Comhairle Contae Chorcaí
Cork County Council

Water Services,
Courthouse,
Skibbereen,
Co. Cork.
Tel No: (028)21299
Fax No: (028)21995

Web:http://www.corkcoco.com/

Administration,
Environmental Licensing Programme,
Office of Climate, Licensing & Resource Use,
Environmental Protection Agency,
Headquarters,
PO Box 3000,
Johnstown Castle Estate,
County Wexford

26th June 2009

Re: D0296-01 - Baltimore Waste Water Discharge Licence Application – Reply to Notice in accordance with Regulation 18(3)(b) of the Waste Water Discharge (Authorisation) Regulations 2007

Dear Mr. Clabby,

I refer to your letter of the 18th May 2009 concerning the above. The following is my reply to your request for further information in accordance with Regulation 18(3)(b) dealing in sequence with the points raised :

Regulation 16 Compliance Requirements

Section A: Non Technical Summary

Revised Non Technical Summary attached.

Section B: Capital Investment Programme

The Upgrade of Baltimore Waste Water Treatment Plant and Pumping Stations is one of four schemes contained in a Design, Build and Operate bundle. Tenders for this bundle are presently being assessed by Cork County Council. The likely timeframe for completion of the upgrading of the Waste Water Treatment Plant and Proposed Main Pumping Station is estimated at June 2011.

The upgrade to the network and the existing pumping stations is a separate contract to the DBO mentioned. This contract is currently awaiting Departmental approval.

Section C: Infrastructure & Operation

C.1 Operational Information Requirements

i. The upgrade to the network and the existing pumping stations is a separate contract to the DBO mentioned above. This contract is currently awaiting Departmental approval. In the meantime more urgent work is required to replace the existing pump and carry out some other refurbishment works in advance of the main contract for the Cove Pumping Station P2. It is hoped to have these works completed by March 2010.

ii. Storm water overflows

The storm water overflows attached to the pumping stations are in fact emergency overflows and are not designed as storm water overflows as stated in original Application. The two emergency overflows from the pumping stations will remain for the existing and proposed scheme.

The stormwater overflow associated with the existing septic tank will be decommissioned once the new treatment plant is built and commissioned, estimated time frame for completion June 2011.

iii. Storage capacity of P1 at the Pier

The storage capacity of the pump sump and gravity sewer is 6.9 m^3.

Storage capacity of P2 at the Cove

The storage capacity of the pump sump is approximately 18 m^3 and not 1 m^3 as previously mentioned in the original application.

Frequency & Duration of emergency overflows from the pumping stations

Pumping station P1 at the Pier – There are no facilities for recording overflows at this station but available evidence suggests the emergency overflow has not operated in the last three years.

Pumping station P2 at the Cove – There are no facilities for recording overflows at this station but currently the pump at this station is out of commission and is in need of replacement. As a result the emergency overflow is in operation at present. Refurbishment of the station including replacement of the pump is planned and likely timeframe for completion of this work is March 2010.

iv. 3DWF Rationale

The proposed treatment plant is designed to cater for a flow of 105m^3/hr through the plant, which equates to 3DWF. The existing septic tank is being utilised as a storage tank with a storage capacity of approximately 163 m^3. This in turn would give approximately 1.35 hours storage of the balance of the Formula A flow with the remainder overflowing to the harbour. This storage is greater than that required in table 3 of the DoEHLG document "Procedures and Criteria in relation to Storm Water Overflows".

Section F: Existing Environment & Impact of the Discharge(s)

F.1 Assessment of Impact of the Existing Primary Discharge on the Environment

i. An assessment of the impact on the existing environment has not been carried out. As the proposed upgraded scheme is on the Water Services Investment Programme it has not been deemed necessary.

ii. We can confirm that the disinfection unit has been incorporated into the DBO contract for the Baltimore Waste Water Treatment Plant which is included in the Water Services Investment Programme issued by the DoEHLG, the tenders for which are currently being assessed by Cork County Council.

iii. The report, 'Assessment of the ecological impacts of providing an upgraded wastewater treatment system at Baltimore, Co Cork was appended with the Application as Attachment F.1.The DoEHLG Circular letter BC14/2003 provides guidance for consent authorities regarding sub-threshold development Environmental Impact Assessment. Cork Co. Co. produced a determination in September 2004 in respect of Baltimore Sewerage Scheme as to whether it would or would not be likely to have significant effects on the environment. This determination was produced as part of the Part 8 Planning Approval process for the proposed waste water treatment plant and found that "the proposed Baltimore Sewerage Scheme is unlikely to have significant effects on the environment".
Cork County Council approved the Part 8 Planning application for Baltimore WWTP on 14th February 2005 without modification of the documentation as included at Attachment B.6.Therefore, an appropriate assessment has been carried out in respect of the proposed wastewater treatment plant, a baseline survey has been completed, the development has been screened for likely impacts, and these impacts have been assessed and mitigation measures proposed. This process was concluded in advance of the publication of the Circular L8/08 but the requirements of Article 6 of the habitats Directive have been taken into account when Cork Co. Co. considered the scheme.

On the 7th February 2008 a letter was received from the Department of Environment, Heritage and Local Government outlining the nature conservation recommendations in relation to the West Cork Grouped Waste Water Treatment Plants and in particular Baltimore WWTP (See Attachment F.1.3). This states that "The above development is not likely to result in a significant loss of habitat in areas of high conservation value. It is also likely to result in an improvement in water quality in the area."

iv. Baltimore Harbour Sewerage Scheme marine Survey by Irish Hydrodata Ltd is included in Attachment F1. The results of the dye, drogue and current measurements have clearly shown the nature of the water movements at the proposed discharge location. Dye and drogues released from the outfall point followed trajectories that carried them away from the site. The directions were generally to the south west sector on the ebb and the north east sector on the flood. Within the sectors the trajectories diverged and no predominant pattern or convergence was observed indicating good dispersion. Many factors were considered and taking into account throughout the above mentioned report and it is considered unlikely that the proposed discharges at the new outfall location off Bull's Point will adversely affect the nutrient levels in the bay.

v. The emissions of main polluting substances to water (as defined in the dangerous Substances Regulations S.I. No. 12 of 2001) are not likely to impair the environment.

List of Drawing Titles:

Revised Drawings:

BALT B5-01 Rev A - Existing Storm Water Overflow

List of Attachments

Attachment F1 Baltimore Harbour Sewerage Scheme marine Survey by Irish Hydrodata Ltd

Yours sincerely,

Declan Groarke,
Senior Executive Engineer,
Cork County Council

Enclosures

SECTION A: NON-TECHNICAL SUMMARY

Advice on completing this section is provided in the accompanying Guidance Note.

A non-technical summary of the application is to be included here. The summary should identify all environmental impacts of significance associated with the discharge of waste water associated with the waste water works. This description should also indicate the hours during which the waste water works is supervised or manned and days per week of this supervision.

The following information must be included in the non-technical summary:

A description of:

- the waste water works and the activities carried out therein,
- the sources of emissions from the waste water works,
- the nature and quantities of foreseeable emissions from the waste water works into the receiving aqueous environment as well as identification of significant effects of the emissions on the environment,
- the proposed technology and other techniques for preventing or, where this is not possible, reducing emissions from the waste water works,
- further measures planned to comply with the general principle of the basic obligations of the operator, i.e., that no significant pollution is caused;
- measures planned to monitor emissions into the environment.

Supporting information should form **Attachment Nº A.1**

Description of the Wastewater Works and the Activities Carried out therein.

Baltimore is a small seaside town situated approximately 12km south-west of Skibbereen. It is a popular centre for water sports, fishing and is a popular tourist town especially for holiday home based tourism.

The Existing Scheme

The Collection System

The existing sewerage system in Baltimore is a partially combined system and consists of both gravity and pumped systems. The first pump station at the pier (P1) serves the public toilets and the Baltimore Sailing Centre. This pump station discharges to the main gravity sewer in the vicinity of the town centre. The foul flow from the western side of Baltimore drains by gravity to a pump station located at the Cove (P2). From there the sewage is pumped to the main gravity collection system. The main gravity sewer discharges to a septic tank.

Both pumping stations have overflow channels to discharge points. The location of the discharge points and pumping stations are shown on Attachment B5.

Storm Sewer

In general the sewers in Baltimore are combined and the volume of storm water runoff in high. There are five areas in the northern part of the town where storm

sewers have been provided. Four of the five storm water sewers are separate to the foul sewer line and have outfalls which are independent to the foul sewer. One however collects surface water from a portion of the relief road and connects back into the foul system at the junction with the Skibbereen road.

Wastewater Treatment Plant

The treatment plant is located by the quay wall just east of the pier. It is in a narrow piece of ground between the road and the pier in an open area with car parking alongside. The treatment process is a primary sedimentation system consisting of a septic tank. The location of the existing outfall from the septic tank is shown in attachment B3.

The design load on the septic tank is:

- Capacity = 1,150 peoples
- Volume = 46,000gallon (209 m^3)
- Current load = 377 p.e. Winter, 1,684p.e. Summer

It is proposed that a new treatment plant will be built to upgrade the capacity and the quality of the treatment. The program of proposed work is detailed in the section B.10.

The Proposed Scheme

The proposed scheme involves the construction of a new plant on a site to the north of the village adjacent to the lifeboat house (see Attachment B2). This plant is to be constructed under a Design Build Operate Contract which has just received Departmental approval to go to tender. It is proposed to construct an activated sludge process, constructed in modular layout with disinfection of the effluent to be included as part of the treatment process.

The existing outfall is to be replaced and used as a storm overflow. A new pumping station is to be constructed adjacent to the existing septic tank, which is to be used as a storm water retention tank, and is to pump 3 times dry weather flow (DWF) at the design loading to the treatment plant. Flows in excess of 3DWF are to be allowed to overflow. One hour storage capacity for flows up to 6DWF will be provided in the pump sump. All overflows are to be screened through 6mm screens prior to discharge. The design PE for the Proposed Wastewater Treatment Plant is 3600 p.e.

A new treated effluent outfall from the wastewater treatment plant is to be constructed. The location of the proposed outfall is shown in Attachment B3.

A number of sections of the existing collection network are to be relined to reduce the infiltration of storm water into the system.

It is also proposed to lay additional storm sewers throughout the town to curtail the amount of storm water entering the new wastewater treatment plant.

The Sources of Emissions from the Wastewater Works

The collection system discharges wastewater into a septic tank at the shoreline between the North Pier and Bull Point. The septic tank provides primary treatment for the sewage. The treated effluent discharges via a 300mm outfall below the LWM near the septic tank. During periods of high flow the septic tank is bypassed by the excess flows. At present the sewage outfall discharges to a shallow bay and where movement of water is low. Limited dispersal of effluent would be expected during low tides.

Both pump stations have emergency overflows and hence represent sources of emissions. Since the discharge may occur due to pump failure these discharges are considered to be emergency overflows. The overflows are discharging into coastal water.

The nature and quantities of foreseeable emissions from the wastewater works into the receiving aqueous environment as well as identification of significant effects of the emission to the environment.

The current population of Baltimore is 377 (Ref. 2006 Census Table 5). The future summertime populations in Baltimore are expected to rise to in excess of 2,000. Sewage is currently treated via a septic tank and thus it is assumed that primary treatment occurs prior to discharge. The EPA Document "Treatment Systems for Small Communities, Business, Leisure Centres and Hotels" (EPA 1999) details wastewater inflow characteristics for domestic and commercial sources. As Baltimore is considered mainly residential and the amount of industrial / commercial premises in the town are minimal, the only wastewater flow would be considered as small flows of domestic sewage from toilet facilities, therefore, the following are the inflow characteristics assumed; Suspended Solids 163mg/l, BOD 168mg/l.

A Preliminary Report carried out in 2000 stated a winter PE of 324 and a summer PE of 1631 for Baltimore. The 2006 Census figures show a population of 377, which is an increase of 53 people. Taking this into account the current population equivalent for winter is 377PE and summer is 1684PE.

Based on a population equivalent of 377- winter population and a discharge volume of 180l/person/day the total BOD reaching the treatment plant is estimated at 11.4kg/day BOD. The suspended solids reaching the plant is estimated at 11.06kg/day SS.

Based on a population equivalent of 1684- summer population and a discharge volume of 180l/person/day the total BOD reaching the treatment plant is estimated at 50.92kg/day BOD. The suspended solids reaching the plant is estimated at 49.4kg/day SS.

The main function of a septic tank is to act as primary settlement tank removing some of the BOD and the majority of the suspended solids. The EPA publication 'Primary, secondary and tertiary treatment' (EPA 1997) estimates that typically 50-70% of suspended solids are removed in primary settlement tanks; BOD is reduced by 20-50% and the bacterial count by 25-75%. According to the National Urban Waste Water

Study (NUWWS) the reduction to the BOD load would be approximately 30% and approximately 50% to the Suspended Solids load.

This would result in a BOD discharge to the bay of 7.98kg/day, a SS discharge of 5.53kg/day in the winter and would result in a BOD discharge to the bay of 35.64kg/day, a SS discharge of 24.7kg/day in the summer.

"For the purposes of this application the relevant pe chosen for the licence period is 1,950 being the pe estimated at end of that period."

The proposed technology and other techniques for preventing or, where this is not possible, reducing emissions from the wastewater works.

The proposed WWTP at Baltimore along with three other wastewater treatment plants have been grouped together to form a Design Build Operate Contract. This has received departmental approval and the tenders were returned in March 2009. They are presently being assessed by Cork County Council. The likely timeframe for completion of the upgrading of the Waste Water Treatment Plant and Pumping Stations is estimated at June 2011.

Likely Timeframes for the Works:

1. ***Receipt of Tenders – March 2009***
2. ***Start Construction – January 2010***
3. ***Completion of Works – June 2011***

The upgrade to the network and the existing pumping stations is a separate contact to the DBO mentioned. This contract is currently awaiting Departmental approval. It is estimated that the network contact will run concurrently with the DBO and will have the same estimated completed date of June 2011.

Further measures planned to comply with the general principle of the basic obligations of the operator i.e. that no significant pollution is caused.

The complete process will likely be upgraded in the near future with the construction of a new WWTP. The treatment capacity, the discharge quality and control systems will be improved to ensure that no significant pollution is caused.

Measures planned to monitor emissions into the environment

The emissions from the existing septic tank can be monitored through the sampling point SW01 Balt (see Map Balt B2–02 for location).

In the upgrade WWTP, monitoring and sampling of the emissions will be provided in inlet and outlet works (see Map Balt B2-03). The sampling will consist of a composite sample and all emissions will be measured and can be sampled before discharge.

B.5 Location of Storm Water Overflow Point(s)

Give the location of **all** storm water overflow point(s) associated with the waste water works.

Existing Storm Water Overflows

Type of Discharge	Overflow Pipe
Unique Point Code	SW02 BALT
Location	Baltimore
Grid ref (6E, 6N)	E:104654 N:026639

(Outfall to be made redundant)

Proposed Storm Water Overflows

Type of Discharge	Overflow Pipe
Unique Point Code	SW05 BALT
Location	Baltimore
Grid ref (6E, 6N)	E:104606 N:026602

Attachment B.5 should contain appropriately scaled drawings / maps (≤A3) of storm water overflow point(s) associated with the waste water works, including labelled monitoring and sampling points associated with the discharge point(s). These drawings / maps should also be provided as geo-referenced digital drawing files (e.g. ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. This data should be provided to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, C.1, D.2, E.3 and F.2.

