AP2/6/2015

BRADÁN FANAD TEO

t/a MHI

APPEAL

The Aquaculture Licence Appeals Board
Kilminchy Court
Dublin Road
Portlaoise
Co. Laois

AQUACULTURE LICENCES APPEALS BOARD
13 OCT 2015
RECEIVED

09.10.2015
RINMORE

Notice of Appeal in accordance with Section 40 & Section 41 of the Fisheries (Amendment) Act. Site reference number T5/555A for the cultivation of Atlantic Salmon, *Salmo salar* on a site on the foreshore at SHOT HEAD, CANTRY BAY, CO. CORK.

Dear Sir/Madam,

Marine Harvest Ireland welcomes the decision of the Minister for Agriculture, Food and the Marine to grant an Aquaculture and Foreshore licence at Shot Head, Bantry Bay, Co. Cork. However, having reviewed the draft licence we wish to appeal the prescriptive nature of a number the schedule conditions. Thus please find enclosed the following documents;

1. Completed Notice of Appeal Form
2. Cheque for the sum of €380.92
3. Copy of a Marine Geo-archaeological Assessment for the proposed fish farm site, Shot Head, Bantry Bay, Co. Cork.
4. Opinion of the consultant archaeologist on the additional requirements in the draft licence.
5. Minister Coveney Press release 244/11

With Regards

Catherine McManus
TECHNICAL MANAGER

Marine Harvest Ireland

Registered in Ireland as Comhlucht Iascaireachta Fanad Teoranta, VAT No: IE4530734O: Registration No. 88929 Directors: Jan Feenstra, David Brennan

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NOTICE OF APPEAL UNDER SECTION 40(1) OF FISHERIES (AMENDMENT) ACT 1997 (NO. 23)

Name and address of appellant:
Marine Harvest Ireland
Kindrum
Fanad
Letterkenny
Co. Donegal

Telephone: 074 9192101 Fax: N/A

Mobile Tel: [redacted] E-mail address: catherine.mcmanus@marineharvest.com

Subject matter of the appeal:

Aquaculture licence granted to Bradan Fanad Teo. t/a Marine Harvest Ireland, Kindrum, Fanad, Letterkenny, Co. Donegal; Ref T5/555A for the cultivation of Atlantic salmon; *Salmo salar* on a site on the foreshore at SHOT HEAD, BANTRY BAY, CO. CORK.

Site Reference Number:- T5/555A
(as allocated by the Department of Agriculture, Food and the Marine)

Appellant's particular interest in the outcome of the appeal:

Marine Harvest Ireland (MHI) has been granted this licence reference T5/555A for a salmon farm at Shot Head, Bantry Bay Co. Cork. While we very much welcome this licence decision, there are a number of conditions in the accompanying licence schedules which we wish to appeal.

Outline the grounds of appeal (and, if necessary, on additional page(s) give full grounds of the appeal and the reasons, considerations and arguments on which they are based):

Conditions within Schedule 4 of licence reference T5/555A.

a) Production volume:

MHI did not apply for a biennial production of 3,500 tonnes of farmed salmon. Rather the company submitted an application for a Maximum Allowable Biomass (MAB) of 2,800 tonnes of salmon. Indeed the entire Environmental Impact Statement (EIS) which was submitted with this application was prepared using the MAB figure and not final harvest production.

The EIS and related documents may be found on the following web link.
http://www.marineharvestireland.com/about/marine-harvest-ireland/our-locations/

The Minister for Agriculture, Food and the Marine, Simon Coveney TD issued a press release on December 5th 2011 to announce the new format for Aquaculture Licence templates. In this press release the Minister confirms that one of the core changes to Aquaculture licences is a "*Change from licensing by Annual Harvested Tonnage (i.e. the dead weight of fish harvested from a site in a calendar year measured in tonnes) to Standing Stock Biomass for Finfish (the weight of live fish on a site at any given time, measured in tonnes). Standing Stock Biomass is recognised internationally as the appropriate metric for assessing loading at an aquaculture production site and can be measured on a real time basis thus facilitating effective regulation and management of sites.*"

For your information I have appended the relevant press release to this appeal document.

Thus we request that the licence should state Maximum Allowable Biomass (MAB).

b) Harvest periods

Schedule 4 of the draft licence stipulates that harvesting should only take place between months 17 and 22 which is much too prescriptive. There is no precedent for this in any previously issued Aquaculture Licence to our knowledge.

Whilst the EIS utilises a "mean" growth model, based on company empirical data, where these harvesting (and fallowing) months are specified, the purpose in that case was to give a reasoned basis for the development of the main models on which the EIS is based, namely stocking schedules, waste production and dispersal models. However, depending on seawater temperatures over the production cycle, harvesting may be possible before this time, particularly where pens of fish are graded passively to remove the largest fish first and to allow even feeding for smaller fish. This is also an important consideration for the control of stocking densities within pens as we must maintain these within the upper limits of those specified by organic aquaculture regulations in the case of the proposed Shot Head unit, which will be operated as an organic farm. Equally, if at any time the farm is subject to jellyfish invasions or nuisance phytoplankton, the company must be free to harvest fish in order to avoid loss of fish.

Thus we request that the harvest period be removed from this licence.

c) Floating Facilities

The dimensions of floating facilities such as fish pens and the mooring grid should not be stated or specified in such detail.

Section 4 of the draft aquaculture licence regarding the containment of stock already states that the "*licensee shall comply with the most up to date guidelines on fish containment developed by the North Atlantic Salmon Farming Industry and the North Atlantic Salmon Conservation Organisation (NASCO) Liaison Group.*" Section 4.2 of

Annex 3 to the Williamsburg resolution (CNL (06) 48 of 2003 states that "*Salmon farming systems should be upgraded as improved, site-appropriate and cost effective systems of proven efficacy become available.*"
http://www.nasco.int/pdf/agreements/williamsburg.pdf

MHI should be free to purchase, install and upgrade to the best available pen and mooring technology which would secure the containment of fish and prevent loss of stock. Fish pen technology is constantly evolving and improving and as long at the site meets the requirements of the NASCO Liaison group and that the Department of Agriculture of Food and the Marine is notified of all such installations and upgrades with full confirmation by a chartered engineer, then we request that dimensional details of floating facilities is removed from the licence.

We also request that the design dimensions of the feeding barge are removed from the licence for the same reason. Feed barges are also continuously improving in design for the purpose of feeding and for the provision of staff facilities.

At time of application best salmon farming practice included mid-cycle grading and redistribution of fish by size amongst the pens, in which case a Maximum Allowable Biomass (MAB) of 2,800 tonnes could safely be held at <10 kg/m^3 in 14 x 20,000m^3 pens which was addressed in the accompanying EIS.

However, best practice has moved on since that time, to the phasing out of in-cycle grading and the maintenance of stock in the same individual pens from input to harvest. Under these circumstances and at a MAB of 2,800 tonnes, 16 x 20,000m^3 pens must now be provided, in order that biomass in the fastest-growing pens remains at <10 kg/m^3 prior to harvest.

