 19 07 02
19 08 05	Sludges from the treatment of urban waste water
19 08 12	Sludges from biological treatment of industrial waste water other than those mentioned in 19 08 11
19 08 14	Sludges from other treatment of industrial waste water other than those mentioned in 19 08 13
19 09 02	Sludge from water clarification
19 09 03	Sludges from decarbonation
19 09 06	Solutions and sludges from regeneration of ion exchangers
19 10 01	Iron and steel
19 10 02	Non-ferrous waste
19 11 06	Sludges from on-site effluent treatment other than those mentioned in 19 11 05
19 12 01	Paper and cardboard
19 12 02	Ferrous metal
19 12 03	Non-ferrous metals
19 12 04	Plastic ad rubber
19 12 05	Glass
19 12 07	Wood other than those mentioned in 19 12 06
19 12 08	Textiles
19 12 09	Minerals (for example sand, stone)
19 12 10	Combustible waste (refuse derived fuel)
19 12 12	Other wastes (including mixtures of materials from mechanical treatment of waste other than those mentioned in 19 12 11
19 13 04	Sludges from soil remediation other than those mentioned in 19 13 03
19 13 06	Sludges from groundwater remediation other than those mentioned in 19 13 05

20 Municipal Wastes	
20 01 01	Paper and Cardboard
20 01 02	Glass
20 01 10	Clothes
20 01 11	Textiles
20 01 34	Batteries and accumulators other than those mentioned in 20 01 33
20 01 36	Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35
20 01 38	Wood other than those mentioned in 20 01 37
20 01 39	Plastics
20 01 40	Metals
20 02 02	Soil and stones
20 03 04	Septic tank sludge

12 (1) (k) Emissions

Liquid Emissions

Liquid emissions from the integrated facility will include foul waters, storm waters and potential fire waters process waters will be collected and directed to the waste water treatment plant (WWTP) . Foul waters will be treated via a small scale treatment plant. Storm and fire waters will be collected in retention tanks. In the event of contamination of these waters, the tanks will be equipped to pump the water to the WWTP if necessary. It is estimated that at maximum operating capacity AVR - Environmental Solutions Ltd. will discharge approximately $10m^3$/hr of treated effluent and storm waters.

The surface water drainage system on the site will be fitted with Class 1 oil and grit interceptors or similar. These will prevent the escape of vehicular fuels or any oil spillages on-site. The WWTP will treat effluent from the sludge drying process and will also treat storm/fire waters, should contamination occur.

Liquid emissions from the WWTP and discharges from the retention tanks will be to the Youghal Town Council outfall via the Youghal Town Council sewer network.

Process Waters
The only process water on-site shall be the final effluent from the waste water treatment plant. This effluent shall be monitored so that it is within the emission limit values set by the EPA. Monitoring shall be carried out at a frequency, to be specified by the EPA. The impact of the plant output on the river flow rate is negligible and therefore does not require mitigation.

Fire Waters
In the event of an incident, for example a fire, the potential contaminated waters will be collected through the storm water drainage system with the entire site acting as a large bunded area using the raised kerbing as an extra backup measure. Fire water will be stored in the Firewater Retention Tank. Any spent fire water will then be treated at the waste water treatment plant.

Bunds
There are a number of bunded areas at the proposed development and include the following:

- Fuel storage area,
- Quarantine area,
- Standby generator pad.

All these bunds will be tested for integrity and a discharge valve will be installed to pump out any contaminated water and hydrocarbons to be treated at an EPA approved facility.

12 (1) (m) Monitoring of Emissions
Discharges from the storm water retention tanks will be monitored continuously for the parameters as set by the EPA. In the event of any contamination of these waters, the discharge to the sewer will cease. The waters will instead be sent for treatment in the WWTP. The final effluent from the WWTP will be regularly monitored to ensure that it complies with EPA licence limit values.

Air and noise monitoring is proposed to be carried out annually to ensure the proposed facility is within the EPA limit values specified.

AVR - Environmental Solutions intend to implement the ISO14000 Environmental Management System. This system will ensure that all environmental legislation relevant to the site is complied with and that there is continuous improvement in environmental performance at the site.

Liquid emissions, air emissions and noise emissions are expected to be the only emissions on the proposed site. Emission characteristics will be in line with limit values to be issued by the EPA.