Attachment included	**Yes**	**No**
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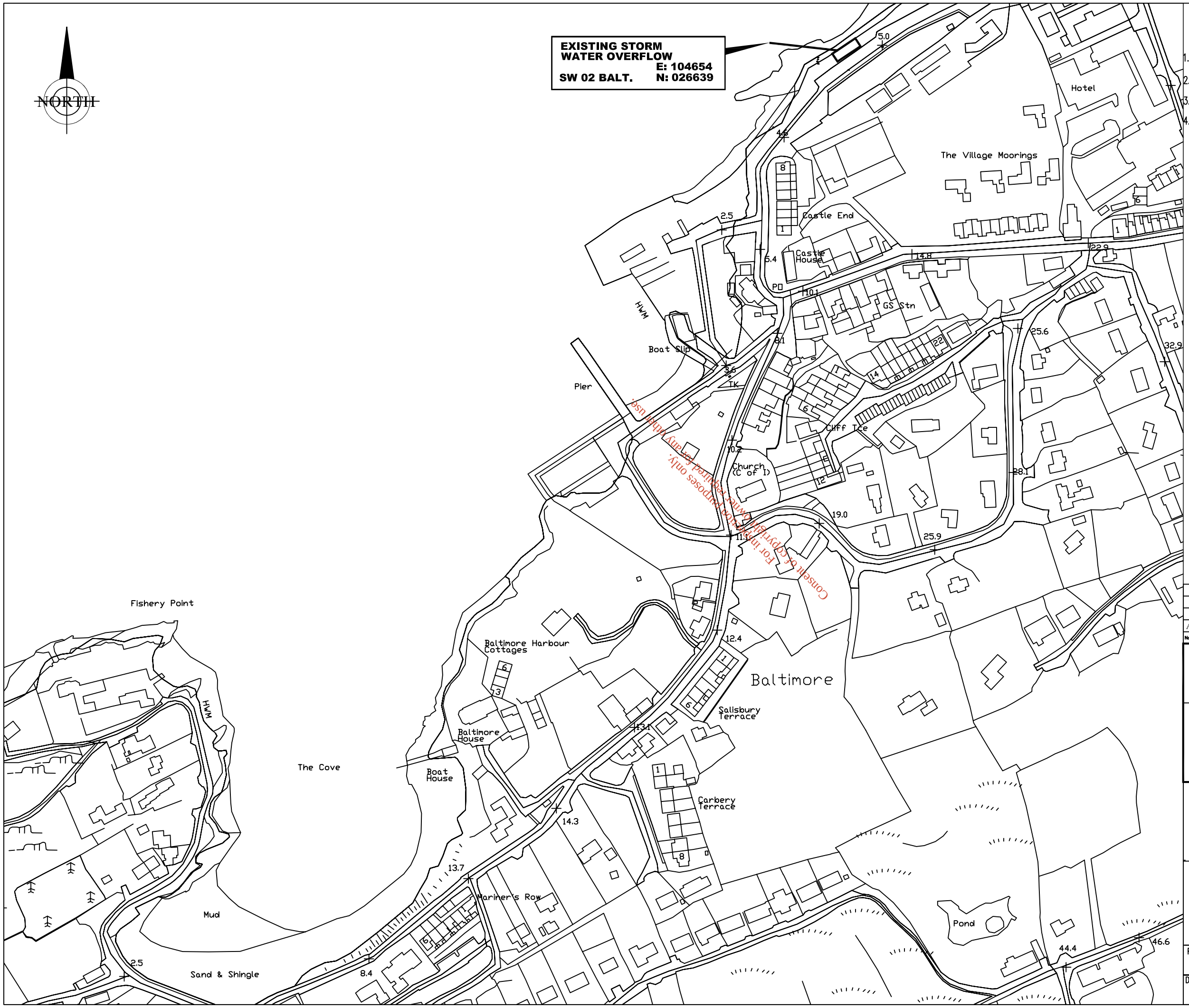

NOTES

1. Do not scale, use figured dimensions only. If in douth ask
2. All dimensions to be checked on site
3. Drawings to be read in conjunction with Licence application
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No.	Date	Drwn	Chkd	Revision Description
A	06/09	OB	DG	REGULATION_18(3)(B)_RESPONSE

Cork County Council, Western Division.

N.O'MAHONY,B.E.,
SENR.ENGR. (WATER SERVICES),
COURTHOUSE, SKIBBEREEN.

M. MURRELL.,
DIRECTOR OF SERVICES
WEST CORK

Job Title:
BALTIMORE_WASTE_WATER DISCHARGE_LICENCE_APPLICATION

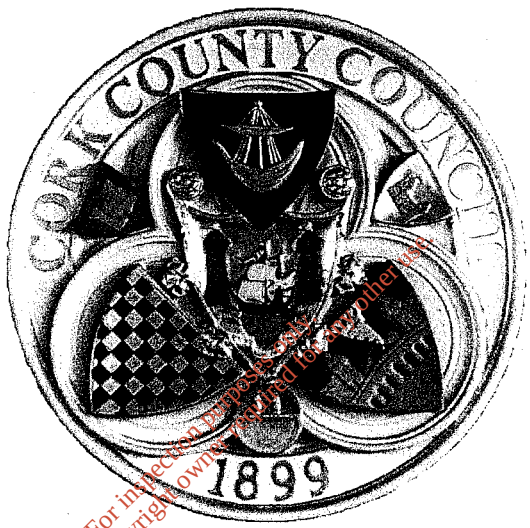
Drawing Title:
ATTACHMENT_B.5 EXISTING_STORM_WATER OVERFLOW_POINTS

Prepared By:	Checked By:	Date:
J.CREAGH	O.O'BRIEN	FEB.2009

Drawing number:	Scales:	Rev:
BALT_B5_01	1:2500	A

Comhairle Chontae Chorcai

CORK COUNTY COUNCIL (WESTERN DIVISION)



Baltimore Sewerage Scheme

Determination whether Baltimore Sewerage Scheme would or would not be likely to have significant effects on the environment

(PROJECTS SECTION)
WESTERN DIVISION

September 2004

Prepared By: Niall O'Mahony, Senior Engineer.

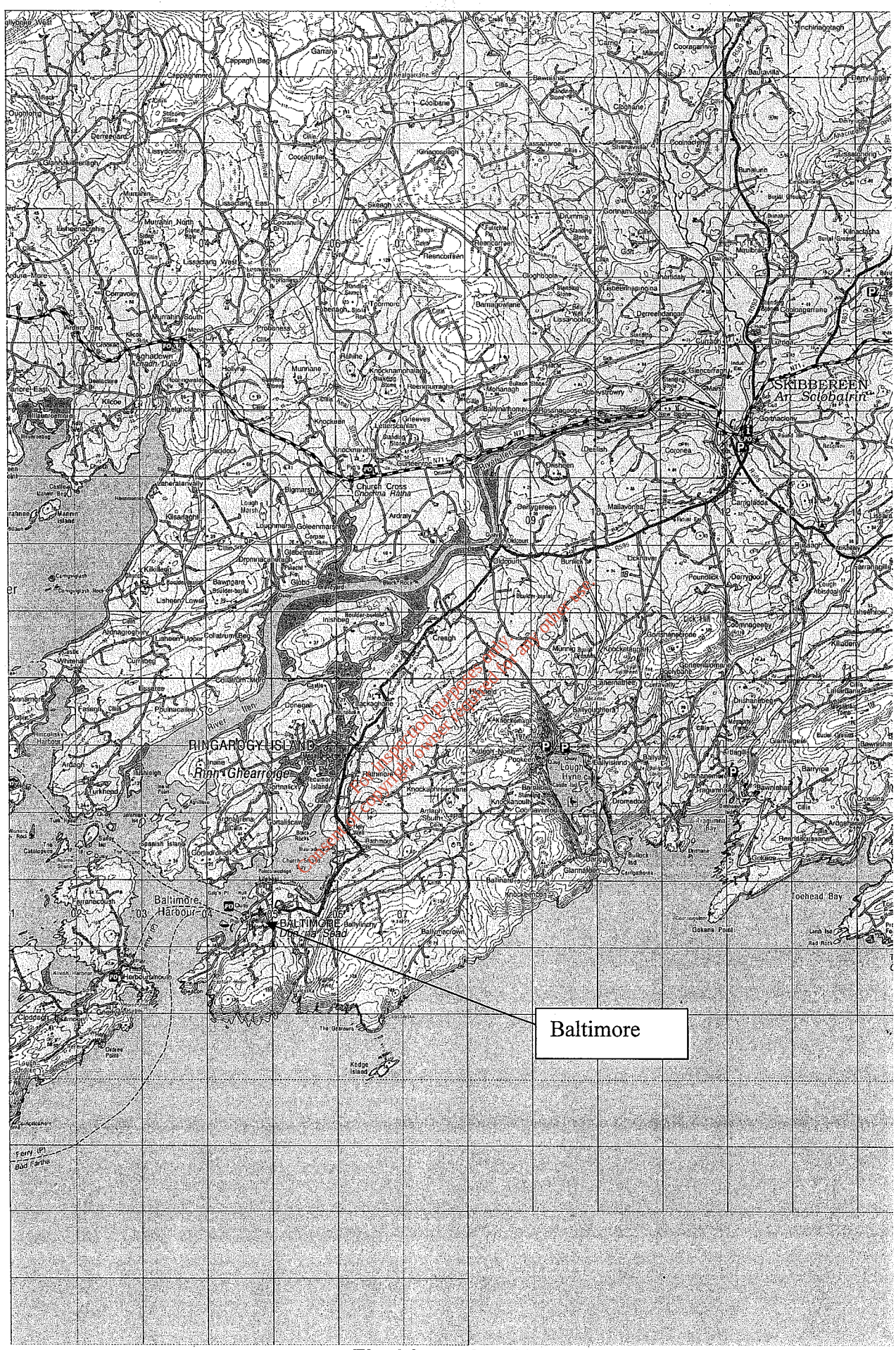


Fig.1 Location Map

Determination whether Baltimore Sewerage Scheme would or would not be likely to have significant effects on the environment

DESCRIPTION OF THE SCHEME

The existing collection system, including pumping stations at the Cove and at the pier, collects wastewater from Baltimore and its environs. The collection system discharges wastewater into a septic tank located on the shoreline between the North Pier and Bull Point, close to Glenans Sailing School. The septic tank provides primary treatment for the sewage. The treated effluent discharges via a 300 mm outfall below the LWM at a location near the septic tank. During periods of high flow the septic tank is bypassed by the excess flows.

Due to the increasing load on the septic tank and the need to provide a satisfactory effluent quality, it is proposed to install a modern Wastewater Treatment Plant (WwTP) to cater for the future increased loads. This proposal is in accordance with the County Cork Development Plan 2003 (Volume 1 Overall Strategy and Main Policy Material INF 2-5) and with the Preliminary Report on Baltimore Sewerage Scheme prepared by E.G. Pettit & Co. for Cork County Council (Water Services) in 1998. This Preliminary Report was approved by the Dept of the Environment, Heritage and Local Government in 1999. The WwTP will be designed to serve a population equivalent of 3,600 persons. This will cater for population growth and development demand for the next twenty years. It proposed to replace the existing septic tank site since it is of limited capacity, provides inadequate treatment by present day standards and is situated in a prominent location. It is proposed to construct a new wastewater treatment plant on a site located on the northern side of Bull Point close to the Lifeboat Station. The wastewater treatment plant may be sunken into the ground and/or screened to reduce its visual intrusion.

The Dept of Environment, Heritage and Local Government has directed that the WwTP at Baltimore be procured through a Design, Build and Operate form of contract in conjunction with a number a similar schemes in West Cork. The scope of works for the scheme will include the construction of a pumping station at the location of the existing septic tank near the Glennans Sailing School. An **indicative** layout of the works is shown at Dwg. No.1339-2(BM)-P01. The final layout of the site will be governed by the contractor's proposals for the site.

It is proposed to discharge the treated effluent to the bay by gravity via a new outfall pipe to be constructed from the shore on the west side of the Lifeboat Station.

The new WwTP will consist of preliminary treatment, secondary treatment and disinfection or their equivalent, to achieve a final effluent of 25 mg/l BOD; 35 mg/l SS; 125 mg/l COD; 10,000/100 mls Total Coliforms; 2,000/100 mls Faecal Coliforms. Mitigation measures will be installed to maintain noise and

odour emissions within recognised and acceptable limits at the site boundary. Standby power generation will be available in case of power failure. Thickened sludges will be transported by tanker or skip off site for further treatment or disposal in accordance with the Sludge Management Plan for County Cork. Screenings arising from the Preliminary Treatment stage will be disposed of at the nearest licenced landfill site.

The control house and any other building which may be located at the treatment works site will be constructed in blockwork with render finish, incorporating masonry panels using locally quarried stone, and slated pitched roofs. The appearance of the buildings will reflect the local traditional building styles. The paved areas will consist of concrete pavement and macadam. A 2.2 m high palisade fence will enclose the treatment works with stockproof fencing providing protection to the screen planting which will be provided to the external boundaries. The access road to the treatment works will be surfaced in macadam. Fencing to the access road will be in concrete post and wire fencing.

The layout for the WwTP shown on Dwg. No.1339-2(BM)-P01 is **indicative** of the layout type which will be proposed by the successful tenderer for the construction of the works. The Design Build Operate form of Contract provides for the Contractor to prepare the detailed design of the Works in order to achieve savings in construction costs and in order to obtain the most technologically advanced treatment processes. The final design and layout proposed by the successful tenderer may not resemble the indicative layout in every detail. However, the tenderers for the scheme will be obliged to ensure that the visual and other impacts of the final scheme layout and processes will not be any greater than those of the plant layout shown in the drawings.

A connection from the Baltimore water supply scheme will be taken from the adjacent public main to the treatment works. Power supply will be brought to the site from the nearest available location in accordance with the requirements of the Electricity Supply Board.

Drawings Accompanying This Application:
Dwg. No.1339-2(BM)-P01 – Baltimore – Indicative Site Layout Plan of the proposed Wastewater Treatment Works.
Dwg. No. 1339-2(BM)-P02 – Pumping Station Layout Plan.
Dwg. No. 1339-2(BM)-P03 – Foreshore Licence Outfall Location Plan and Details.

DETERMINATION

Schedule 7 attached to article 120 of the Planning & Development Regulations 2001 states that the Council should have regard to the following criteria:

1. **Characteristics of Baltimore Sewerage Scheme** and in particular to:

- **Size of the proposed scheme** – the scheme and hence the pumping stations, pipelines and Wastewater Treatment Plant (WwTP) is designed to cater for sewage and combined stormwater from the built up area of Baltimore. The existing network consists of partially combined sewers. The sewer network will undergo rehabilitation on sections of the existing sewers along with the construction of new foul, storm, and combined sewers. The site for the WwTP is 0.35 Hectares. The ultimate population equivalent is 3,600, which is consistent with other agglomerations of this size and development subject to an influx of seasonal tourists. The P.E. is substantially below the threshold of 10,000 P.E. outlined in Part 2 (11) of Schedule 5 of the Planning & Development Regulations 2001 & Article 2, point (6), of Directive 91/271/EEC not included in Part 1 of this schedule.

- **The cumulation with other proposed development** – the scheme is designed to cater for the sewage needs of the majority of the immediate area. The nearest other sewerage scheme or sources of discharge of effluent is Skibbereen, 10 km to the North East. There is currently no treatment being provided at Skibbereen but there are proposals as part of the same Design Build Operate contract to provide secondary treatment at Skibbereen. There is no evidence of any present or future cumulative problems arising from these schemes. The proposed works will cater for sewage flows from all development within the catchment area of the Baltimore Sewerage Scheme.

- **The use of natural resources** – the WwTP will be powered by mains electricity and the water supply will be from the existing public water supply. The demands for both electricity and public water supplies will not be significant in the context of the available supplies. The assimilative capacity of the sea in Baltimore Harbour will be used to dilute and disperse the final effluent, see below for further details.

- **The production of waste** – treated effluent from the WwTP will discharge to the sea in Baltimore Harbour. Storm overflows from the pumping stations and storm holding tank will intermittently discharge 6mm screened sewage to Baltimore Harbour. The only other waste products produced are screenings from the WwTP inlet works and sewage sludge. The screenings will be bagged and collected for transportation to the nearest licenced landfill site. The

ultimate predicted volume of sludge is 1.7 tonnes dry solids per week (summer) and this will be transported off site for treatment according to the Sludge Management Plan for County Cork.

- **Pollution & nuisance** - the existing combined sewerage network outfalls from a 300mm diameter pipe near the septic tank below the low water mark (LWM) discharging primary treated sewage to Baltimore Harbour. At present the outfall discharges to a shallow bay where movement of water is low. Limited dispersal of effluent would be expected during low tides. It is probable that this is having a negative ecological impact in the immediate area of the discharge.
  The proposed new WwTP will improve the quality of water in the bay. The following extract from the "Assessment of the ecological impacts of providing an upgraded Wastewater Treatment System at Baltimore, Co. Cork" should be noted:

  It is proposed to construct a modern treatment plant to improve the level of treatment and to cater for the future increased loads. The plant is to be located at Bull Point. Standby power generation will be available on site in case of power failure. The new plant will consist of preliminary, secondary treatment and disinfection or their equivalent to achieve the standards as proposed in the table below. It is proposed to disinfect to the standard given below throughout the entire year. These proposed treatment standards, which are shown in Table 3, are in line with those specified by the Urban Wastewater Treatment Regulations, 2001 for non-sensitive waters.

Table 3: Proposed treatment standards.