In addition, Amoebic Gill Disease has emerged since the submission of the application, which requires treatments such as freshwater, where the availability of spare pens assists in the treatment and recovery process. Thus an ideal pen arrangement now would be 18 pens, in either a 2 x 9 or 3 x 6 formats which, in turn, changes the dimensions of the mooring grid and anchor layout but would be comfortably accommodated within the boundaries of the licenced site area outlined in the draft licence.

Thus MHI requests that the proposed layout and position of pens may be varied provided that the pen volumes do not exceed the space required to accommodate the MAB to a peak biomass of 10 kg/m^3 in any pen and provided that the pen, grid and mooring configuration is certified by way of written confirmation by a Chartered Engineer (see Clause 3.4 of the draft licence) which will be submitted to the Department of the Agriculture, Food and Marine.

Conditions within Schedule 5 of licence reference T5/555A.

Archaeological Monitoring:

Following publication of our Aquaculture licence application and accompanying EIS in January 2012 the Department of Arts, Heritage and the Gaeltacht requested MHI to commission an Archaeological Impact Assessment of the Shot Head site area. This Marine Geo-archaeological Assessment was duly commissioned and submitted in June 2012 to the Aquaculture and Foreshore Management Division of the Department of Agriculture, Food and Marine for circulation to the statutory consultee. I have attached a copy of the report to this appeal submission. I have also sought the opinion of the consultant archaeologist on these additional requirements in the draft licence and his comments are attached to this appeal.

Within this report there is a recommendation for the further protection of potential archaeology, taking into consideration the results of the assessment and the impact of the proposed development. In addition;

- The assessment did not reveal the presence of archaeological material at the site of the proposed development.
- The impact of the proposed development is the laying of anchors on and within the seabed.
- The laying of anchors on and within the seabed is a standard operational procedure conducted by most marine operators.

We are unaware of other marine operators being requested to conduct procedures for the protection of potential archaeology following the deployment of anchors, in Bantry Bay or elsewhere.

The laying of anchors on and within the seabed has taken place, is taking place and will continue to take place within Bantry Bay. This includes the unmonitored laying of anchors by oil tankers, bulk carriers and ocean going liners. The Bantry Bay terminal is licensed for takers of up to 330,000 DWT which are a nominal length of 300m. Tankers frequently anchor in the main channel of Bantry Bay prior to offloading. Very large vessel traffic numbers in Bantry Bay are in the range of 40-60 vessels per annum. This is discussed in the accompanying EIS.

It is our belief (Marine Harvest Ireland) that since no archaeology has been revealed at the site;

- Further works for the protection of possible archaeology as required in Schedule 5 of the draft Aquaculture licence are unnecessary and are possibly precedent setting.

- The impact of anchoring is a standard, unmonitored, everyday operational procedure within the greater marine industry.

Thus as is proposed in the Marine Geo-archaeological Assessment already commissioned by MHI, a sidescan sonar visualisation of the seabed should be carried out following the placement of the anchors. The results of this sidescan seabed visualisation can then be inspected for indications of archaeological material and to determine the impact of the anchoring process on the site.

Other:

Marine Harvest Ireland submitted its application in June 2011 for this aquaculture licence and accompanying foreshore licence under the applicant name of **Bradan Fanad Teo trading as Marine Harvest Ireland**. However in the intervening 4 years, the applicant company has been consolidated into **Comhlucht Iascaireachta Fanad Teoranta** (CIFT) thus we request that the licences are issued under the following name;

Comhlucht Iascaireachta Fanad Teoranta, trading as Marine Harvest Ireland, Kindrum, Fanad, Letterkenny, Co. Donegal.

Fee enclosed: **€380.92**
(payable to the Aquaculture Licences Appeals Board in accordance with the Aquaculture Licensing Appeals (Fees) Regulations, 1998 (S.I. No. 449 of 1998))(See Note 2)

Signed by appellant: Cathaoir Ó Maoil Date:

Note 1: This notice should be completed under each heading and duly signed by the appellant and be accompanied by such documents, particulars or information relating to the appeal as the appellant considers necessary or appropriate and specifies in the Notice.

Note 2: The fees payable are as follows:

Appeal by licence applicant	€380.92
Appeal by any other individual or organisation	€152.37
Request for an Oral Hearing (fee payable in addition to appeal fee)	€76.18

In the event that the Board decides not to hold an Oral Hearing the fee will not be refunded.

Oifig Faisnéise
Áras Talmhaíochta
Sráid Chill Dara
Baile Átha Cliath 2

Tel: (01) 607 2802
Fax: (01) 662 1165

Department of
Agriculture,
Food and the Marine
An Roinn
Talmhaíochta,
Bia agus Mara

Press/Information Office
Agriculture House
Kildare Street
Dublin 2

E-mail: info@agriculture.gov.ie
Website: www.agriculture.gov.ie

PRESS RELEASE

5 December, 2011

244/11

MINISTER COVENEY LAUNCHES

NEW AQUACULTURE LICENCE TEMPLATES

The Minister for Agriculture, Food and the Marine, Simon Coveney TD, today launched new aquaculture and companion foreshore licence templates. The new templates, which are species specific, have been introduced to address the technological, environmental and legal issues that have come to the fore since the first licences were issued under the Fisheries (Amendment) Act, 1997. A new template for the accompanying foreshore licence has also been devised.

The new templates will be introduced as individual licences come up for renewal and as new licences are issued.

Speaking at the launch, the Minister said *"the new templates contain significant new terms and conditions which are designed to reflect the technical advances that have taken place in the industry and the enhanced environmental protection now required under EU and national legislation. They will form the basis for sustainable development of the industry and the creation of long-term jobs into the future."*

Key new features of the licence templates include:

- a move to Standing Stock Biomass for finfish as the means of measuring production capacity at an aquaculture site;
- enhanced provisions on environmental monitoring;
- greater clarity on the requirements for operators in relation to operational conduct and monitoring;
- the possibility for the group-marking of sites for navigational purposes;
- specific provisions covering company registration/dissolution, tax certificates, payment of fees etc.

Information Seminars for industry are currently being rolled out by the Department.

ENDS

"Minister launches new Aquaculture Licence Templates"

Background Note

1.0 New Aquaculture licence templates have been devised to take account of the technological, environmental and legal issues that have arisen since the first licences were issued under the Fisheries (Amendment) Act 1997 – the core legislation governing aquaculture licensing. The templates were developed by a Working Group established to address these issues. The Working Group consisted of the Department's Aquaculture and Foreshore Management Division, Engineering Division, Legal Services Division, the Marine Institute and BIM.