Parameter	*Value*	*Unit*
Design Capacity	*3,600*	*p.e.*
BOD	*25*	*mg/l*
SS	*35*	*mg/l*
COD	*125*	*mg/l*
T. Coliforms	*10,000*	*MPN/100 mls*
F. Coliforms	*2,000*	*MPN/100 mls*

3.2 For ease of comparison between the current and proposed treatment the discharge per person is again estimated at 180 l/day and the winter population is left unchanged at 383 p.e. Using these figures the estimated loading of BOD discharged to the bay from the upgraded treatment plant is 1.72 kg/day in winter. Using a predicted maximum summer population of 3,600 p.e the summer discharge is estimated at 16.20 kg/day. Using the same figures the amount of suspended solids discharging to the bay is estimated at 2.41 kg/day in winter and the summer discharge at 22.68 kg/day.

Table 4 – A comparison of treatment efficiencies for SS and BOD

	Assuming primary treatment via existing septic tank Winter p.e. 383,Summer p.e. 3,600 180l/person/day BOD removal 35% approx. SS removal 60% approx.	*New treatment plant. Winter p.e. 383,Summer p.e. 3,600 180l/person/day BOD 25mg/l SS 35 mg/l*	*% reduction*
BOD (winter) kg/day	*7.53*	*1.72*	*77.10%*
BOD (summer) kg/day	*70.76*	*16.20*	*77.10%*
SS (winter) kg/day	*4.50*	*2.41*	*46.44%*
SS (summer) kg/day	*42.25*	*22.68*	*46.44%*

Table 5 – A comparison of treatment efficiencies for bacteria.

	Assuming primary treatment via existing septic tank Assumes removal rate of 50%	*New treatment plant*
T. Coliforms	*5 X10^{7} CFU/100ml*	*10,000 MPN/100ml*
F. Coliforms	*2 X 10^{7} CFU/100ml*	*2,000 MPN/100ml*

3.3 As detailed above the proposed works will substantially improve the quality of the effluent discharged to Baltimore Harbour. In the absence of an upgraded treatment plant and given the rise in population which is expected to occur in Baltimore the amount of nutrients and bacteria reaching the bay will significantly increase in the future:

The old outfall at the septic tank will no longer be in use as a primary outfall but a new emergency and stormwater overflow pipe will be constructed from the proposed pumping station and storm holding tank to be provided at this location, thus reducing the impact to Baltimore Harbour.
The new WwTP will comply with the Urban Wastewater Treatment Regulations, 2001 and will consist of preliminary treatment, secondary treatment and disinfection or their equivalent, to achieve a final effluent of 25 mg/l BOD; 35 mg/l SS; 125 mg/l COD; 10,000/100 mls Total Coliforms; 2,000/100 mls Faecal Coliforms.
Mitigation measures will be installed at the WwTP so that odour concentrations should not exceed 2 o.u./m^3 at the site boundary at a 98 percentile probability of occurrence or it should not exceed this limit for more than 2 % of the year whichever is the lesser and odour concentration should not exceed 5 o.u./m^3 at the site boundary at a 99 percentile probability of occurrence or that it should not exceed this level for more than 1 % of the year, whichever is the lesser. The plant shall be designed to ensure that the maximum noise level of 45 dB(A) as the maximum allowable 15 minute Leq at the site boundary due to operations within the site during daytime (8 am to 8 pm) and 40 dB(A), 15 minute Leq at night (8 pm to 8 am) and at weekends, when all equipment installed is being operated, is complied with and there shall be no discrete tones or impulses. In addition, the noise level at a distance of 1 m of each sound producing mechanical item of equipment shall not exceed 85 dB(A) except in the case of internal combustion engines in which case the noise level of 85 dB(A) shall apply to a distance of 1 m from the building in which they are housed.
The Pumping Station at Glennans will have dual pumping, emergency storage facilities and screened emergency overflow pipe discharging to the sea below LWM to cater for power failure or extreme storm events. The provision of the new WwTP and sewers and the rehabilitation of the existing collection system will have a positive effect on Baltimore Harbour and Roaringwater Bay.

- **The risk of accidents,** having regard to substances or technologies used – any chemicals used will be stored in bunded areas. The site will be fenced all around by 2.2 high security fencing. Access to the site will be via a 2.2m high access gate that will be normally locked. The work practices will comply with the Safety, Health & Welfare at work (Construction) Regulations 1995 (S.I. No. 138 of 1995).

2. **Location of Baltimore Sewerage Scheme** and in particular the environmental sensitivity of geographical areas likely to be affected by the proposed Sewerage Scheme, having regard in particular to:

- **The existing land use** –The existing land use of the site for the proposed WwTP, as described in the "Assessment of the Ecological impacts of providing an upgraded Wastewater treatment System at Baltimore, Co. Cork", is overgrown by bracken,, heath and grassland. The 1996 Cork County Development Plan shows it as an unzoned area of scenic landscape. The current Cork County Development Plan 2003 does not have specific zoning for Baltimore which will be dealt with by the Local Area Plans. The nearest building to the site is the Lifeboat Station and the nearest dwelling house is some 200m away. This is above the standard of 50m recommended in the draft EPA Wastewater Treatment Manual for Small Communities, Business, Leisure Centres and Hotels. It is an improvement on the existing situation where currently the septic tank is 50m from the nearest dwelling house.

- **The relative abundance, quality and regenerative capacity of natural resources in the area** – the vegetation within the site and on the existing boundary of the site will be preserved as much as possible. New planting will also be provided to screen the treatment units and the boundary fence. The assimilative capacity of the receiving waters in Baltimore Harbour have been examined in the Preliminary Report and by recent Hydrographic Dye testing. The conclusions to these reports suggest that adequate dispersal of the treated effluent is available and thus the assimilative capacity of Baltimore Harbour and Roaring Water Bay is adequate to receive the treated effluent.

- **The absorption capacity of the natural environment**, paying particular attention to the following areas –
  (a) Wetlands – There are no wetlands in the area,
  (b) Coastal zones – Baltimore is in a coastal zone at the head of the Ilen Estuary south of Roaring Water Bay. All of Baltimore Harbour has been designated as a Candidate Special Area of Conservation (cSAC) and the western part is a Proposed National Heritage Area (pNHA). Development has taken place along the coastal fringe in common with other settlement areas and the proposed WwTP is designed to cater for this and future development.
  (c) Mountain & forest areas – no such areas are affected by Baltimore Sewerage Scheme.
  (d) Nature reserves & parks – No nature parks or reserves will be affected by Baltimore sewerage scheme.
  (e) Areas classified or protected under legislation, including special protection areas designated pursuant to Directives 79/409/EEC and 92/43/EEC – Roaringwater Bay and Baltimore Harbour into which the treatment plant will discharge

is a cSAC (site code 000101). The far side of Baltimore Harbour is also a pNHA (site code 0101). As detailed in the site synopsis three marine habitats listed under the EU Habitats Directive, i.e. Large shallow inlets and bays, Marine caves and Reefs are found within the bay. The "Assessment of the ecological impacts of providing an upgraded wastewater treatment system at Baltimore, Co. Cork" was completed by Dixon.Brosnan Environmental Consultants. This assessment considered the existing and proposed treatment arrangements, the conservation site designation, the topography, marine and terrestrial ecology, mammals, birds, possible impacts and mitigation measures. Dixon.Brosnan concluded that marine habitats will be affected by the construction work on the outfall pipeline. However, although a variety of flora and fauna species were noted during survey, the habitats noted are locally common and no rare or endangered species were noted. They further noted that none of the terrestrial habitats and species noted are of particular conservation value and no significant impact is expected to occur. The mitigation measures proposed will be followed to minimise the impacts. The Coastal Zone Administration Section of the Department of Communications, Marine and Natural Resources have been consulted. An application for a foreshore licence for the construction of the outfall to Baltimore Harbour and the Storm Overflow outfall at Glennans is in preparation and will be submitted in the near future. The South Western Regional Fisheries Board have also been consulted and they have indicated that they are supportive of the proposals. We wrote to the Heritage and Planning Division of the Department of the Environment, Heritage and Local Government in Sept 2003 advising them of the proposed development and requesting their recommendation in respect of conservation issues. The Development Applications Unit of the DoEH&LG responded on the 14th July 2004 in which they requested additional information. This information including the results of a dye dispersion study were forwarded to the Development Applications Unit of the DoEH&LG on 10th Sept 2004. There are no Designated Areas under the Quality of Bathing Waters Regulations 1992 in the area. The area is not designated under the Quality of Salmonid Waters Regulations 1988. Roaringwater Bay is designated in the Second Schedule under the Quality of Shellfish Waters Regulations 1994. Following dilution of the effluent in Baltimore Harbour, the quality of the water in the shellfish areas will comply with Shellfish Waters Quality Standards as set out in the third schedule of Quality of Shellfish Waters Regulations 1994.

(f) Areas in which the environmental quality standards laid down in legislation of the EU have already been exceeded – Roaringwater Bay is listed in schedule 2 of the Quality of Shellfish Regulations and the proposed new WwTP will

improve the quality of the water in Baltimore Harbour and Roaringwater Bay.

(g) Densely populated areas – The location of the WwTP and outfall is on the northern fringe of the town in an area that is surrounded by undeveloped fallow land and the nearest house is approximately 200m from the site.

(h) Landscape of historical, cultural or archaeological significance –An archaeological assessment has been carried out by The Archaeological Services Unit of UCC which confirms that there are no impacts on any recorded archaeological monuments. The recommended mitigation strategies will be incorporated into the scheme.

3. **Characteristics of potential significant effects** of the proposed Sewerage Scheme and in particular to:

- **The extent of the impact** (geographical area and size of affected population) – the Baltimore Sewerage Scheme is designed to cater for the existing area and proposed population of the area and deal with the wastewater generated within the area itself.

- **The transfrontier nature of the impact** – Baltimore is not within a significant distance of any relevant frontier.

- **The magnitude and complexity of the impact** – the proposed Baltimore Sewerage Scheme is a conventional scheme using proven technology dealing with wastewater from within its own catchment. Potential impacts have been identified in respect of some of the various environmental topics normally considered in the scoping and preparation of an environmental impact assessment (Schedule 6, section 2(b) Planning & Development Regulations 2001). These topics include human beings; flora; fauna; soils water; air; climatic factors; the landscape; material assets, including architectural and archaeological heritage and cultural heritage; and the interaction of the above factors. In summary, the potential and actual impacts of the development include the following:
  a) Emissions to air, soil and water could result in significant environmental impact but given the small scale of the development and the consequent small scale of emissions and the level of treatment and mitigation measures proposed it is not anticipated that there will be any significant impact from the proposed development.
  b) Ecological assessments have established that marine habitats will be affected by the construction of the outfall pipeline. However, these studies further noted that none of the terrestrial habitats and species noted are of particular conservation value and no significant impact is expected to occur.

c) Dye dispersion studies of Baltimore Harbour confirm that there is adequate dilution and dispersion available.
d) Odour and noise emission limits are proposed which will ensure that the potential impact of any noise or odour nuisance will be minimised.
e) The storm overflow to the Harbour from the pumping station at Glennans will be upgraded and will incorporate screening to eliminate discharge of visible sewage solids to the harbour. The conversion of the septic tank into a stormwater holding tank will reduce the frequency of stormwater overflow events in line with the requirements of the Urban Wastewater Directive.
f) The distance of WwTP from existing housing conforms to the recommendations of the draft EPA Wastewater Treatment Manual for Small Communities, Business, Leisure Centres and Hotels.

- **The probability of the impact** – the positive impact of effluent treatment on an area is well recorded and documented and no unpredicted impacts should arise.

- **The duration, frequency and reversibility of the impact** – the proposed Baltimore Sewerage Scheme will operate continuously.

CONCLUSION

Taking account of the determination above and the guidance provided in "Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development" issued by the DoEH&LG, dated August 2003 and the "EPA Advice Notes on Current Practice in the preparation of Environmental Impact Statements", I am satisfied that **the proposed Baltimore Sewerage Scheme is unlikely to have significant effects on the environment.**

Signed:

_____

Niall O'Mahony
Senior Engineer

BALTIMORE HARBOUR

SEWERAGE SCHEME

MARINE SURVEY

REPORT

Courtesy: Dept. of Communications, Marine and Natural Resources – National Coastline Survey

Prepared by:	*Prepared for:*
Irish Hydrodata Ltd Ballygarvan Co. Cork	T.J. O' Connor & Associates Consulting Engineers

Rev. 1 - September 10th 2004

CONTENTS

1.0 INTRODUCTION

As part of the Baltimore Sewerage Scheme, Irish Hydrodata Limited (IHD) were commissioned by T.J. O'Connor & Associates, Consulting Engineers, to carry out dye tracking tests at the proposed outfall location off Bull Point, close to the existing lifeboat house in Baltimore Harbour (Figure 1). The tests were to be carried out for a 12-hour period on both a spring and neap tide. Drogue tracking surveys were to be performed in conjunction with the dye releases to confirm the findings of the latter.

In addition, current speed and direction were to be measured at the proposed outfall location. Measurement of wind and salinity were also to be taken.

The neap tide survey was carried out on August 10th 2004 and the spring tide survey on August 16th 2004.

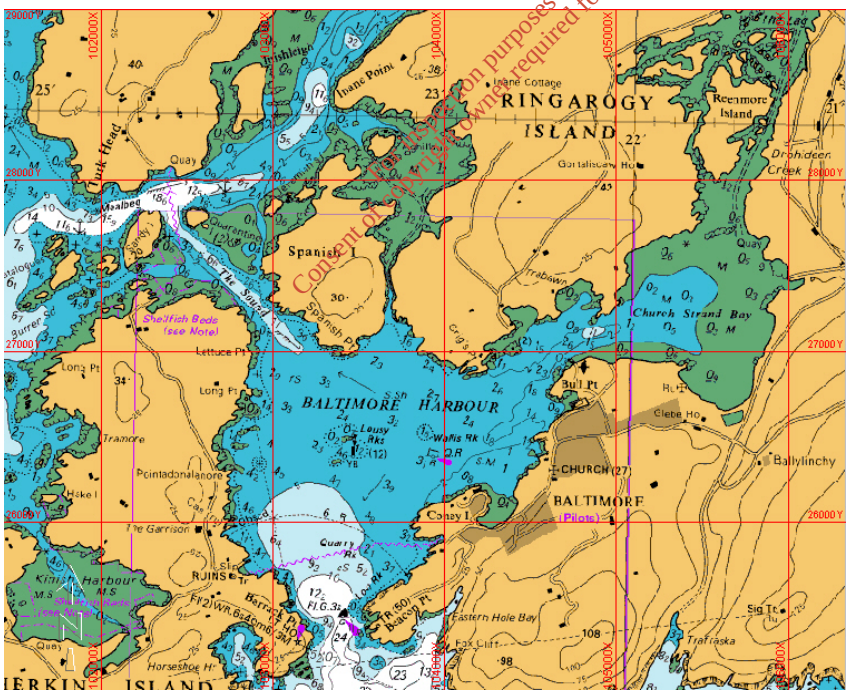


Figure 1.1 Site Map

The objective of the tests was to assess the potential for dispersion of effluent released from this location.

2.0 SURVEY EQUIPMENT

The survey was carried out using IHD's 20ft survey launch. Positioning on Irish National Grid (ING) was achieved using a Trimble NT300D DGPS system. Dye measurements were made using a Turner Designs flow-through fluorometer. Currents were measured using an InterOcean S4 self-recording current meter. Salinity was measured using a Kent EIL TS-bridge and wind was measured using a Deutz hand-held anemometer on the survey vessel.

All positioning data was acquired and logged to PC under the control of the hydrographic software package *HYPACK MAX*.

3.0 SURVEY METHOD

A slug of Rhodamine WT dye was released at approximately 90-minute intervals. The resultant patch was tracked by the survey vessel and its extent positioned regularly (approximately 20-minute intervals). The extent of the patch was initially determined by eye. When the patch was no longer visible to the eye the fluorometer was used to determine its position and concentration.

A drogue was released with each dye slug and its position noted regularly. The drogue was sometimes tracked for longer than it was possible to track the dye in order to give an indication of where the dye patch might travel if it still existed.

4.0 TIDAL DATA FOR BALTIMORE HARBOUR

The statistical tidal data for the secondary port of Baltimore Harbour (from Admiralty Tide Tables 2004) is presented in Table 4.1 below.

TIDE ITEM	ABOVE CHART DATUM (m)
MHWS	3.5
MHWN	2.9
MSL	2.12
MLWN	1.4
MLWS	0.6

Table 4.1 Statistical Tidal Data for Baltimore Harbour, Co. Cork

Predicted tidal heights and times can vary from those actually observed. The accuracy of the predictions is affected by such parameters as the length of the original data set on which the predictions are based, meteorological conditions etc. The reader should refer to Admiralty Tide Tables 2004 for more information as a fuller discussion is outside the scope of this report

5.0 SURVEY RESULTS – AUGUST 10th 2004

5.1 TIDE

The predicted tidal levels for Baltimore Harbour on August 10th 2004 are shown below. Predictions are from the UK Hydrographic Office Tidal Prediction program *'TotalTide'*.

TIME (BST)	ABOVE CHART DATUM (m)
00:53	2.9
07:20	1.4
13:25	2.9
19:51	1.4

Table 5.1 Predicted Tidal Data for Baltimore Harbour, Co. Cork – August 10th 2004

As can be seen from Tables 4.1 and 5.1, the tidal levels on this day corresponded to a mean neap tide.

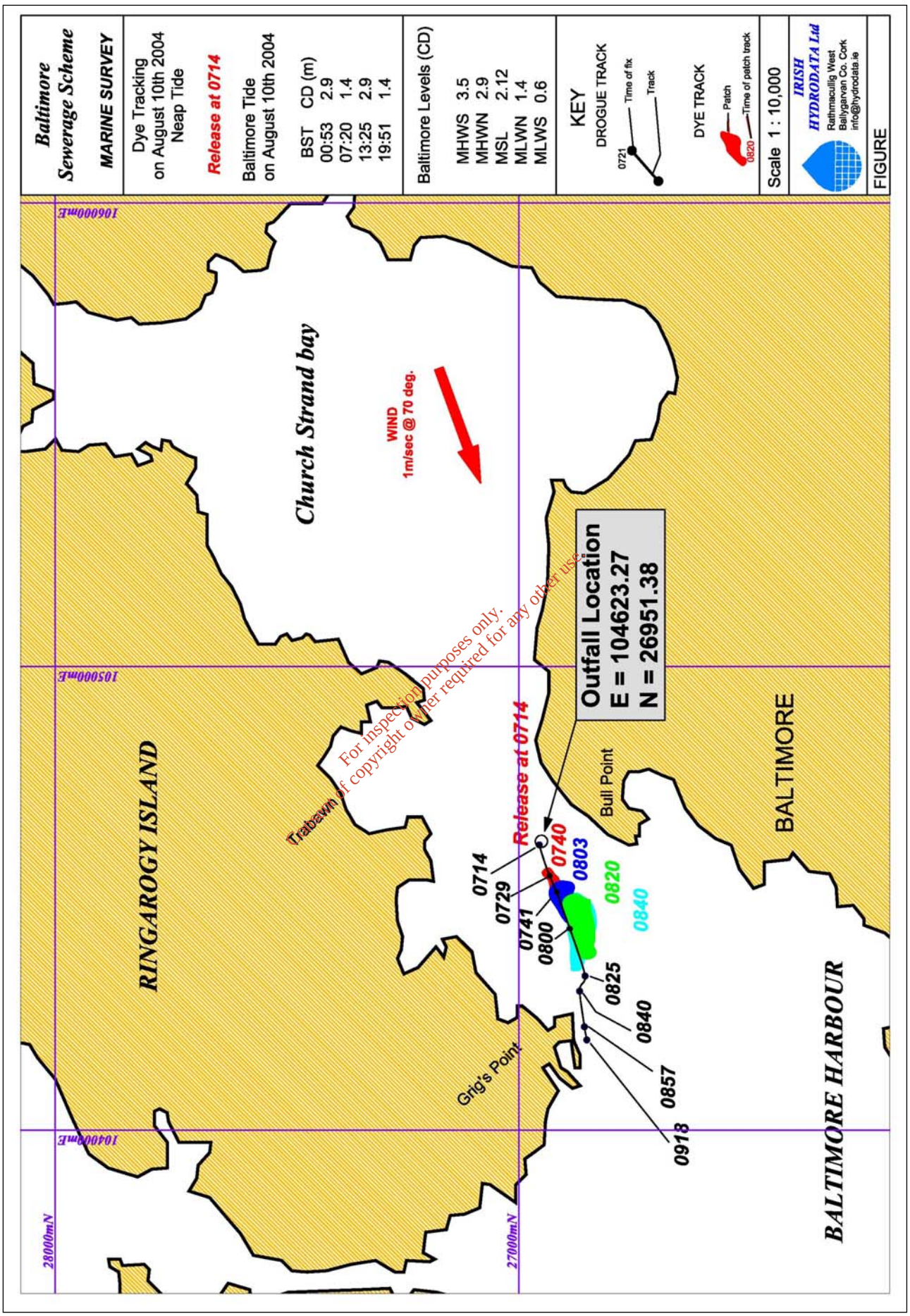
5.2 DYE AND DROGUES

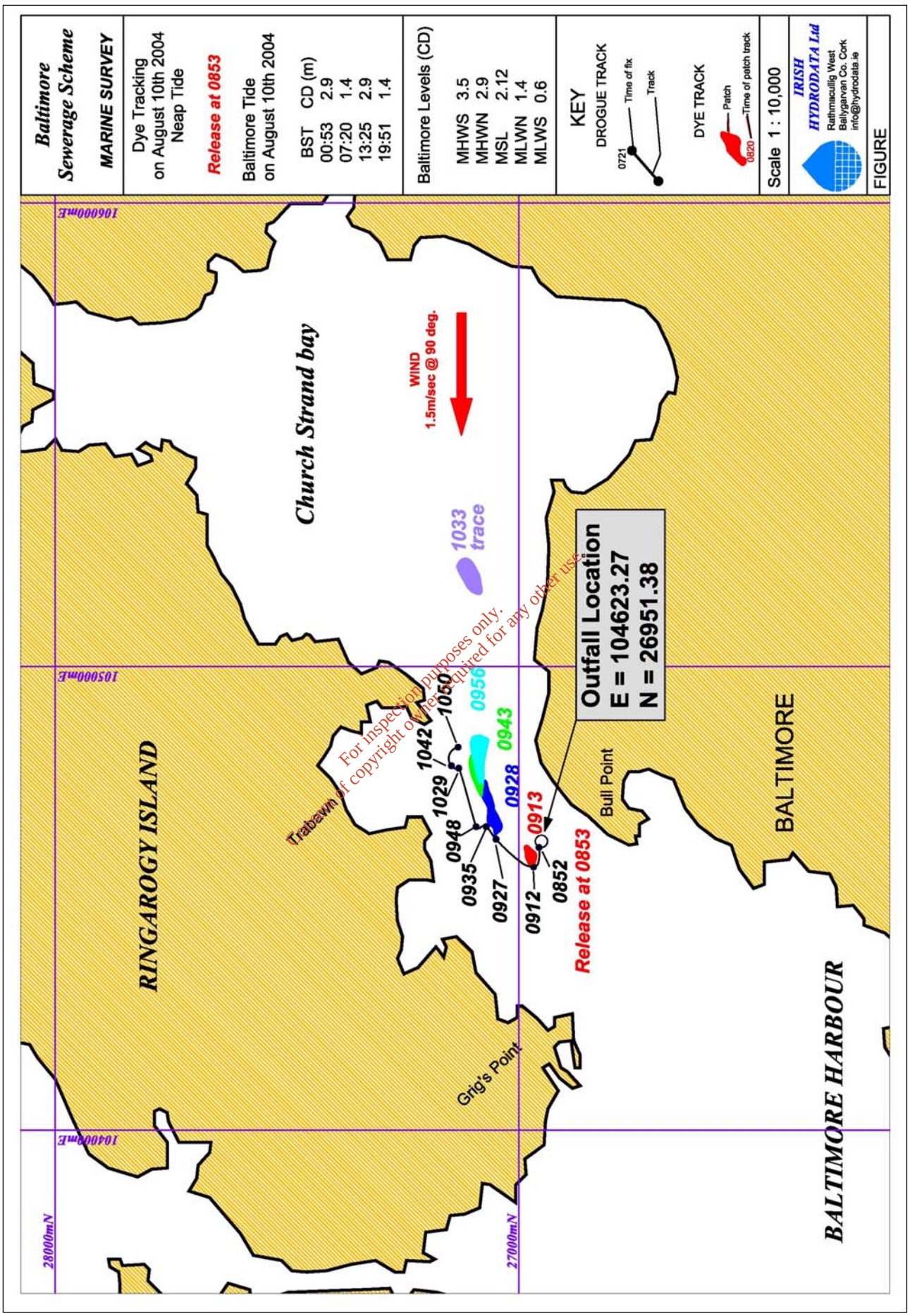
Dye and drogue releases were made at the times shown in Table 5.2 below.

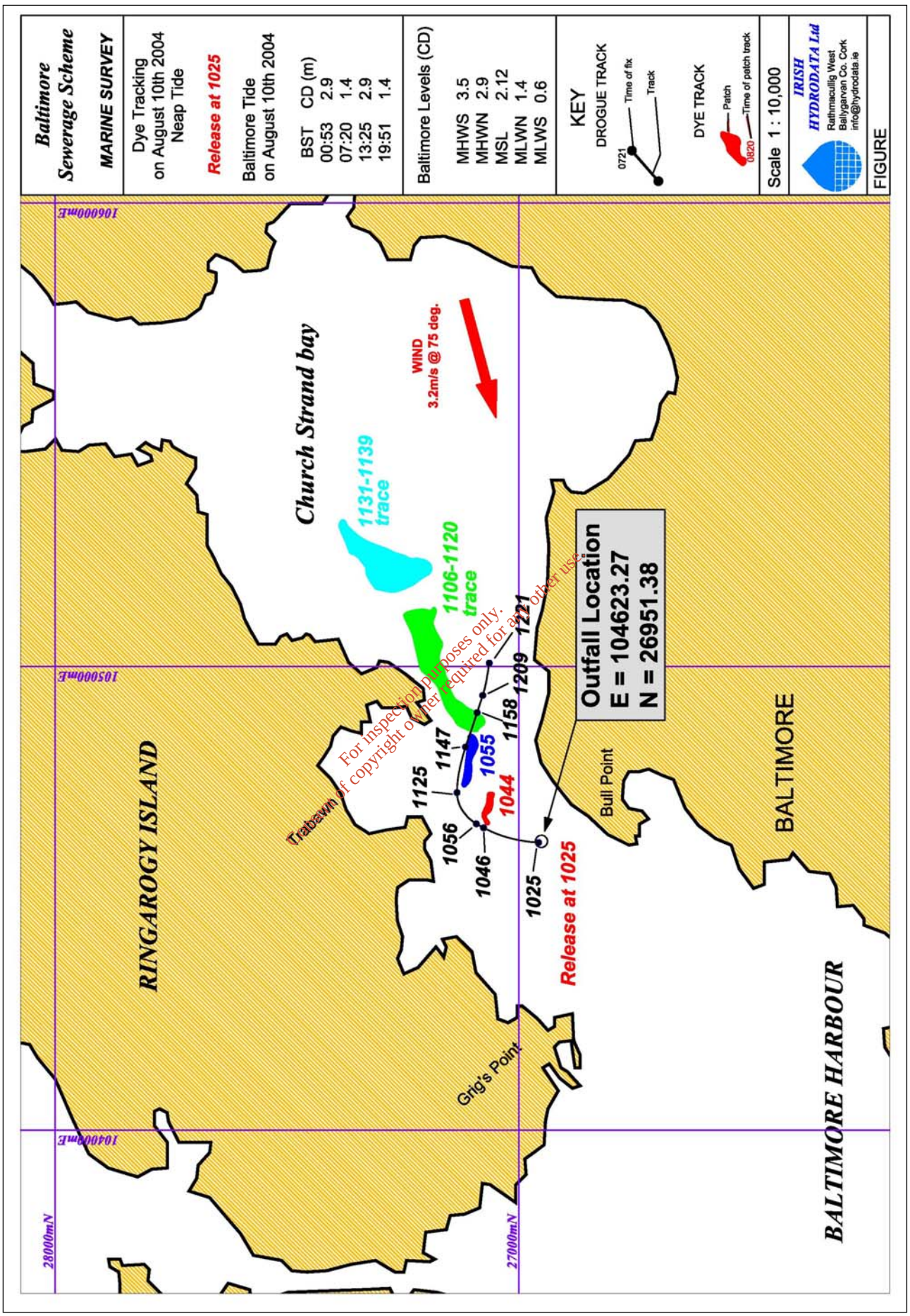
RELEASE No.	TIME OF RELEASE (BST)
1	0714
2	0853
3	1025
4	1143
5	1320
6	1450
7	1617
8	1751

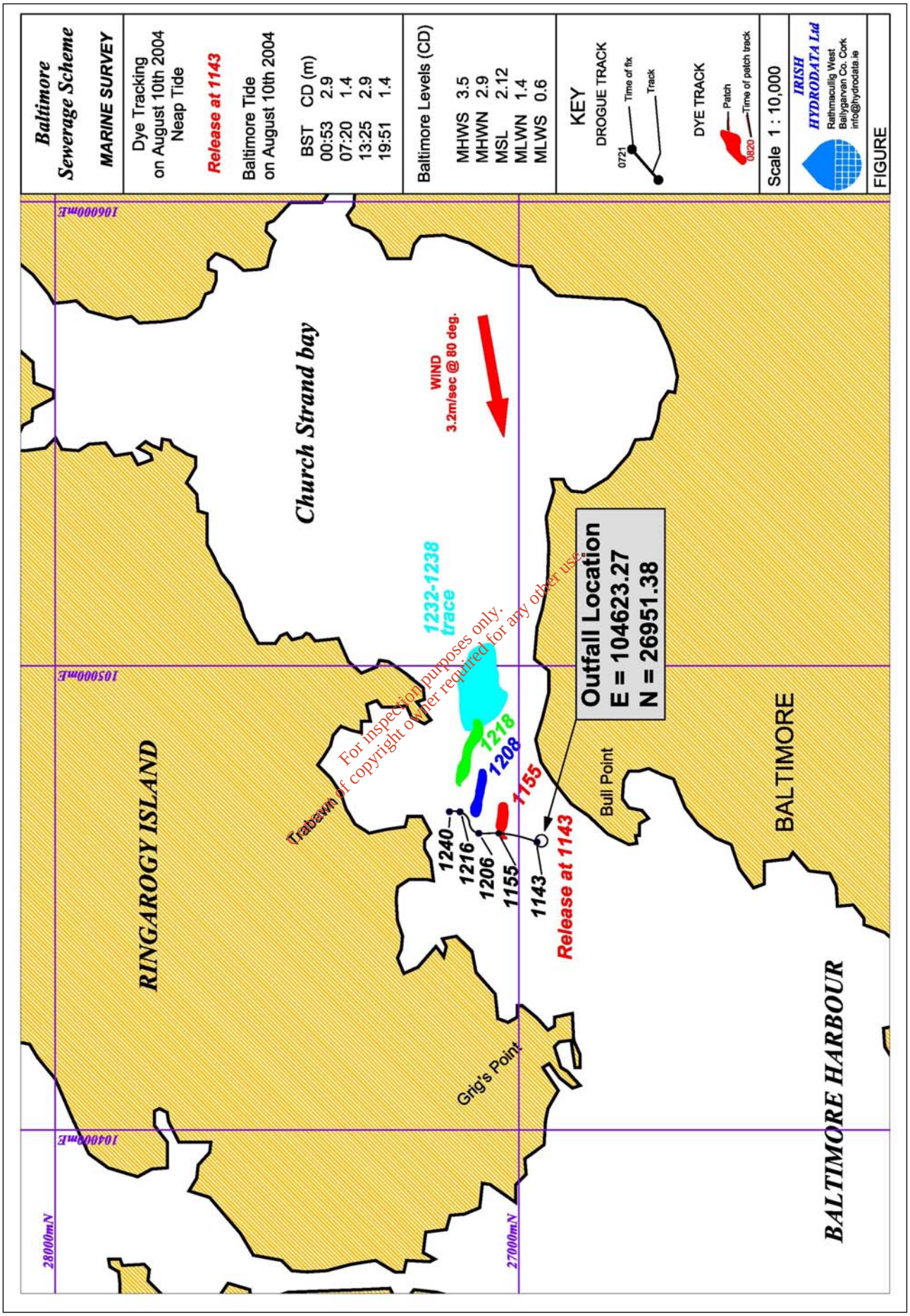
Table 5.2 Times of Releases – August 10th 2004