New Template Types

2.0 Seven aquaculture templates have been developed:

- Marine based shellfish e.g. mussels, typically using longlines
- Marine based shellfish sea-bed bottom culture e.g. mussels, oysters, scallops – no structures are used
- Marine based shellfish inter/sub tidal e.g. oysters, typically using bags and trestles
- Marine based aquatic plants/fish food e.g. seaweed using longlines
- Marine finfish e.g. salmon, rainbow trout, cod – using cages
- Land based finfish (freshwater), mainly hatcheries for salmon farms
- Marine multi species – to provide for cases where multi method or multi species are used e.g. a combination of longlines and trestles, mussels and oysters etc

Core Changes

3.0

- Change from licensing by Annual Harvested Tonnage (i.e. the dead weight of fish harvested from a site in a calendar year measured in tonnes) to Standing Stock Biomass for Finfish (the weight of live fish on a site at any given time, measured in tonnes) Standing Stock Biomass is recognised internationally as the appropriate metric for assessing loading at an aquaculture production site and can be measured on a real time basis thus facilitating effective regulation and management of sites

- New provision on environmental monitoring taking account that most aquaculture sites are located in Natura 2000 areas – protected by European Birds and Habitats Directives

- Enhanced requirement in relation to operational conduct and monitoring

- Potential for sites to be marked on a group basis
- Licences not assignable for 3 years following grant – except in exceptional circumstance
- A company incorporated outside the State will be required to register with the CRO within one month of being granted a licence
- Requirement to produce a current Tax Clearance Certificate on demand
- A provision that when a company dissolves, its associated Aquaculture Licence cease to exist
- Licences will be species specific

ENDS

Donal Boland

Maritime Archaeologist

Chorus Cottage, Moyure, Eyrcourt, Co. Galway

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Catherine McManus
Marine Harvest Ireland Ltd
Letterkenny
Co Donegal

08/10/2015

Proposed development at Shot Head, Bantry Bay, Archaeology

Find listed below my thoughts on the requirement for further works at the above site.

The area of seabed assessed for potential archaeology is very large compared to the area of seabed that will be impacted by the laying of anchors associated with the proposed development.

No seabed features which could be interpreted as archaeological were revealed by the assessment.

My recommendation to conduct a second sidescan visualisation of the site following the anchor laying process is based on the fact that both data sets can be interpreted separately and compared for features which could be interpreted as archaeological.

Based on the results of the post impact sidescan visualisation of the seabed and comparison of the pre and post impact data sets an informed decision can be made as to whether the overall assessment has revealed seabed features which could be interpreted as archaeological and if further works are required.

Kind Regards

Donal Boland

The licensee shall:

Engage the services of a suitably qualified Archaeologist, with underwater /maritime experience

I agree with the above statement, if works are required then those works should be carried out by a qualified person.

to monitor all seabed disturbance works, including anchor installation, associated with the development.

The only direct impact the proposed development will have on the seabed is the placement of anchors on and within the seabed. As of this time I can think of no method to directly monitor the placement of the anchors. I have proposed a method utilising sidescan sonar to visualise the seabed following the placement of the anchors. The results of the sidescan seabed visualisation can be inspected for or indications of archaeological material. The results of the sidescan seabed visualisation conducted post the placement of the anchors can be compared to the results of the

sidescan seabed visualisation completed prior to the placement of the anchors at the time of the site assessment to determine the impact of the anchoring process on the site.

The Archaeological monitoring shall be licensed under the National Monuments Acts 1930-2004 and a detailed method statement shall accompany the licence application.

I agree with the above statement

The methodology shall include a definite finds retrieval strategy that looks to assess the activity for artefactual bearing potential.

I agree with the above statement and it should form part of a detailed method statement designed to protect archaeological features or material if archaeological features or material are revealed by the post placement sidescan seabed visualisation.

Should archaeological remains be found during the course of the monitoring the monitoring archaeologist shall have the power to have the works stopped in that area pending a decision on how best to deal with the archaeology. In this event the National Monuments Service, of the Department of Arts, Heritage and the Gaeltacht, shall be contacted immediately.

I agree with the above statement for normal marine monitoring operations but as I have to date failed to formulate a methodology for the direct monitoring of anchor placement I would find it hard to implement the above procedure.

The Licensee shall ensure that secure temporary storage facilities are in place so as to immediately house any finds made during the monitoring

I agree with the above statement and it should form part of a detailed method statement designed to protect archaeological features or material if archaeological features or material are revealed by the post placement sidescan seabed visualisation.

The Licensee shall be advised by the Underwater Archaeology Unit of the Department of Arts, Heritage and the Gaeltacht with regard to any necessary mitigation actions e.g. preservation in situ, dive survey or excavation. The Licensee shall facilitate the Archaeologist, in recording any material found.

I agree with the above statement and it should form part of a detailed method statement designed to protect archaeological features or material if archaeological features or material are revealed by the post placement sidescan seabed visualisation.

The National Monuments Service, of the Department of Arts, Heritage and the Gaeltacht shall be furnished with a report describing the results of the monitoring once completed.
I agree with the above statement.

Marine Geo-archaeological Assessment
Proposed Fish-farm Site
Shot Head, Bantry Bay, Co. Cork

Donal Boland, Maritime Archaeologist
Chorus Cottage,
Moyure, Meelick,
Eircourt,
Co. Galway

DJBMA Report 01-06-12
Licence No. 12R72

Client:	Marine Harvest Ireland Ltd.
Date:	June 2012
Licence No:	12R72
Report No:	D.J.B.M.A. 01-06-12

Author: Donal Boland, Maritime Archaeologist

Address: Chorus Cottage
Moyure, Meelick
Eircourt
Co. Galway

Phone: 087 2653468

Email: donaboland@eircom.net

Contents

1 EXECUTIVE SUMMARY

This report details and interprets the shoreline and marine geophysical survey data recorded at the site of, and adjacent to, a proposed fish-farm development at Shot Head, Bantry Bay, Co. Cork.

The pre-development geophysical surveys were conducted under guidelines and acquisition parameters as recommended by the Underwater Unit of The Department of Arts, Heritage and the Gaeltacht. Geophysical surveys, including bathymetric, side-scan sonar and magnetic surveys, were conducted from the client's survey vessel at an average lane spacing of 100m.

The shoreline inspection revealed that the intertidal zone adjacent to the site of the proposed development is comprised of a near-vertical to vertical rock cliff, that the upstanding remains of a deserted village survives at Mehal Head and that a path which once extended from the village to the shoreline survives, heavily eroded at its shoreline end.

The results of the magnetic survey ranged from -6nT in the north, to 30nT in the southeast of the survey area with a total range differential of 36nT. The results revealed the site to be magnetically quiet with the survey results indicating changes in the seabed substrate. No readings which could be interpreted as indicating the presence of archaeological materials were identified from the data acquired over the proposed Shot Head development site.

Line by line of analysis of the sidescan data recorded at the proposed Shot Head development site revealed no features which would indicate the presence of upstanding or submerged archaeological remains.

It is concluded that:

- The seabed at the location of the proposed development will be impacted by the laying and bedding of twenty six substantial anchors.

- The walkover and photographic inspection of the shoreline adjacent to the seabed survey site revealed the upstanding remains of a deserted village and the eroded remains of a shore access path leading from the village towards the shoreline.

- The substrate material as visualised by the 500kHz side-scan sonar survey would indicate that the seabed at the site of the proposed development is impacted by hydraulic forces generated by storm forces.

- The rock substrate is interpreted as having a low potential for the retention of archaeological material. The coarse substrate is interpreted as having a low to medium potential for the retention of archaeological material. The finer substrate is interpreted as having a high potential for the retention of archaeological material

- No anomalies were identified from the 500kHz side-scan sonar survey conducted over the proposed development site.

- No anomalies were identified from the magnetic survey conducted over the proposed development site.

It is recommended that:

1. The proposed fish farm development at the Shot Head site should proceed.

2. A further sidescan survey should be conducted over the Shot Head site following the installation of the anchors to determine if their installation has revealed the existence of submerged archaeological material.