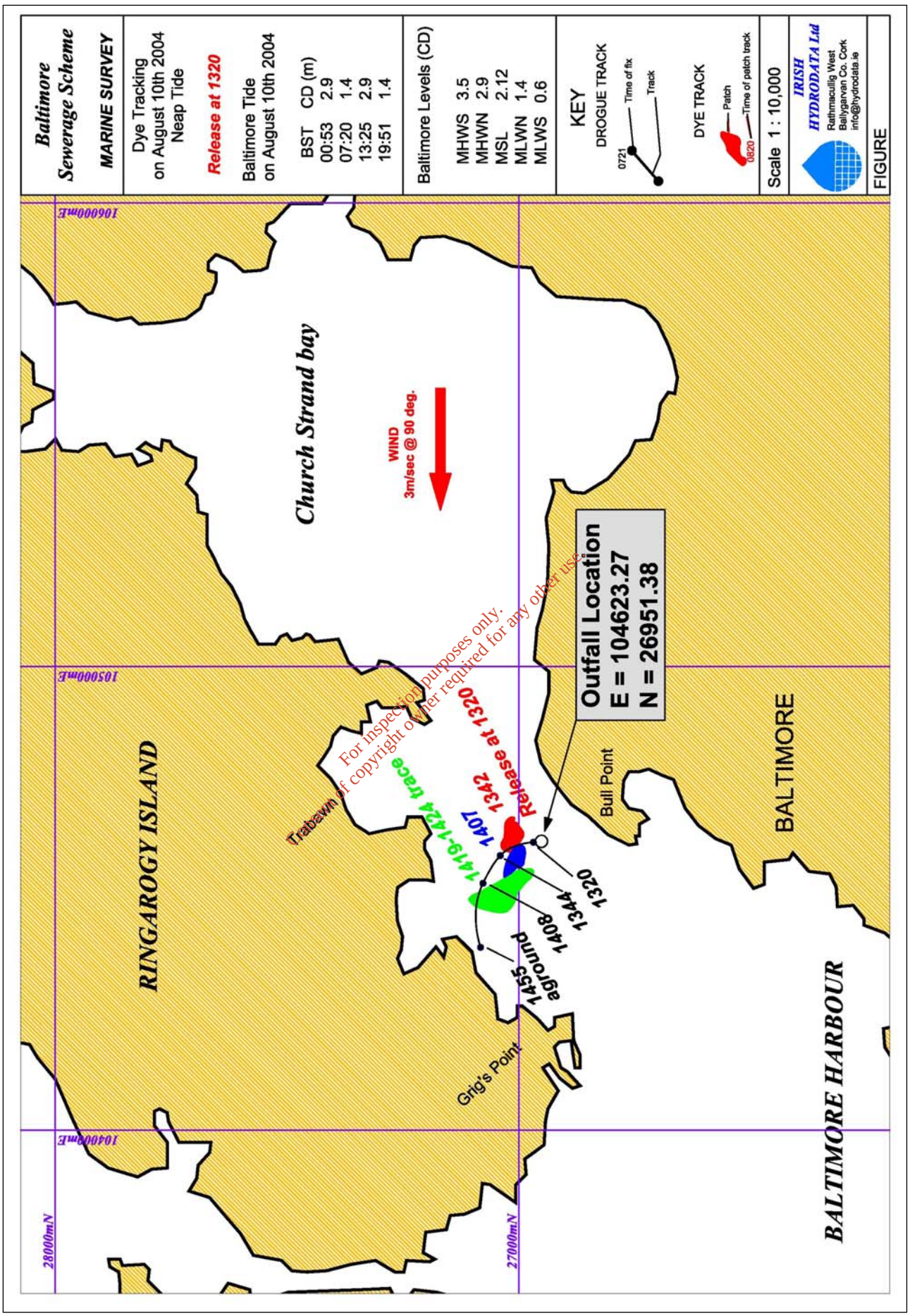
The dye patch movements and drogue tracks are presented in Figures 5.1 to 5.8 inclusive. The dye patches are seen to move away from the discharge point and follow different trajectories at all release times. A maximum excursion of 800m (at 1hr after release) was noted on the flood tide during release number 3 while a maximum excursion of 700m (at 1hr after release) was noted on the ebb tide during release number 8.

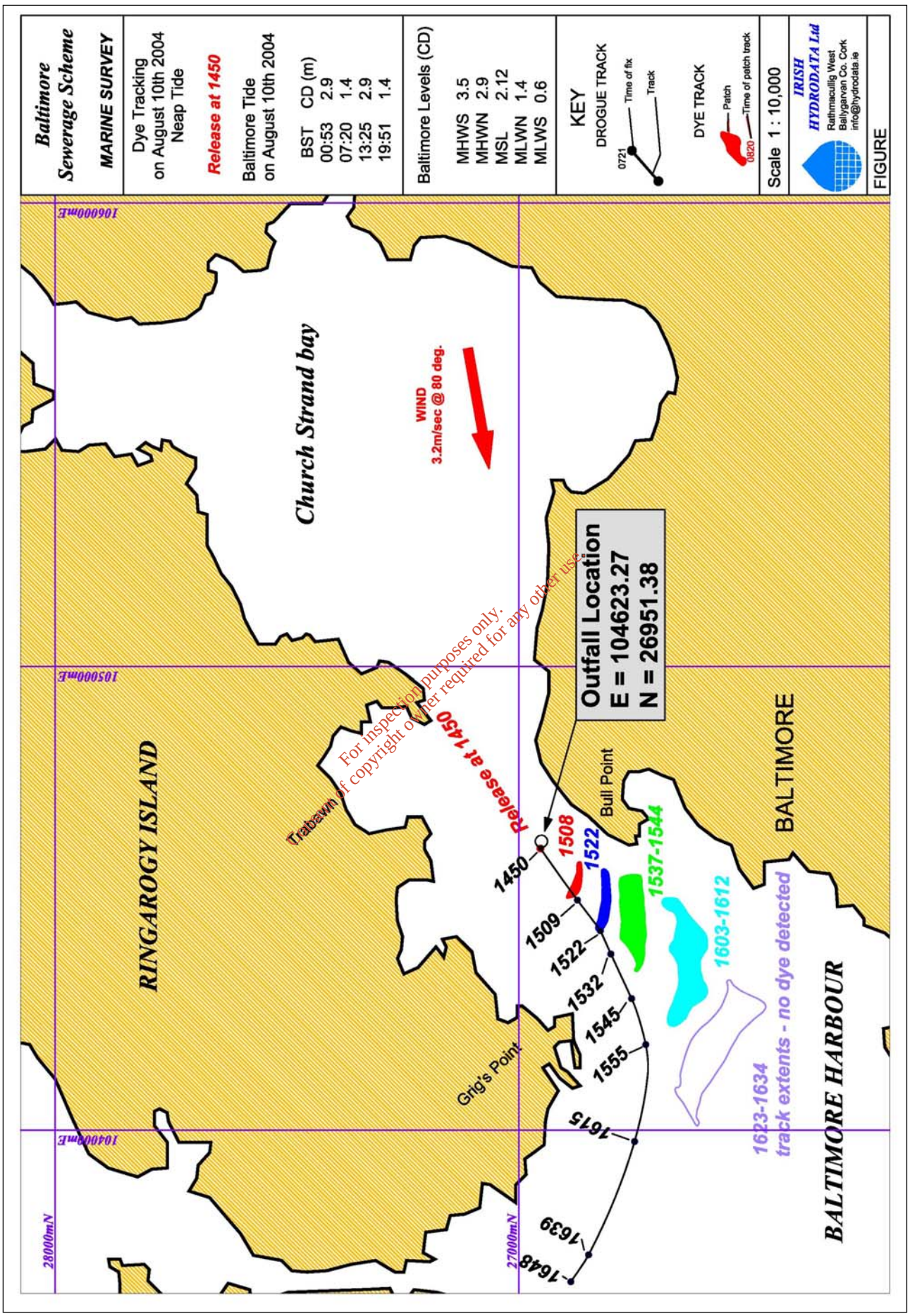


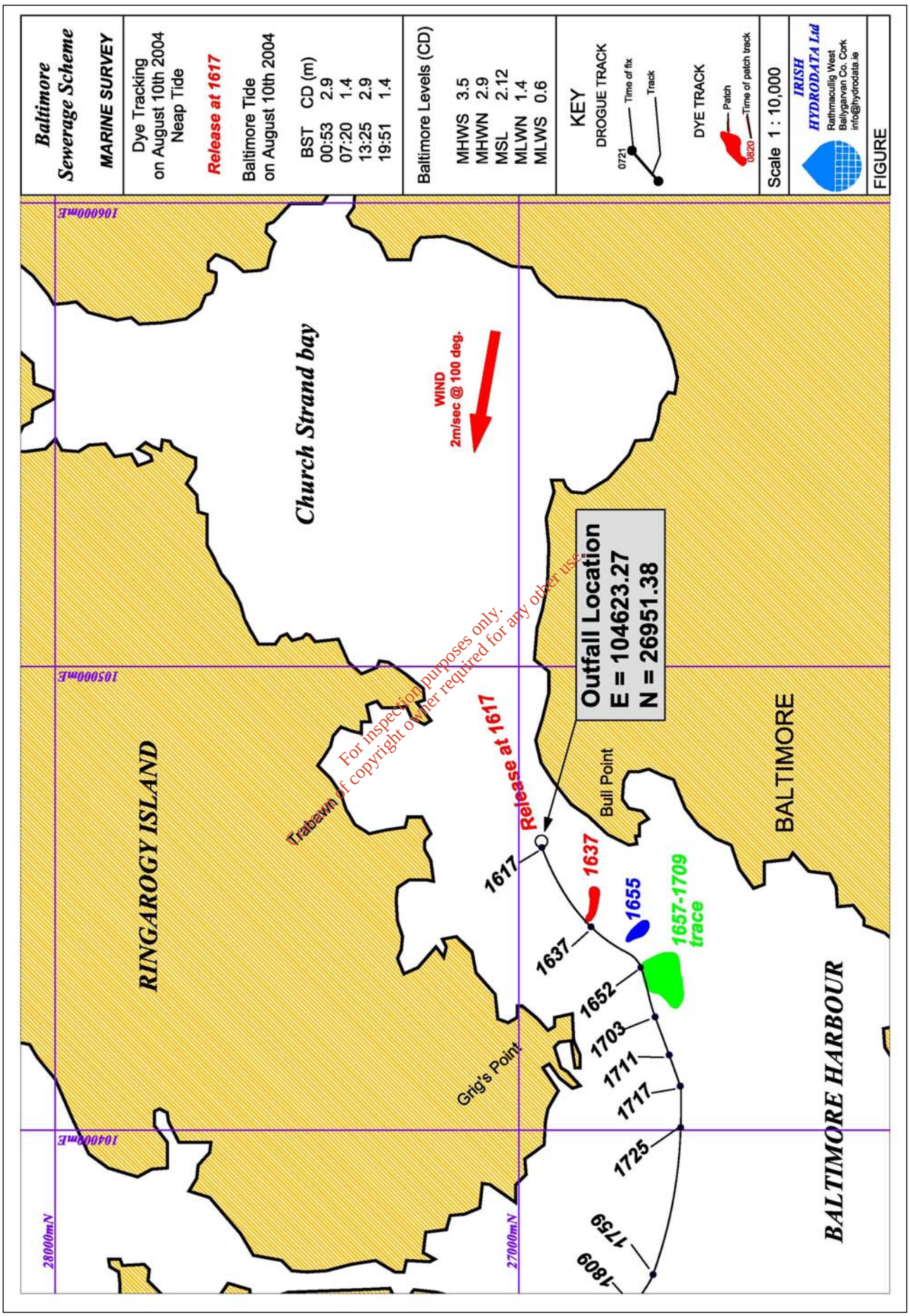


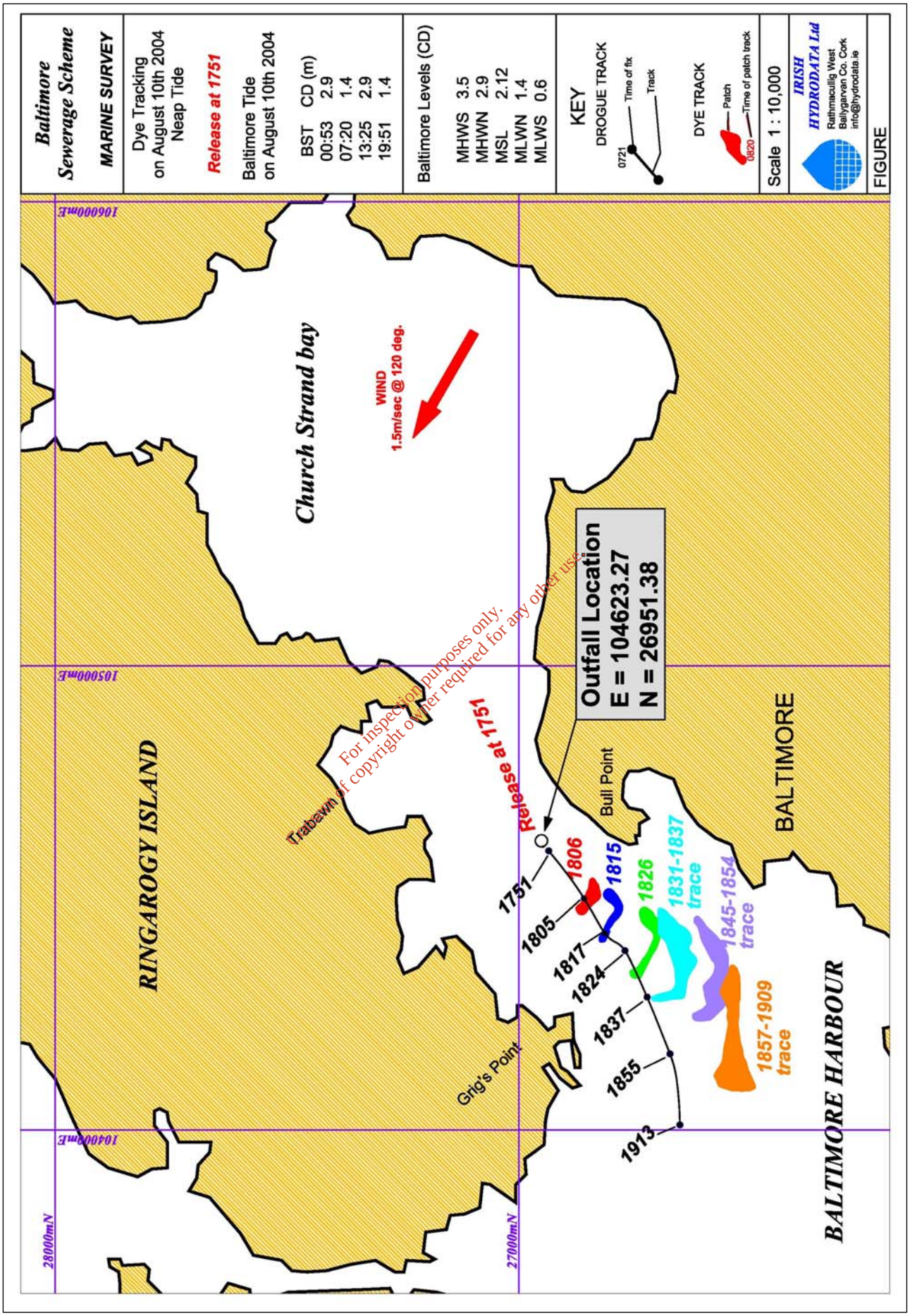












5.3 CURRENTS

The S4 current meter was deployed at the proposed outfall location in approximately 2.5m depth relative to Chart Datum. The current meter was positioned 1m below the water surface, being attached to a buoy which was anchored at the outfall location. The device thus rose and fell with the tide and always measured the current at 1m below surface.

The current components were measured for a period of 5-minutes every 10-minutes and a vector average computed. A time series plot of the speed and direction is presented in Figure 5.9.