2 INTRODUCTION.

2.1.1 The Site.

The site of the proposed development is located in deep water over a sloping seabed on the northern shore of Bantry Bay off the townland of Roosk, to the east of Shot Head and to the west of Mehal Head.

Permission is being sought for a fish-farm development at the site, which will provide local employment and help sustain existing fish-farm operations in Bantry Bay. Positional details and the location of the development are provided in Table 1 and Figures 1- 2

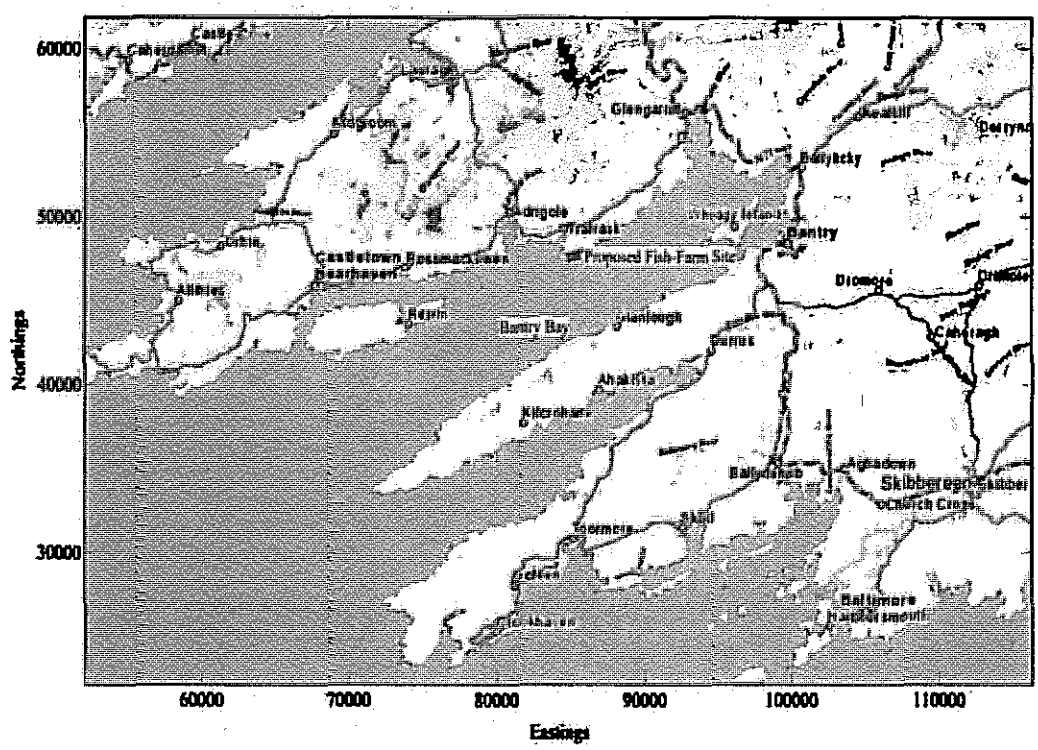


Figure 1: Location map displaying the proposed Shot Head development site within its regional context. (The proposed site is displayed as a red rectangle)

Location	Easting	Northing
Northwest Corner	84737	47796
Northeast Corner	85567	47980
Southwest Corner	84845	47308
Southeast Corner	85675	47481
Centre	85206	47644

Table 1: The extremity positions of the proposed Shot Head fish-farm site.
(Positions provided in Eastings & Northings, Irish National Grid)

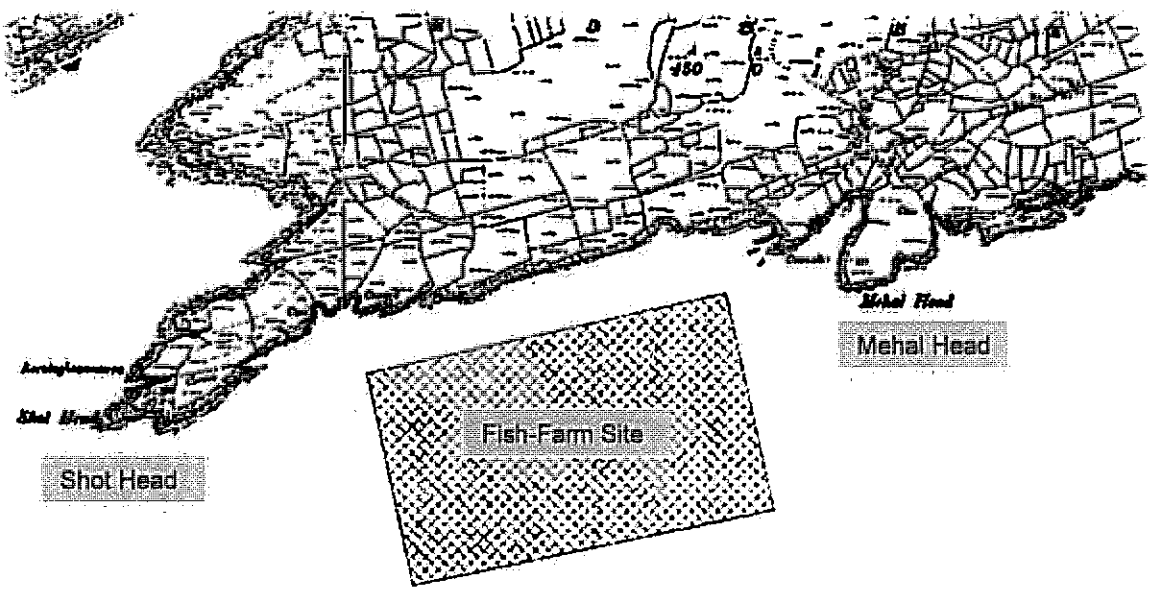


Figure 2: The location of the proposed Shot Head fish-farm site overlaid on OS 6" Map

2.1.2 The Proposed Development.

The only visible static structures on the site will be the pen rings (with top nets, required to prevent bird predation and damage to fish), grid buoys, anchor buoys, navigation lights and the feed barge. The pen rings will have a circumference / diameter of 128m / 41m, giving an individual pen surface area of 1,300m^2. The number of pens deployed for the bulk of the 24-month production cycle will be twelve, with a combined surface area of 15,650m^2, or just over 1.5 hectares, within the site area of 42.5 hectares.

The floating pen rings will be held in position, in a 6 x 2 pen formation, by a submerged (that is not visible at the surface) mooring grid. Each pen will be moored within a 70m x 70m grid

square. The total area of the submerged grid, comprising 6 x 2 grid squares, will measure 420m x 140m, or 58,800m^2, or approximately 6 hectares. Thus the pen rings will occupy less than 4% of the proposed seabed area for licence application, whilst the mooring grid will occupy some 14% of the proposed seabed area for licence application.

The mooring grid will be attached to the seabed by some 26 mooring anchors, each taking up a seabed area of approximately 2m x 2m (4'6" x 4'6"). These will lie around the perimeter of a seabed rectangle much larger than the visible pen area above it. The delineation of a mooring rectangle on the seabed infers no claim whatever on ownership or rights of entry to the area. In fact, such is the small size of mooring anchors on salmon farm sites that it is normal practice for inshore fishing activities to continue within the seabed mooring area.

The pen nets for the Shot Head site will be 15m deep, giving an individual pen volume of some 20,000m^3 and a total pen volume for 12 pens of 240,000m^3.

A feed barge will be deployed on the shoreward, most sheltered side of the site. The feed barge will be used to feed the stock automatically throughout daylight hours and, thereby, to optimise feed conversion and to minimise waste. The amount of feed fed to each pen is measured using an onboard, computerised farm management and feed dosing system. The feed is delivered to each pen individually via a pipe distribution system using compressed air. The barge type is expected to be an AKVA RH2000 type, with a length of 21.5m and a beam of 7.5. The total feed capacity of the barge will comprise four hoppers holding 200 tonnes of feed.

2.2 The Scope of this Report.

This report details and interprets desktop, shoreline and geophysical survey data recorded at the site of a proposed fish-farm development at Shot head, Bantry Bay, Co. Cork

The sub-tidal geophysical surveys were conducted under guidelines and acquisition parameters as recommended by the Underwater Unit of The Department of Arts, Heritage and the Gaeltacht.

Licence Number: 12R72

2.3. Data Acquisition Method.

2.3.1. Data Acquisition.

Geophysical surveys were conducted from the client's multicat vessel, the *MV, Orchid* on its Maiden Voyage (Figure 3), at an average lane spacing of 100m. Details of the survey suite and operational parameters are provided in sections 2.3.2 to 2.3.5 with the details of data processing and analysis provided in sections 2.4.2 to 2.4.4.

Figure 3: The multicat vessel *MV Orchid*, from which geophysical surveys at the Shot Head site were conducted.

2.3.2. Global Positioning System.

Positional data with a quoted accuracy of 1-3m were provided by a *CSI Wireless DGPS MAX* series differential global positioning system (Figure 4) with differential corrections supplied by the General Lighthouse Authority (GLA) reference station at Portlinus.

During survey the dGPS antenna was placed at a height over 2m above deck level to maximise its exposure to available satellites. Acquired data are representative of the position of the antenna, therefore the layback (the distance between the antenna and the deployed instrument) was recorded. Positional data were downloaded at a rate of 10 readings sec^{-1} via

a standard RS-232 serial port interface into *Coastal Oceanographics Hypack Max* Version 4.3a Gold software on a laptop platform. The NMEA (National Marine Electronics Association) data strings GPGGA (Global Positioning System Fixed Data) and GPVTG (course over ground and ground speed) were recorded in real time as data files, while simultaneously being integrated into the marine geophysical record. Positional data were recorded in degrees and decimal-minutes using the WGS-84 ellipsoid. Parameters utilised for the conversion of WGS84 data to Irish National Grid are detailed in Table 2.

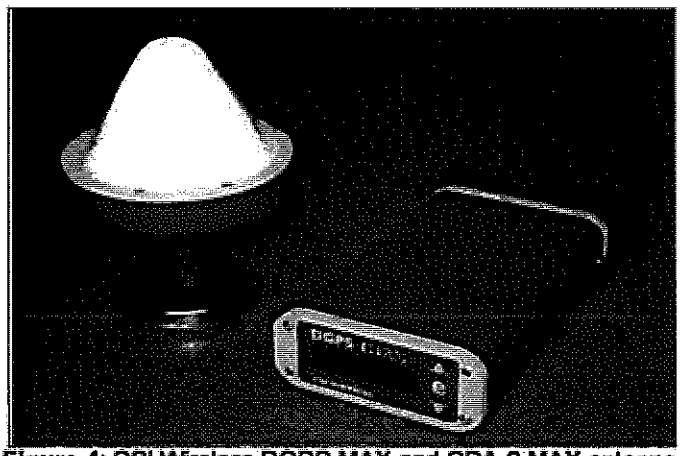


Figure 4: CSI Wireless DGPS MAX and CDA-2 MAX antenna.

Parameter	Conversion factor
Semi-major Axis	6377340.189
1 / Flattening	299.324964
Latitude of Origin in Degrees	53.500000
Longitude of Origin in Degrees	-8.000000
False Easting	200000.000
False Northing	250000.000
Scale Factor	1.000035
Datum Shift DX	-482.530
Datum Shift DY	130.596
Datum Shift DZ	-564.557
Datum Shift RX	-1.042000
Datum Shift RY	-0.214000
Datum Shift RZ	-0.631000
Datum Shift Scale	8.150000

Table 2: Parameters utilised for conversion of WGS84 data to Irish Grid.

2.3.3. Bathymetric Survey.

The bathymetric survey was conducted using a dual single-beam pole-mounted echo-sounder operating at 33 & 200 kHz. This active sonar instrument consists of four basic components: a control-display system, transmitter, transducer, and receiver. When directed by the control and display component, the transmitter produces an oscillating electric signal with unique frequency characteristics (*SeaBeam*, 2000), typically within the 100-300 kHz range (Quinn, 2000). The transducer (a ceramic piezo-electric plate) converts the electrical energy generated into mechanical vibrations that are transmitted into the water column as an oscillating pressure (sound) wave. This acoustic pulse has a cone angle of 1-40°, orientated vertically downwards, so concentrating the energy of the transmitted pulse into a circular area on the sub-stratum (Fresnel Zone). Water depth determines the radius of this circular area (i.e. the deeper the water, the larger the radius of the circular area), insonified by the echo-sounder (Quinn, 2000).

The returning echo from the seabed is received and converted back into an electrical signal by the transducer, which acts as a hydrophone. This signal is transferred to the echo-sounder's receiver system, amplified and passed through a detection scheme, which determines the echo's time of arrival. The receiver component computed the time between transmission and reception of the acoustic pulse (two-way-time; twt) and determines water depth (d) from half the product of two-way-time (t) and the mean sounding velocity (V_p):

$$d = t V_p / 2$$

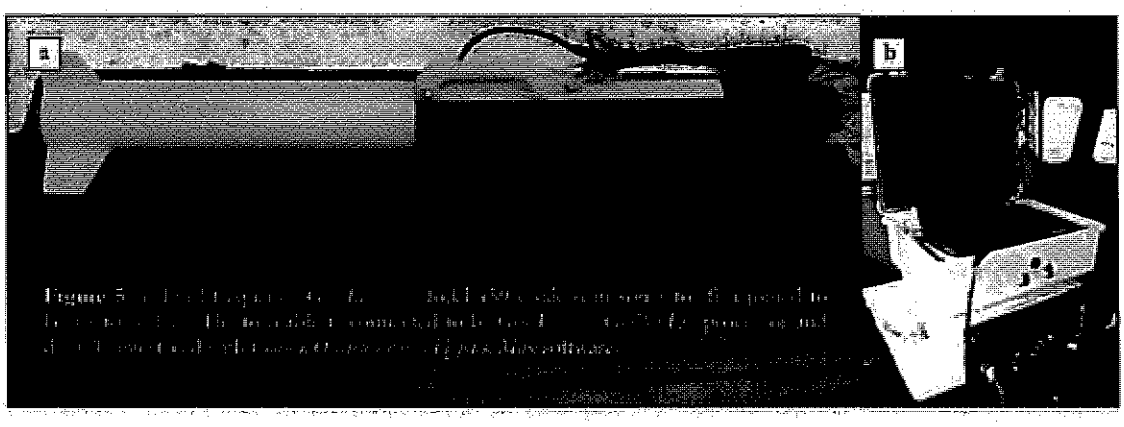
Depth is automatically logged by the control and display system, which then triggers the next sound pulse.