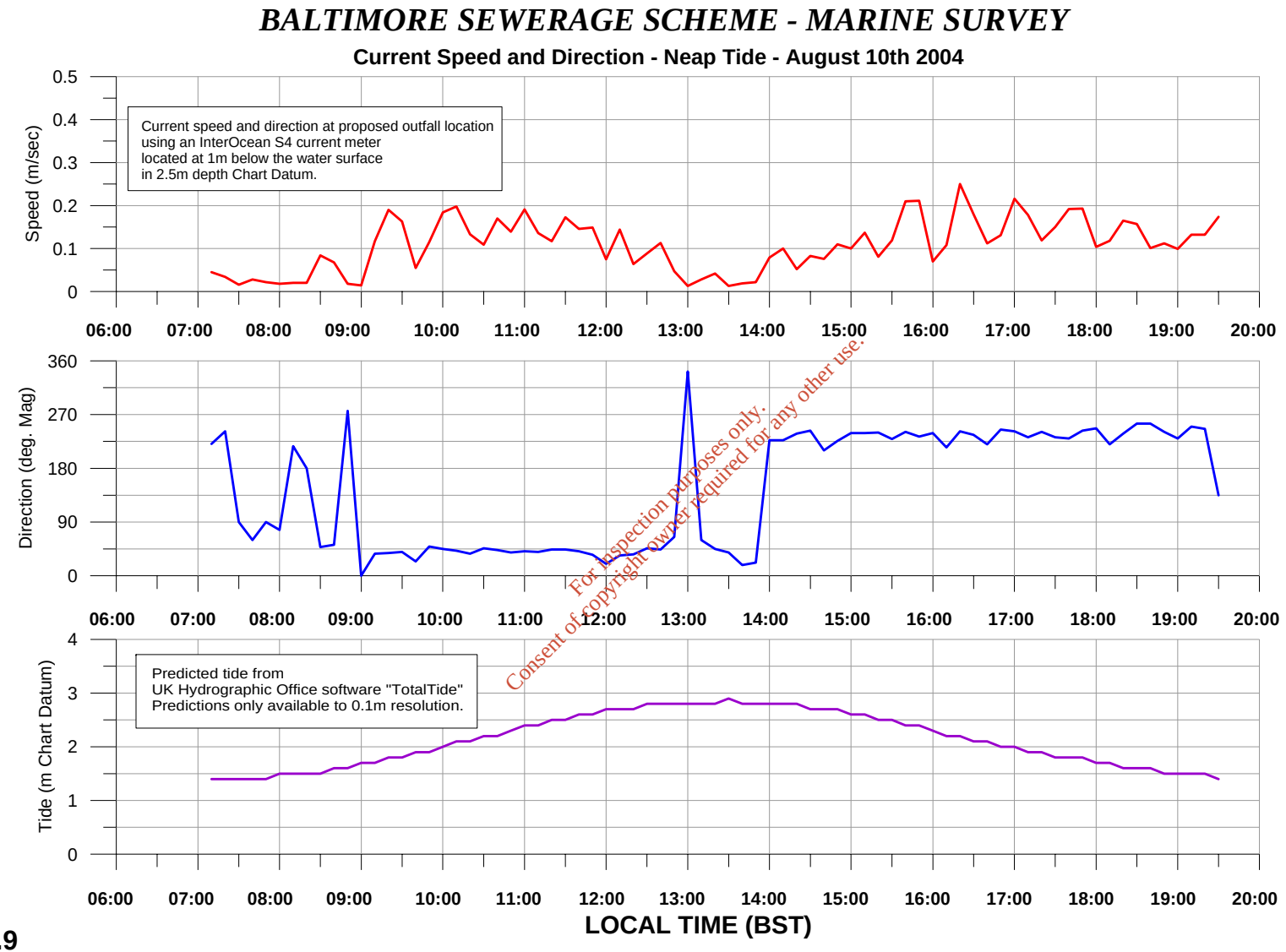


Figure 5.9

5.4 WIND

Wind data was recorded on the survey vessel on an hourly basis using a hand-held anemometer. The data is presented in Table 5.3 below.

TIME	WIND SPEED (m/sec	WIND DIRECTION (°)
0700	1.0	70
0800	1.0	70
0900	1.5	90
1000	3.0	80
1100	3.3	70
1200	3.2	80
1300	2.5	90
1400	3.5	90
1500	3.2	80
1600	2.0	100
1700	1.7	90
1800	1.5	120
1900	1.0	130
2000	1.0	120

Table 5.3 Wind Measurements – August 10th 2004

5.5 SALINITY

Salinity profile data was recorded at the outfall location at 90-minute intervals during the survey. The data is presented in Table 5.4 below.

Depth(m)	0800	0930	1100	1230	1400	1530	1700
1	32.8	32.8	32.9	33.1	33.0	33.1	33.0
2	32.7	32.6	32.6	33.0	32.8	32.9	33.0
3	32.5	32.5	32.6	32.8	32.6	32.8	32.9
4	32.0	32.0	32.0	32.5	32.6	32.6	32.7
5				32.5	32.5	32.2	

Table 5.4 Salinity Measurements (parts per thousand) – August 10th 2004

6.0 SURVEY RESULTS – AUGUST 16th 2004

6.1 TIDE

The predicted tidal levels for Baltimore Harbour on August 16th 2004 are shown below. Predictions are from the UK Hydrographic Office Tidal Prediction program *'TotalTide'*.

TIME (BST)	ABOVE CHART DATUM (m)
06:15	3.3
12:11	0.8
18:34	3.4

Table 6.1 Predicted Tidal Data for Baltimore Harbour, Co. Cork – August 16th 2004

As can be seen from Table 4.1 the mean spring range is 2.9m. The tidal range on this day was 2.55m corresponding to 88% of a mean spring tide range.

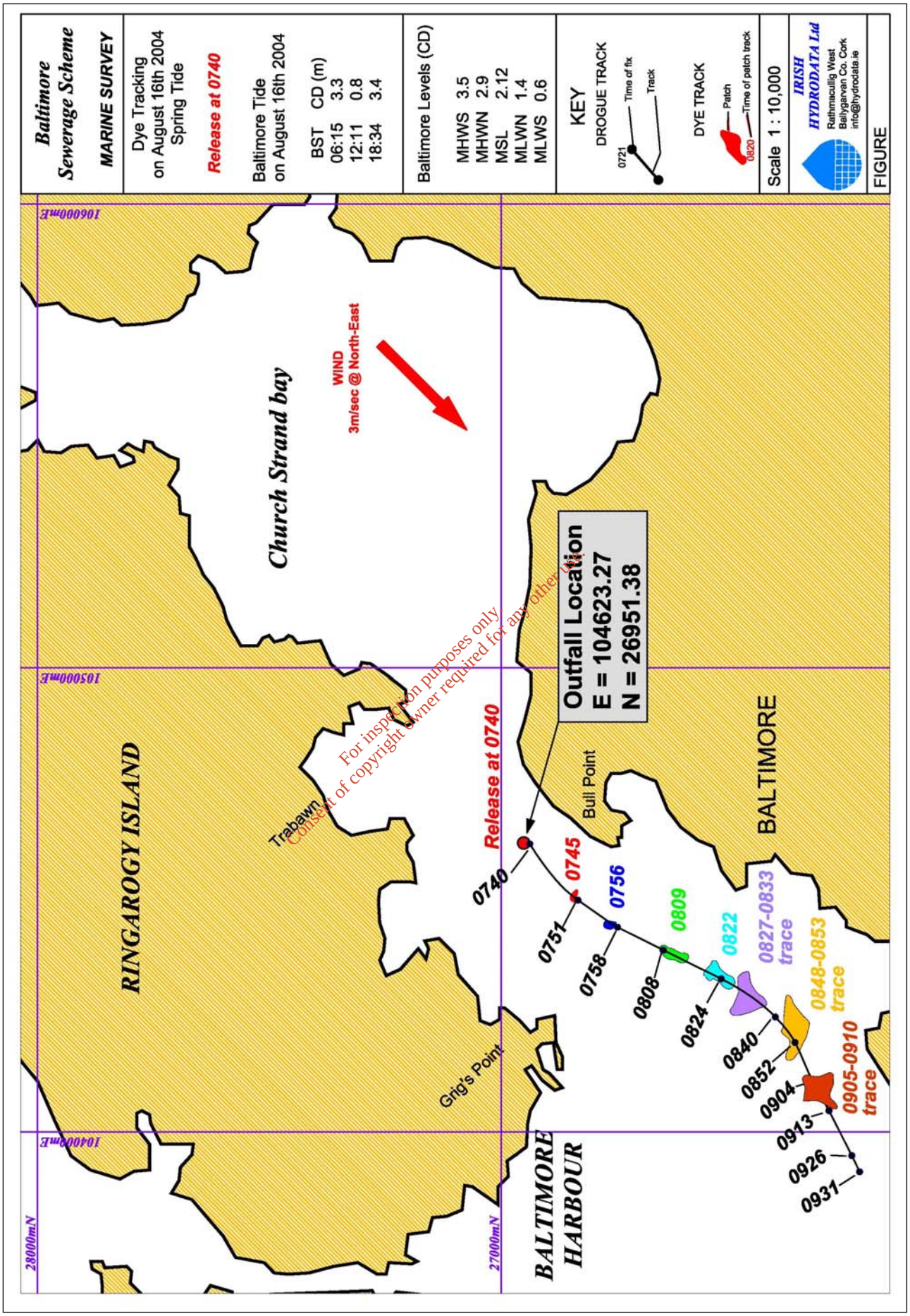
6.2 DYE AND DROGUES

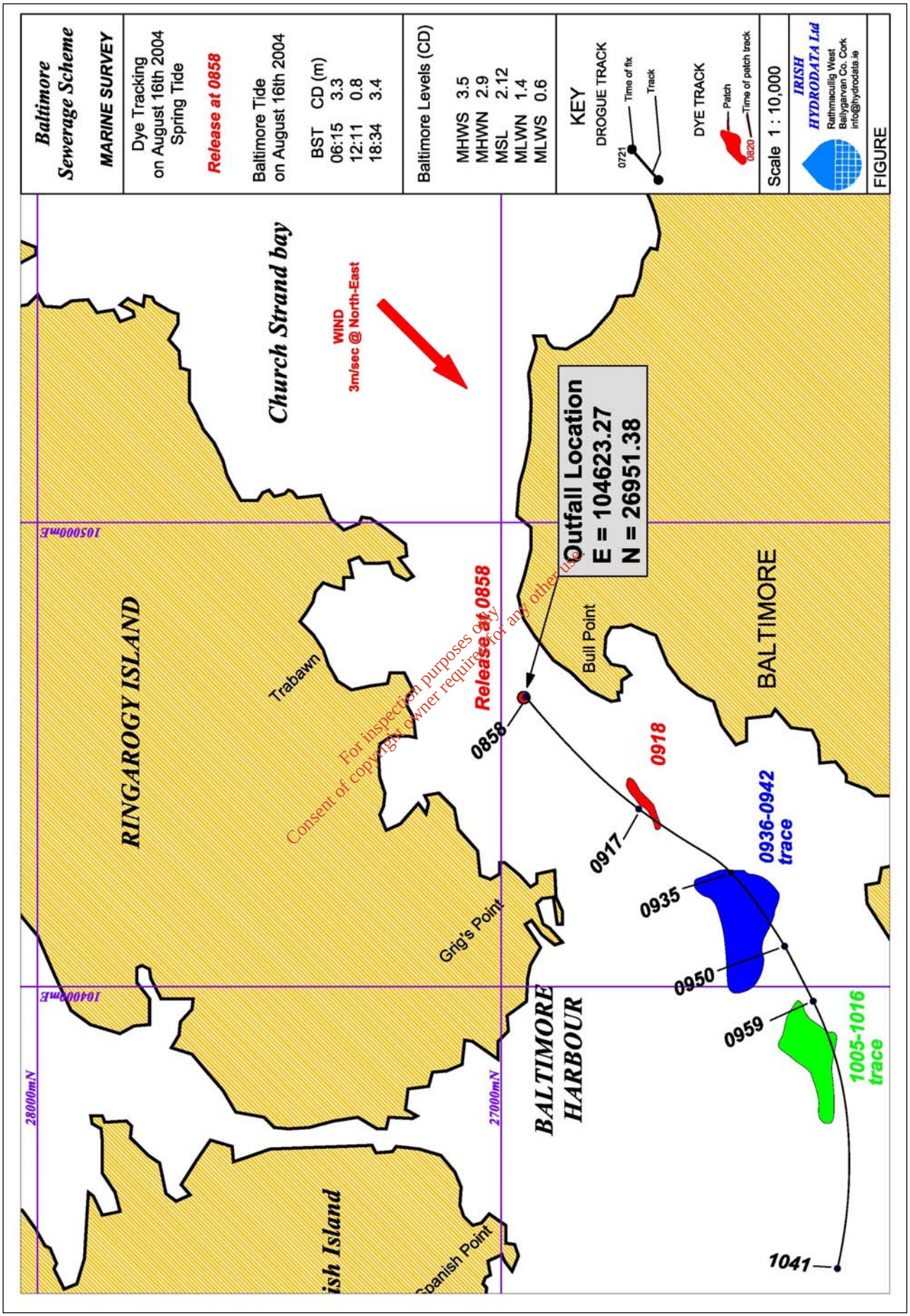
Dye and drogue releases were made at the times shown in Table 6.2 below.

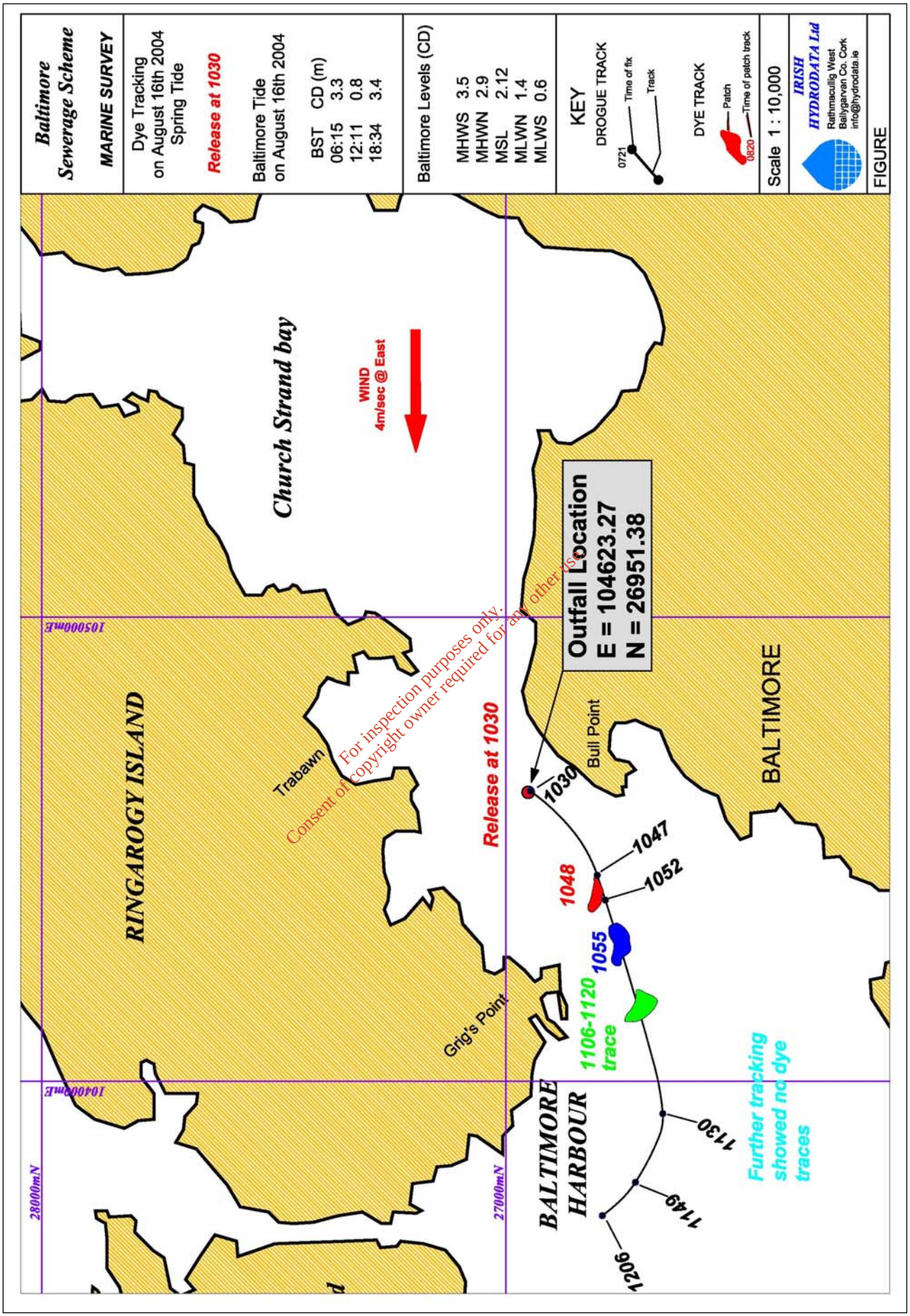
RELEASE No.	TIME OF RELEASE (BST)
1	0740
2	0858
3	1030
4	1159
5	1333
6	1504
7	1628
8	1806