During the survey, positional and bathymetric data are downloaded at a rate of 6 soundings sec^{-1} via an RS-232 serial port interface to a laptop. Layback corrections were not required as the DGPS antenna was mounted directly above the bathymetric transducer, at opposite ends of a rigid brace.

2.3.4. Side-Scan Sonar Survey.

Side-scan sonar is an active acoustic technique, which uses the backscattering effect of narrow beams of high-frequency sound to produce a map of the acoustic properties of the sea-floor (Fleming, 1976). The system is composed of a towfish, cable for data transmission and topside electronics (processor, display unit and recorder). The beams are transmitted from multiple interconnected transceivers on either side of the towfish and across the seafloor below. The transceiver arrays are arranged linearly to produce narrow horizontal beam angles (typically 1-2°) and wide vertical beam angles (typically 40-50°). The narrow horizontal beam width concentrates the energy in a swath perpendicular to the axis of travel (*EdgeTech*, 1994). The towfish generates one pulse of energy at a time (typical duration of $<1ms^{-1}$) and waits for the sound to be reflected back and received by linear array (twt). As the towfish moves forward, successive sonic transmissions generate parallel data lines on the digital display unit (laptop), which build up to form the acoustic image of the seafloor (sonagraph) (*EdgeTech*, 1994).

The side-scan sonar survey at the Shot Head site was conducted using a dual-frequency *GeoAcoustics* Model 159A side-scan sonar towfish, 50m Kevlar® tow-cable and Model SS941 transceiver system (Figure 5) at an operational frequency of 500kHz. Data were acquired without slant-range correction, with swath width set at 156m (78m range per channel). Track line spacing was fixed at 100m, ensuring that in excess of 150% sea bed coverage was achieved throughout the survey. Sonar data was acquired in SEG-Y format, collected and processed in a *GeoAcoustics GeoPro LC* on an Apple Macintosh laptop platform and logged to disk.



2.3.5. Magnetometer Survey.

The magnetometer survey was conducted using an *Aquascan AX2000* proton magnetometer linked to a *CSI Wireless DGPS MAX.*

Prior to data acquisition, the magnetometer is fine-tuned to the field-strength in the general area of operation. This enables maximum strength of reception to be received and also acts as a test for a low signal or high noise conditions. The latter is particularly relevant in developed inshore areas where non-archaeological magnetic anomalies, including anchors, chains, overhead and submerged cables, and other vessels, are abundant. These will often have large magnetic signatures, which mask archaeological anomalies. Comparison of magnetic data with side-scan sonar data supports interpretation in this case. As the signal generated by precession is small, the magnetometer cannot be used effectively near AC power sources, nor is the instrument effective in areas of igneous geology, where the base-line field-strength is too high for magnetic anomalies to be identified from the record.

During survey the magnetometer probe was towed behind the survey vessel at a distance of 3-4 times the length of the vessel to avoid detection of its field-distribution pattern. The layback between the dGPS antenna and the magnetometer probe was recorded.

Data were acquired in XYZ Raw ascii files a 2-second sampling interval and displayed in real-time on an interfaced laptop platform. Track line spacing followed the same 100m pattern as the side-scan sonar survey, thus ensuring adequate coverage for archaeological survey as recommended by the Maritime Unit, The Department of the Environment, Heritage and Local Government.

2.4. Data Processing and Interpretation.

2.4.1. GPS.

The track line resulting from the bathymetric, side-scan sonar and magnetometer surveys at the proposed Shot Head development site is displayed in Figure 6. It is comprised of seven survey lines in an approximate Northeast Southwest direction over the proposed development site.

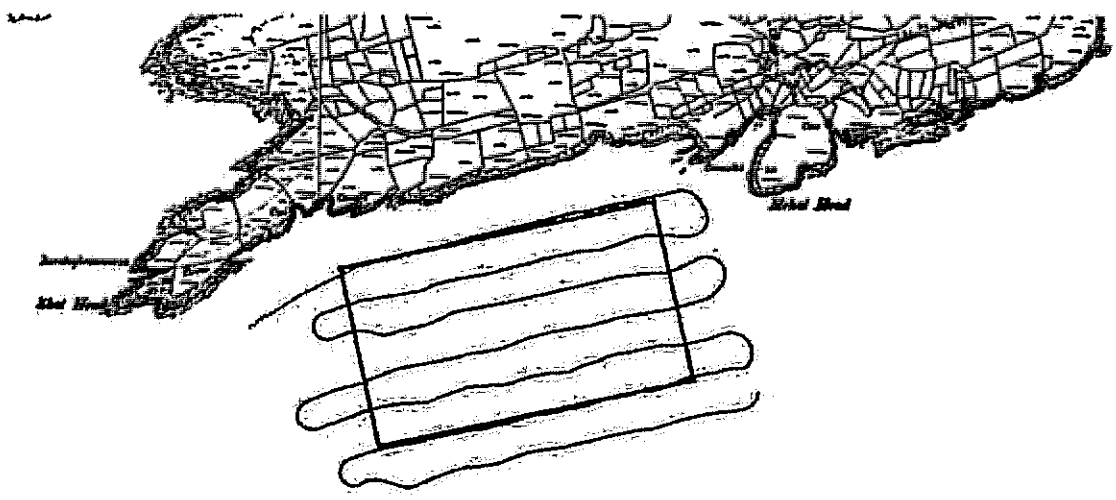


Figure 6: The track lines resulting from the site survey and an outline of the survey site overlaid on OS 6" Map.

2.4.2. Bathymetric Survey.

Bathymetric XYZ files were processed using *Surfer 8*. Raw ascii files were gridded in 2m bins using the Nearest Neighbour interpolation method. Two- and three-dimensional contour plots were produced for interpretation and data integration.

2.4.3. Side-Scan Sonar Survey.

500kHz data in SEG-Y format were examined for each survey line. Sonar data were processed in *GeoPro LC* on an Apple Macintosh platform. Images were extracted as GeoTIFF files for inclusion in this report.

2.4.4. Magnetometer Survey.

Magnetometer data were processed using *Surfer 8*, gridded in 10m bins using the Nearest Neighbour interpolation method. Two- and three-dimensional contour plots were filtered and examined for anomalies.

3. RESULTS OF SURVEY.

3.1. Desktop Survey.

3.1.1. Historical and Archaeological Background.

Bantry Bay was known to the ancients by the name of Inber Sceine. It is a noble sheet of water, landlocked by beautiful mountains. The scenery is picturesque, bold, and grand. There are four safe harbours in the Bay. The largest and best known is Berehaven Harbour, which lies between Bear Island and the mainland. The harbour is seven miles long, and from one to four miles wide. It is of considerable depth, having 1,200 hectares (2,900 acres) covered with from 10 to 27m (6 to 15 fathoms) at low water spring tides and 850 hectares (1,900 acres) covered with over 9m (five fathoms) at low water. It has two entrances, one at the east, the principal one, which is well lighted by two lighthouses, and one at the west, which is of considerable width and great depth, so that vessels may go in and out in any weather. It was considered the best harbour in the then United Kingdom for naval purposes and accommodated the whole British Navy. Forts were constructed at both ends of Bear Island, and were mounted by the best and most up-to-date cannon, which commanded both entrances of the harbour. The bay is remarkable for the descent of two French fleets. A naval battle was fought here between the English and French in 1689, the French having come to the aid of King James II. The French fleet comprised forty-four sail. Admiral Herbert received intelligence that they were coasting near Baltimore. He set out in pursuit of them, and found that they had anchored in Bantry Bay. The Admiral lay off the Bay all night, and entered the bay the next morning. The French weighed anchor, and were soon under sail, and bore down upon the English. When they came within musket shot the battle began by the firing of small and large guns. The English wanted to engage them closer, but the wind was against them, and they were under a disadvantage. Admiral Herbert then put off to sea with the view of putting his ships into line, and of gaining the wind, but the enemy was very cautious, and kept bearing down on him, so the manoeuvre was foiled. He continued the fight until five o'clock p.m., when the French Admiral, Perrault, stood into the bay. Some of the British ships being disabled in their rigging, Admiral Herbert did not follow him, but set out with his fleet for Plymouth, where he arrived on the 7th of May. In the action, one captain, one lieutenant, and 94 seamen were killed, and 250 wounded.

Bear Island forms part of the parish of Kilaconenagh, in the barony of Bere. It is situated on the north side of the bay of Bantry, 21 miles south west of Bantry. It comprises 2,849 acres (1,153 hecatres), of which about one quarter is under tillage, and the remainder consists of mountain, bog, and pasture land. A pier was constructed at Lawrence Cove, which is very useful to the fishery, affording protection to fishing vessels.. The southern shore is bold and rocky, but on the north the land slopes gently to the water's edge. There is a small lake on

the south side of the island. The whole island is of the clay-slate formation and excellent stone for flagging is quarried, with copper found, in several places. After the arrival of the French fleet in the bay in 1796, Government erected five Martello towers, a signal tower, a large and commodious barrack for two officers and 150 men, a quay, storehouses, and other public works.

La Surevillante, a French 12-pounder frigate, was lost in Bantry Bay in January 1797. It had been part of a failed invasion attempt of Ireland led by General Lazare La Hoche, supported by the United Irishmen and Wolfe Tone. The site, one mile north-east of Whiddy Island, was rediscovered in 1980 during seabed clearance operations following the oil terminal disaster in 1979. The wreck was the focus of an integrated marine archaeological project during the summer of 1999 funded by the Royal Irish Academy, Dúchas and the University of Ulster. The project revealed that the site is one of the best-preserved historic wreck sites in Irish waters. La Surveillante lies in 32m of water at the upper end of the bay. A considerable portion of the hull survives, standing up to 4m off the seabed at the bow. Excavation and sub-bottom profiling have shown that the wreck lies on a gravel layer 1-2m beneath the bed sediments and is in a relatively stable condition. The structure and a range of associated artefactual material survive, encased in copper sheathing. Thirteen cannon, a large central anchor, the remnants of a galley structure and an assortment of small arms, saddlery and rigging elements lie about the wreck.

3.1.2. The Sites and Monuments Record.

The Record of Monuments & Places (RMP) is a list of archaeological sites known to the National Monuments Service with accompanying RMP Maps, based on OS 6" Sheets, which indicate the location of each recorded site. The RMP list is based on The Sites and Monuments Record files housed in the National Monuments Services offices. The Sites and Monuments Records (SMR) are lists with accompanying maps and files of all certain or possible archaeological sites and monuments mainly dating to before 1700AD for all counties. These lists were in many cases based initially on cartographic, documentary and aerial photographic sources. The SMR (as revised in the light of available fieldwork) forms the basis of the statutory RMP. The record is updated on a constant basis and focuses on monuments that predate 1700AD. Buildings belonging to the seventeenth century and later are not well represented in their archive, although they are considered as archaeological sites today. As a result, field inspection often reveals additional sites from this recent past. The Sites and Monuments Record lists two sites in the Townland of Roosk, which is landward and immediately north of the proposed development. The sites are detailed in Table 3.

Number	Type	Townland	Eastings	Northings
CO117-010	Children's burial ground	Roosk	484838	84863
CO117-012	Bullaun stone	Roosk	485923	85948

Table 3: The Sites and Monuments Record for the Townland of Roosk.

Cillinf or Children's burial ground. The phrase "Children's burial ground" refers to an unconsecrated place used primarily, though not exclusively, for the burial of unbaptised children. The word cill is derived from the Latin cella, and means Church or Graveyard. The custom of setting apart a special place for the burial of very young or unbaptised children appears to have been common practice in Ireland until the 19th century. Numerous such burial grounds, known as Children's Burial Grounds, Cillini, Calluraghs, Caldraghs or Cealhúinacha, are recorded on the Ordnance Survey maps, particularly in the west of Ireland.

Frequently, the locations chosen were abandoned Early Christian church sites or ringforts, but children were also buried in such places as haggards, fields, boundary fences, cross-roads, under lone bushes, in cliff-clefts, on the sea-shore or outside a graveyard wall. Children's burial grounds are frequently located within a pre-existing early ecclesiastical site or ringfort. Those sites which are not associated with an older monument are usually marked now by little more than an area of uncultivated stony ground, often raised above the general surroundings.

Within the burial grounds, the individual graves may be marked by a low mound or by a low, uninscribed standing stone and sometimes the graves themselves are visible above ground as small box-like arrangements of stones. The presence of quartz pebbles is also a common feature. It was said that little coffins were brought in the night and the only sign that a burial had taken place was a newly made grave. This practice stopped around 1900. Folklore relates that adults, particularly strangers or suicides, were sometimes interred in these burial grounds. Cillinf were the designated resting places for individuals considered unsuitable for burial within consecrated ground by the Roman Catholic Church and were traditionally associated with the burial of unbaptised infants.

Bullaun stones consist of large rectangular blocks of weathered limestone with a deep bowl-shaped depression, hollowed out of their upper side. "*Bullaun*" refers to the hollow in the rock itself, which can have many bullauns in it, although many have only one. The stone may have been used in pagan worship with perhaps offerings of milk, grain or even blood deposited in the bowl. It has been suggested that the bullaun stone was also known as a "wart stone" and healing powers were attributed to the rain that collects in the bowl-shaped hollow or they may also have been used in fertility rites.

A bullaun stone is a stone in which a cup shaped hollow has been made either naturally or by hand. The stones are associated with religious ritual and magic and the water collected within was thought to have the ability to cure ailments. To gain a cure, it was said a person had to visit the stone three times in the same week and go around the stone seven times on bare knees. As with sacred wells believers may have left offerings to the gods/goddess either in the water contained within the hollow or underneath the stone itself.

It is generally thought that bullaun stones date from the Bronze Age (2000BC to 500 BC, in Ireland). These stones have an undisputable association with water, and with worship of the Celtic fire goddess Brigid, and her successor, St. Bridget. Many are found in association with early churches and holy wells. Their presence at so many early Christian sites places them as being of massive importance to the pre-Christian inhabitants of Ireland -- something that the Church was eager to assimilate. Ritual use of some bullaun stones (reputedly for both blessing and cursing) continued well into the Christian period. The Christian church incorporated bullaun stones into their rituals and it is easy to imagine the origin of the baptismal font or the Roman Catholic holy water font which greets people as they walk through the church door.