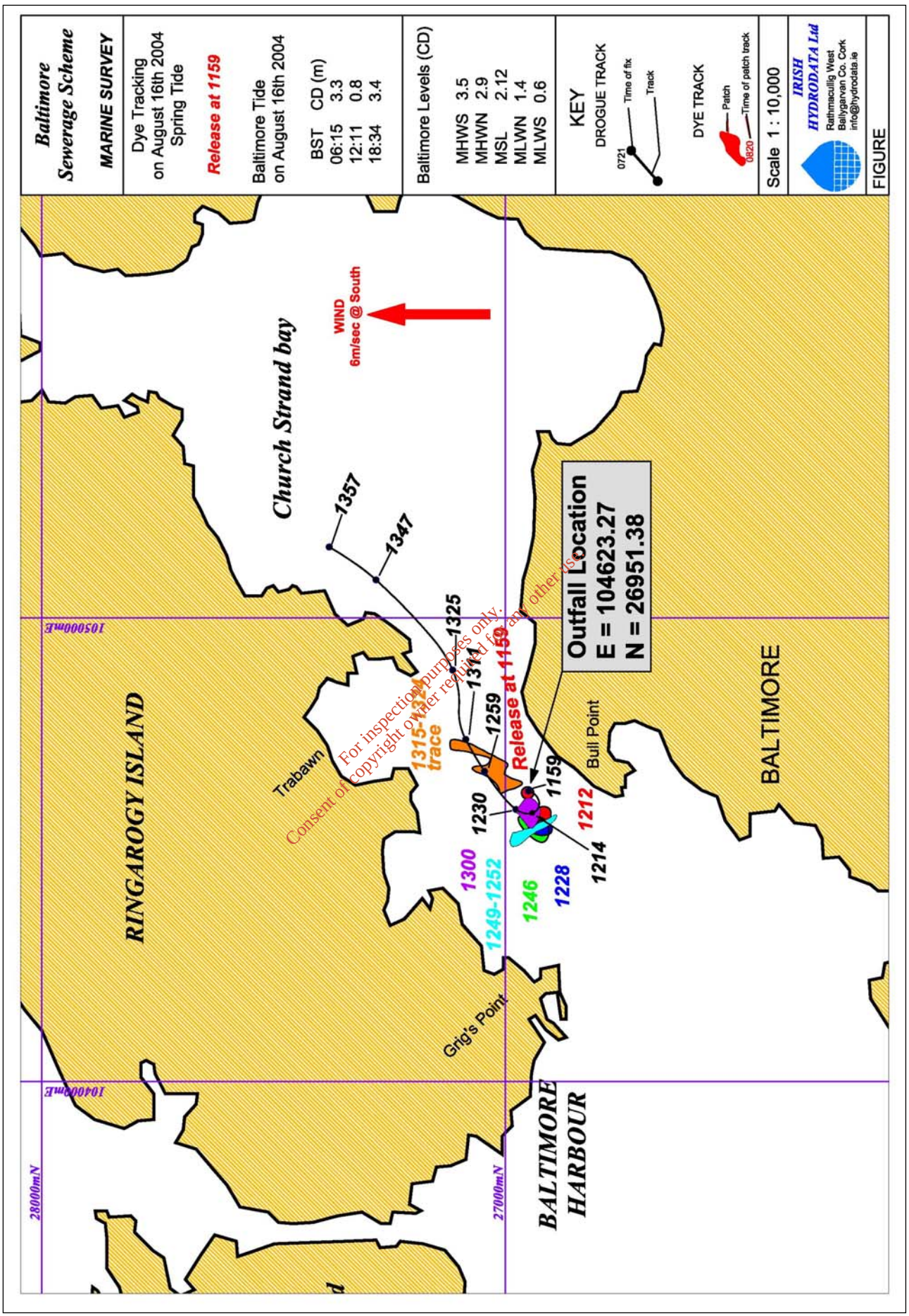
Table 6.2 Times of Releases – August 16th 2004

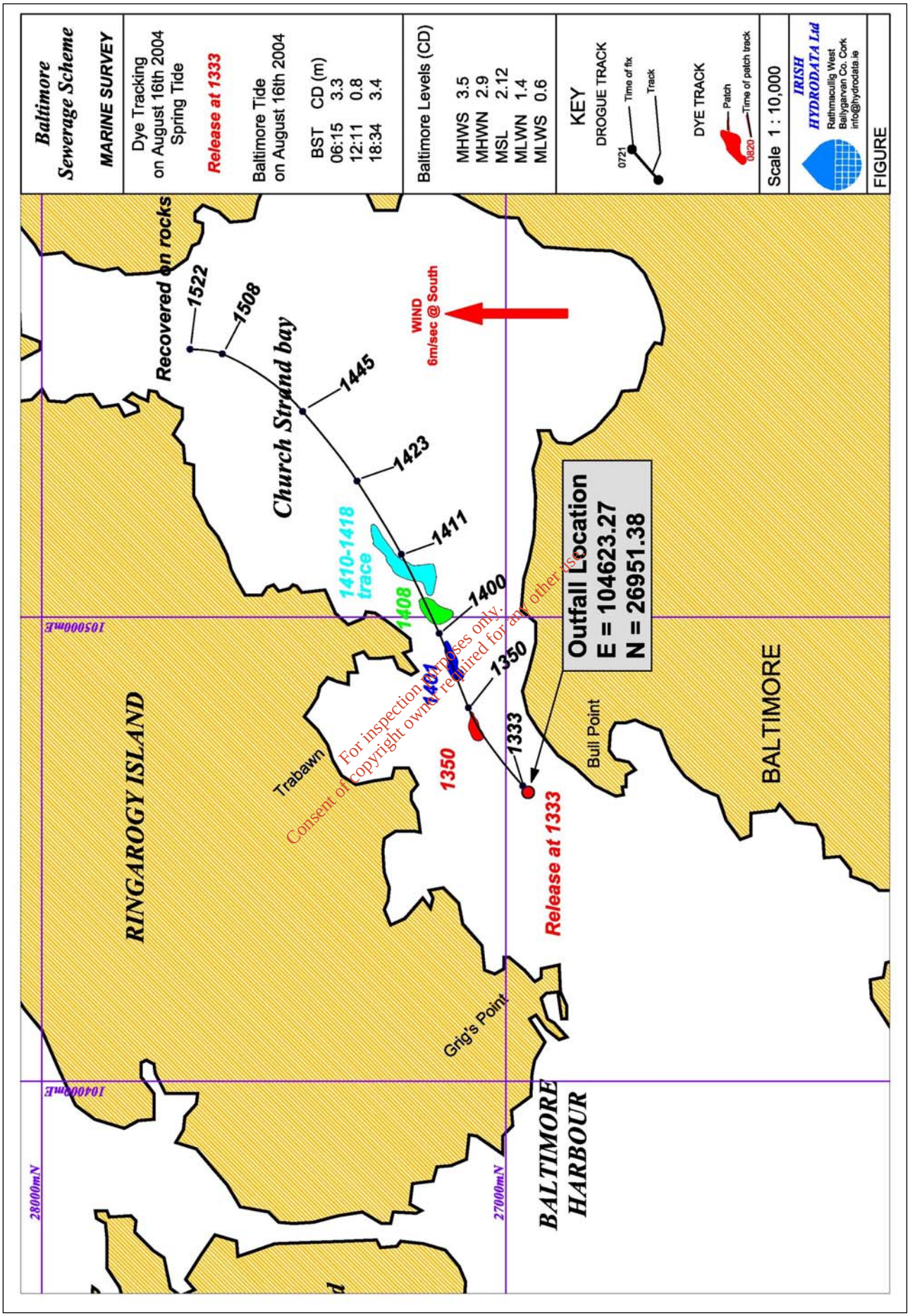
The dye patch movements and drogue tracks are presented in Figures 6.1 to 6.8 inclusive. A maximum excursion of 1130m (at 1.25hrs after release) was noted on the ebb tide during release number 2 while a maximum excursion of 900m (at 1hr after release) was noted on the flood tide during release number 6.

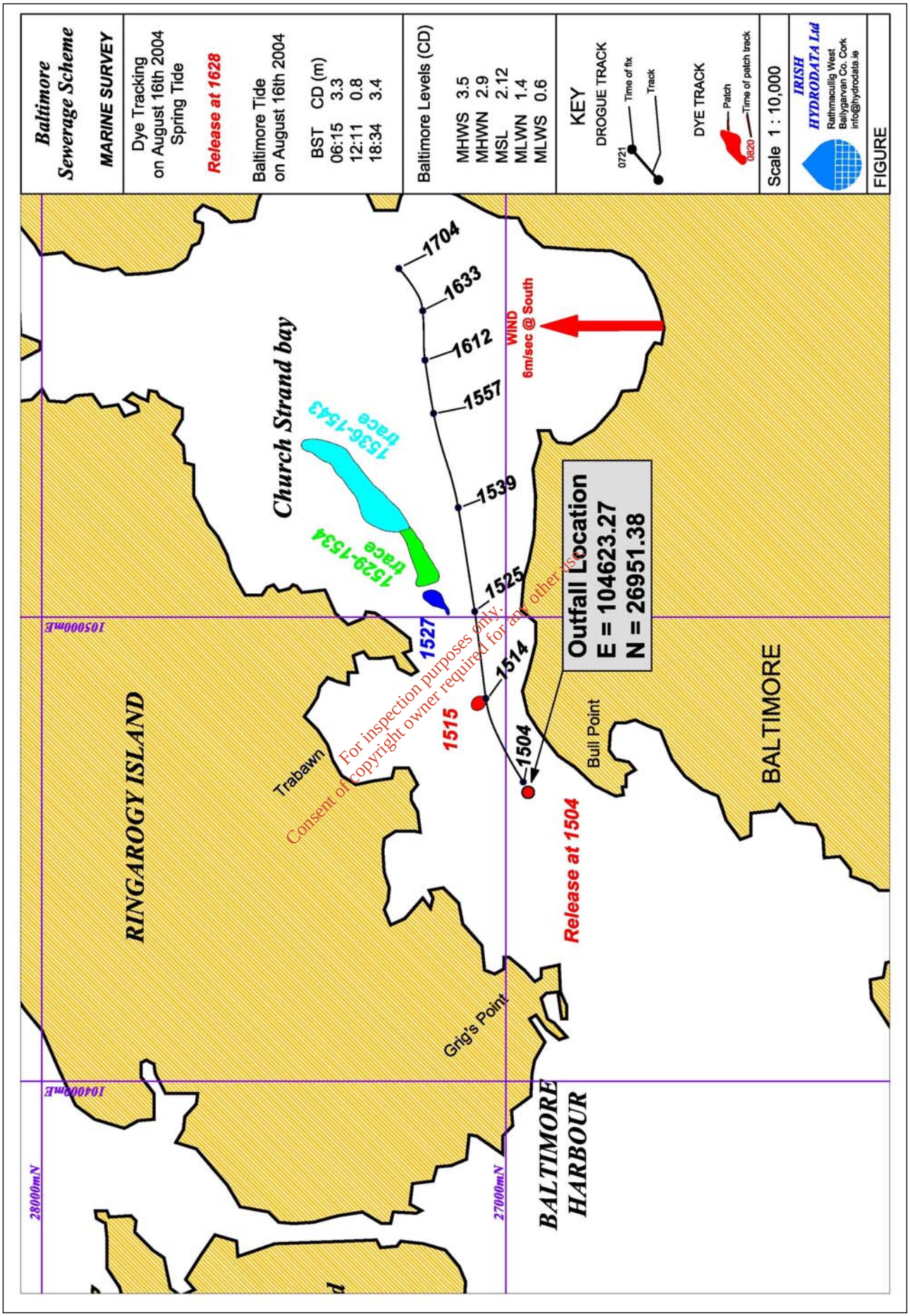


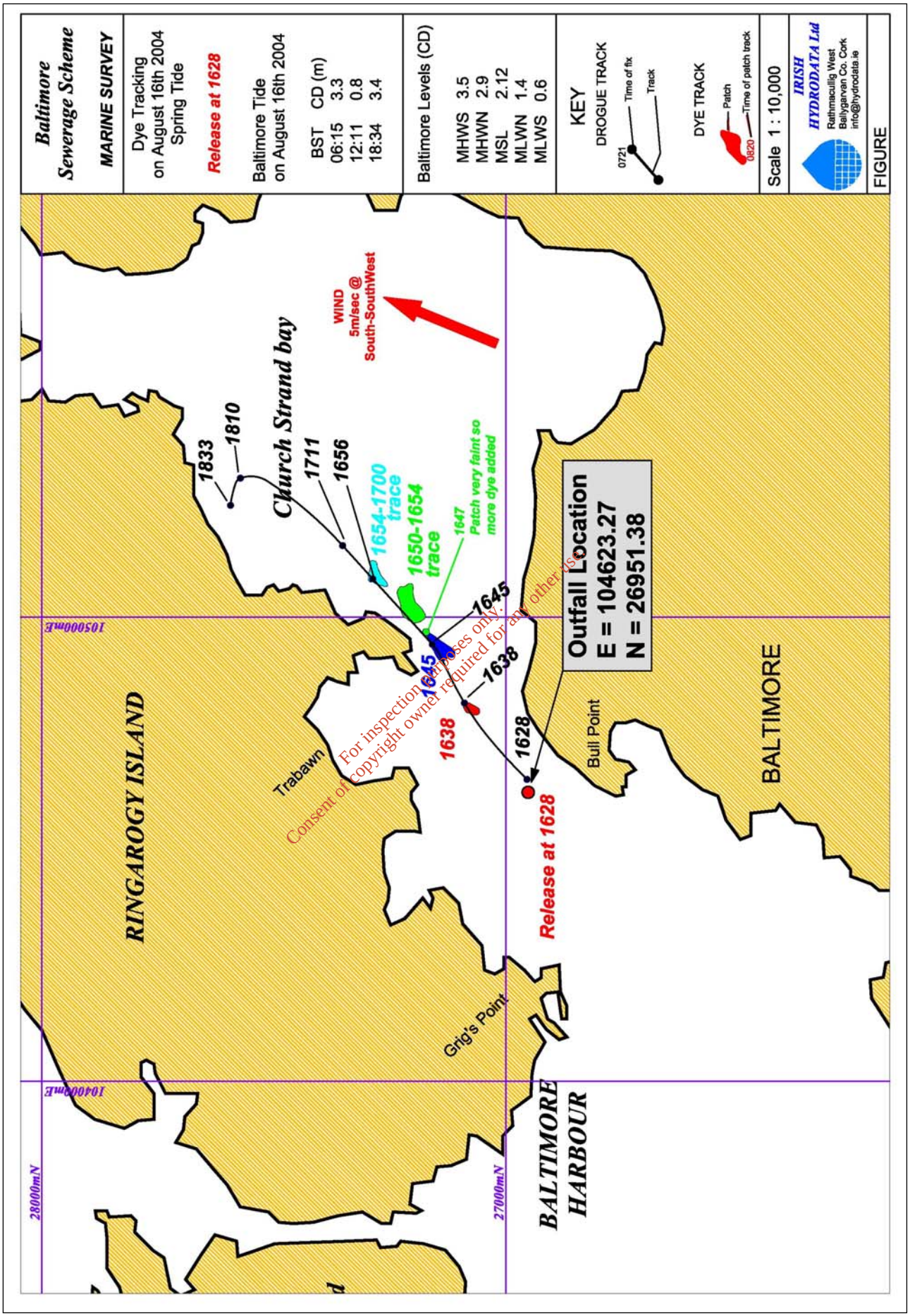


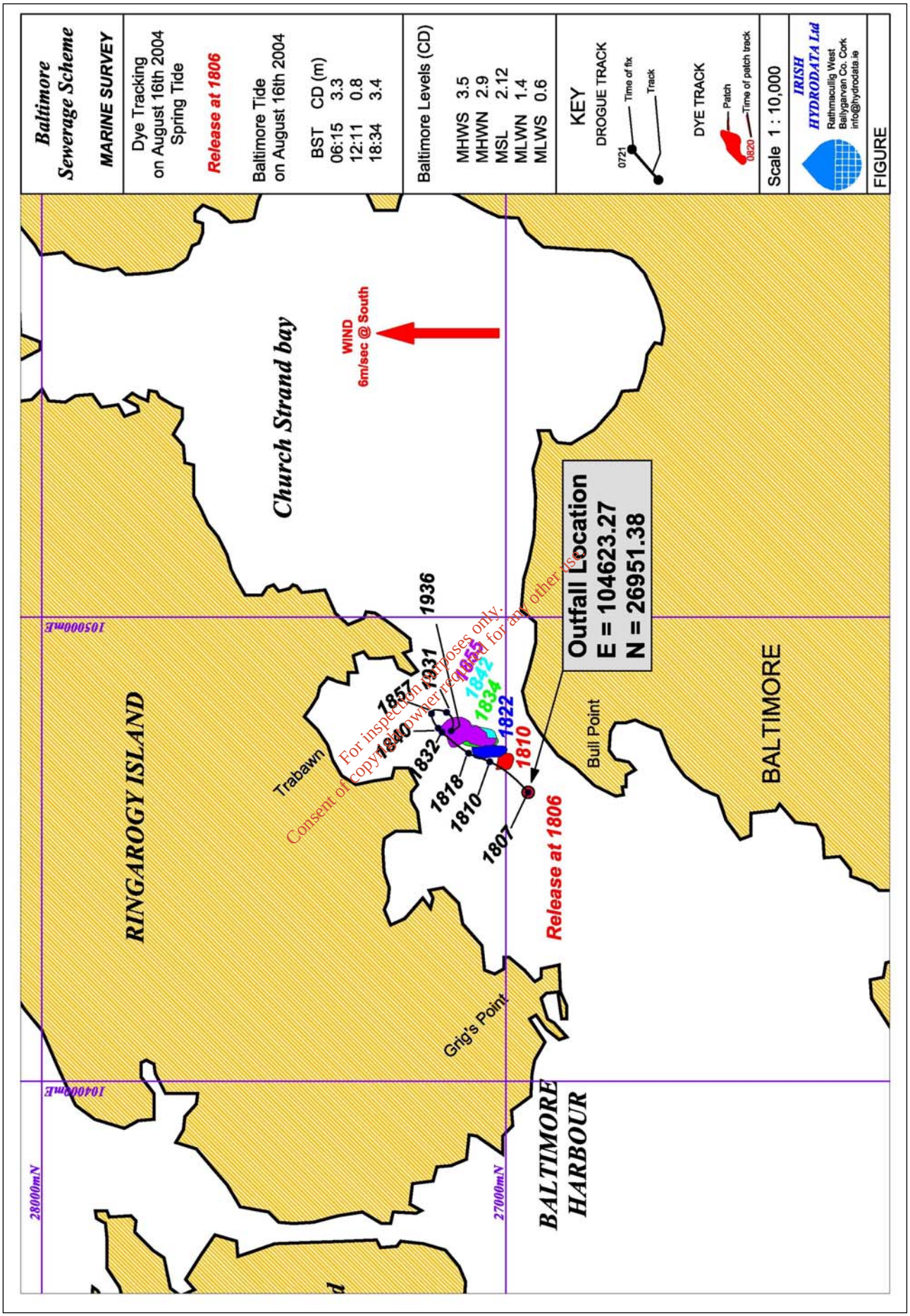












6.3 CURRENTS

The current meter was deployed in a similar fashion to that employed on the neap tide survey.

The current components were measured for a period of 5-minutes every 10-minutes and a vector average computed. A time series plot of the speed and direction is presented in Figure 6.9.

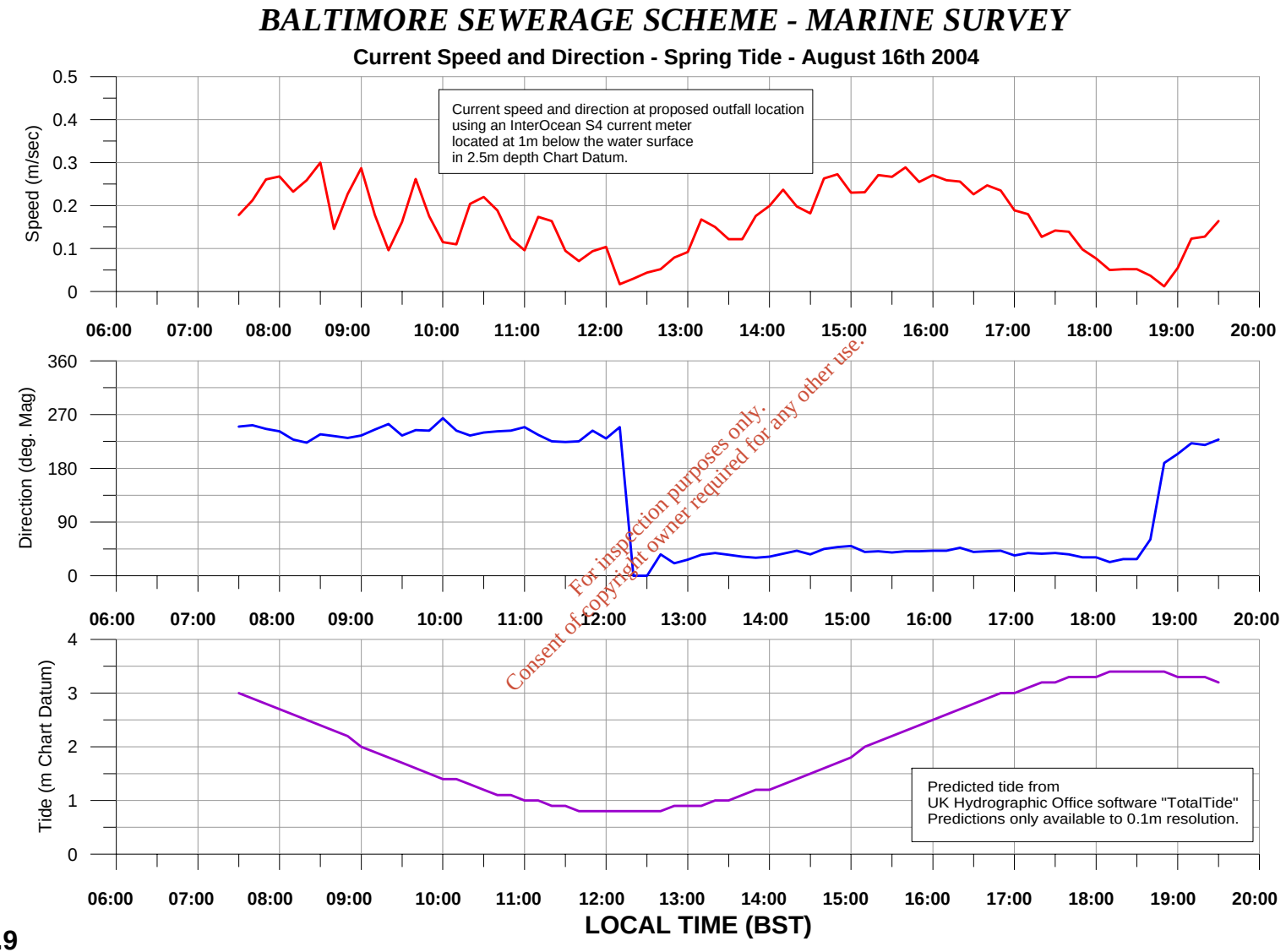


Figure 6.9

6.4 WIND

Wind data was recorded on the survey vessel on an hourly basis using a hand-held anemometer. The data is presented in Table 6.3 below.

TIME	WIND SPEED (m/sec	WIND DIRECTION (°)
0700	0.0	-
0800	0.0	-
0900	3.5	50
1000	3.0	50
1100	4.3	90
1200	6.0	180
1300	5.2	180
1400	5.5	200
1500	5.0	210
1600	5.1	210
1700	5.2	225
1800	6.0	180
1900	5.1	200
2000	5.5	210

Table 6.3 Wind Measurements – August 16th 2004

6.5 SALINITY

Salinity profile data was recorded at the outfall location at 90-minute intervals during the survey. The data is presented in Table 6.4 below.

Depth(m)	0715	0845	1015	1145	1315	1445	1615
1	33.5	33.5	33.4	32.1	32.5	33.0	33.4
2	33.1	33.1	33.0	31.9	32.1	32.8	33.0
3	33.0	32.0	32.2	31.9	32.1	32.1	32.8
4	32.1	31.8	31.9			31.9	32.1
5	32.2	31.5					31.0
6	31.6						

Table 6.4 Salinity Measurements (parts per thousand) – August 16th 2004

7.0 DISCUSSION

7.1 Survey Results

The results of the dye, drogue and current measurements have clearly shown the nature of the water movements at the proposed discharge location. Current speeds have been shown to be rectilinear and well defined with peak spring values of 0.28m/s and neap values of 0.20m/s. Both flood and ebb flows last for similar duration.

Dye and drogues released from the outfall point followed trajectories that carried them away from the site. The directions were generally to the south west sector on the ebb and the north east sector on the flood. Within the sectors the trajectories diverged and no predominant pattern or convergence was observed indicating good dispersion.

The effect of wind on the drogues and dye can not be quantified from the limited field work carried out. However, the wind does have an effect on drogues and to a lesser extent on dye patches as the surface waters must respond to surface drag.

7.2 Waste Water Characteristics

The proposed discharge will have the average characteristics listed in Table 7.1. The increase in nutrient levels from the existing situation where the effluent enters the bay near the harbour is presented in Table 7.2. These represent an overall summer time increase of less than 50%.

Parameter	Quantity
Flow (summer)	9.375 l/s
TP	5 mg/l
TN	35 mg/l
Faecal Coliforms	2000 fc/100ml

Table 7.1 - Effluent Characteristics.

Nutrient Discharge	Existing Kg/day	Proposed Kg/day	Increase Factor
TP	2.98	4.05	1.36
TN	19.8	28.35	1.43

Table 7.2 - Change in Nutrient Loadings.

7.3 Initial Dilution at Outfall Site

Tidal currents at the site are reasonably well defined and regular. Mean speeds during neap tides approximate to 0.1m/s while slack water periods, when the current approaches 0m/s, probably last for less than 1 hour. Estimates of the worst case initial dilutions have been calculated with a jet dilution model for these situations and are presented in Table 7.3. This model solves the integral conservation equations which describe the dynamics of a submerged buoyant jet entering a water body. The assumed flow rate is 9.375 litres/s and the pipe diameter is 0.15m.

Ambient Current Speed	Low Water Depth = 2.5m	Mid Tide Depth = 4.5m
0.0 m/s	11	-
0.1 m/s	-	60

Table 7.3 - Predicted Initial Dilutions at Outfall Site.

7.4 Impact of the Proposed Discharge

Moving the discharge from its present site to the new discharge point will improve overall dispersion of the treated discharge. The discharge will be mixed with a greater volume of water and thus contaminants will be dispersed more rapidly.

The computed initial dilution for an average neap tide current is 60. Thus the average concentration of nutrient and faecal coliforms on the water surface adjacent to the discharge point will be reduced to the values shown in Table 7.4.

Parameter	Quantity
Total Phosphorous	0.08 mg/l
Total Nitrogen	0.58 mg/l
Faecal Coliforms	33 fc/100ml

Table 7.4 - Predicted Concentrations after Initial Dilution

The maximum allowable nutrient levels for a range of salinity values are presented in Table 7.5. The nutrient criterion is scaled from 2.6mgl/ at zero salinity (fresh water) to 0.25mg/l at 35 ppt salinity.

Salinity (ppt)	Total Nitrogen (mg/l)	Ortho Phosphate (mg/l)
0	2.600	.060
5	2.247	.060
10	1.894	.060
15	1.541	.060
20	1.208	.057
25	0.889	.051
30	0.569	.046
31	0.506	.044
32	0.442	.043
33	0.378	.042
34	0.314	.041
35	0.250	.040

Table 7.5 - Maximum allowable levels for saline waters

The salinity levels measured at the proposed outfall location during the surveys of August 10th and August 16th (Tables 5.4 and 6.4 respectively) ranged from 31.0 to 33.5ppt. However, it is felt that a level of approximately 35ppt could occur should certain circumstances prevail such as very low freshwater levels during the summer months. Maximum allowable nutrient levels for saline waters (35ppt) are presented in Table 7.6. It is clear that additional far-field dilution factors of little more than 2 are required to reduce levels to below allowable levels and dilutions of approx 50 will ensure that background levels will not be increased by more than 10% on typical levels. Based on previous experience it is thought that these overall dilutions should be achieved within 1000m of the discharge point.

Parameter	Max Allowable	Typical Background
Ortho Phosphate	0.04 mg/l	0.01 mg/l
Total Nitrogen	0.25 mg/l	0.1 mg/l

Table 7.6 - Maximum Allowable and Typical Saline Water Background Nutrient Levels
Note: Ortho phosphate usually accounts for 60% of total phosphorous

Note that typically the spring tide dilution will be a factor of 2 greater than that for a neap tide and the average tide (mean of spring and neap) dilution will be a factor of 1.5 greater than that for a neap tide. This applies only to the time

of maximum current as initial dilutions at low water on a spring tide will be lower than that at low water on a neap tide.

On the basis of the above calculations it is considered unlikely that the proposed discharges at the new outfall location off Bull's Point will adversely affect the nutrient levels in the bay.

7.5 Licensed Shellfish Sites

Figure 7.1 shows the areas licensed for shellfish farming. Most of these sites are of the order of 2.5km or more from the proposed outfall location. Given the dilutions available and the low bacterial concentrations of the source effluent it is not likely that there will be any adverse effects at the distant sites. However, if one refers to the dye release at 1320hrs on the neap tide survey of August 10th it can be seen that a drogue went close to the licensed site at Carrigacuskeam to the East of Grig's Point. Therefore it is likely that the effluent plume emanating from the proposed outfall would impinge on that site at some stage of the tide, especially if the wind was stronger and from a more southerly direction than it was on the day of the field work (3m/s Easterly).

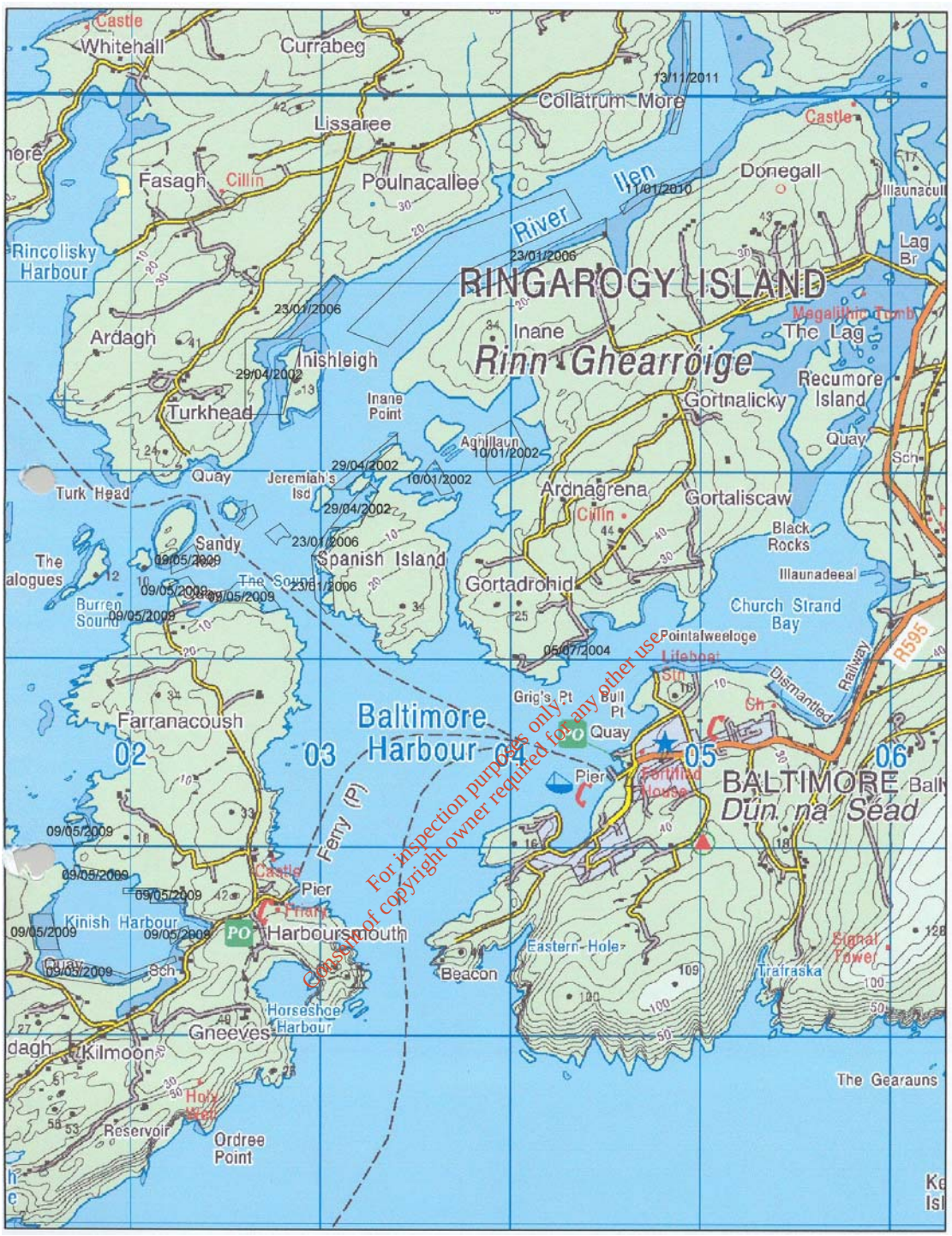


Figure 7.1 – Areas Licensed for Shellfish Farms

APPENDIX A

Photographs

Dye patch with drogue – RNLI boathouse in background

Dye patch with drogue