3.1.3. Topographical records of The National Museum of Ireland.

The National Museum of Ireland Topographical Files is the national archive of all known antiquities recorded by the National Museum. These files relate primarily to artefacts but also include references to monuments. They also contain a unique archive of records of previous archaeological excavations. The Museum's files present an accurate catalogue of objects reported to that institution from 1928. There is a computerised database of finds from the 1980's onwards. The find-spots of artefacts can also be an important indication of the archaeological potential of the related or surrounding area.

Inspection of the relevant National Museum of Ireland files for the Townland of Roosk revealed no record of artefacts or find spots having been recorded.

3.1.4 Record of archaeological excavations

The excavations database contains summary accounts of all the excavations carried out in Ireland,, both North and South, from 1970 to 2007. It has been compiled from the published Excavations Bulletins from those years, with a similar format. The Excavations Bulletin was started by Tom Delaney in the early 1970s and was revived by Claire Cotter in 1985. Since 1986 it has been compiled by Isabel Bennett and published by Wordwell, with support from the Office of Public Works, the Department of the Environment, Heritage and Local Government.

Analysis of the excavations database revealed no results for an archaeological excavation in the Townland of Roosk

3.1.5 The Shipwreck Inventory

The shipwreck inventory is based on a desktop survey with information gathered from a broad range of cartographic, archaeological and historical sources, both documentary and pictorial. The inventory records all known wrecks for the years up to and including 1945 and to date approximately 12,000 records have been compiled and integrated into a database.

Inspection of the inventory of wrecks revealed a listing of sum thirty nine vessels which were lost within or around Bantry Bay, with a further ninety three positions at which wreckage may be located. Analysis of the above data revealed that none of the recorded wreck locations or positions at which wreckage may be located fell within or close to the location of the proposed development. A listing of wrecks recoded in the shipwreck inventory for Bantry Bay are detailed in Table 4.

Number	Name	Lost	Location	Type
W03535	Fille Unique	1792	Bantry Bay	Transport Vessel
W07950	Arravale	1930	Roancarraig	Trawler
W07969	Barbara	1812	Bantry Bay	
W08001	Bonadventure	1665	Bantry Bay	
W08210	Elizabeth &Sally	1820	Bantry Bay	
W08237	Evlyn	1907	Whitehorse Point	Trawler
W08287	Frederick Busmaning	1862	Bantry Bay	Barque
W08415	Infanta	1863	Bantry Bay	Galleon
W08423	Irish Girl	1913	Bere Island	Scooner
W08440	Java	C1900	Berehaven	Brigantine
W08576	Manhattan	1800's	Pulleen	
W08665	Nabby	1805	Bantry Bay	
W08708	Ocean Queen	1886	Bantry Bay	Scooner
W08757	Plover	1884	Bantry Bay	Cutter
W05481	Protector	1884	Bantry Bay	Sloop
W08802	Rio Formosa	1878	Bantry Bay	Steam Ship
W08834	Sally & Jenny	1760	Bantry Bay	
W08852	Scevola	1796	Bantry Bay	
W08871	Sir George Provost	1810	Bantry Bay	
W08874	Sister	1786	Bantry Bay	Merchant Ship
W08875	Sisters of Liverpool	1796	Bantry Bay	
W08876	Skipjack	1906	Bantry Bay	Gunboat
W08507	La Servellante	1797	Bantry Bay	Frigate
W08984	Trasher	1906	Bantry Bay	Destroyer
W08967	Thunderer	1805	Bantry Bay	
W09250	Waterwitch	1898	Bantry	Trawler
W09164			Bantry Bay	Privateer
W09163			Bantry Bay	Privateer
W09175		1826	Bantry	
W09041		1897	Bantry Bay	Boat
W09045			Bantry Bay	Trawler
W09098			Bantry Bay	Bantry Ship
W08157	Dolphin	1750	Roancarraig Rocks	
W05402	Dynevor Castle	1930	Sheeps Head	Trawler
W05409	Emmerline	1840	Bantry	
W05537	Wizard	1859	Brancarrig Rocks	
W05391	Charilaos Tricoupis	1917	Bantry Bay	
W05567	Begona	1917	Bantry Bay	

Table 4: The shipwreck inventory listing of vessels lost within or around Bantry Bay.

3.2. Site Survey.

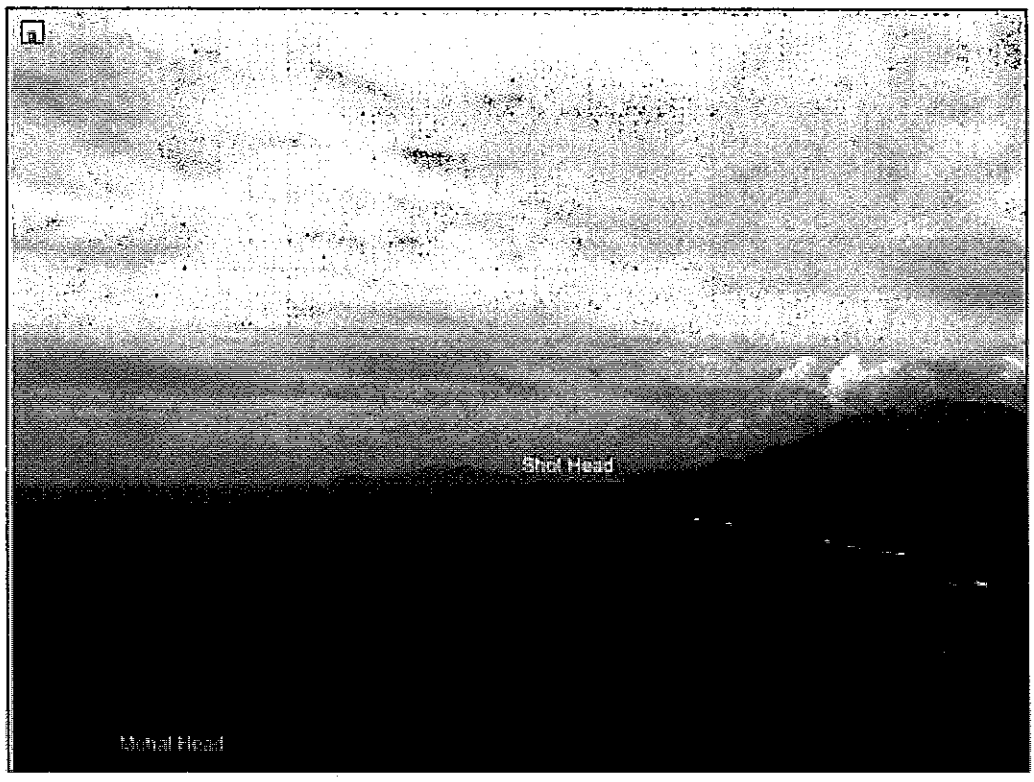
3.2.1. Shoreline Inspection.

The proposed fish farm development site is located off the Townland of Roosk to the East of Shot Head and to the West of Mehal Head (Figure 7a).

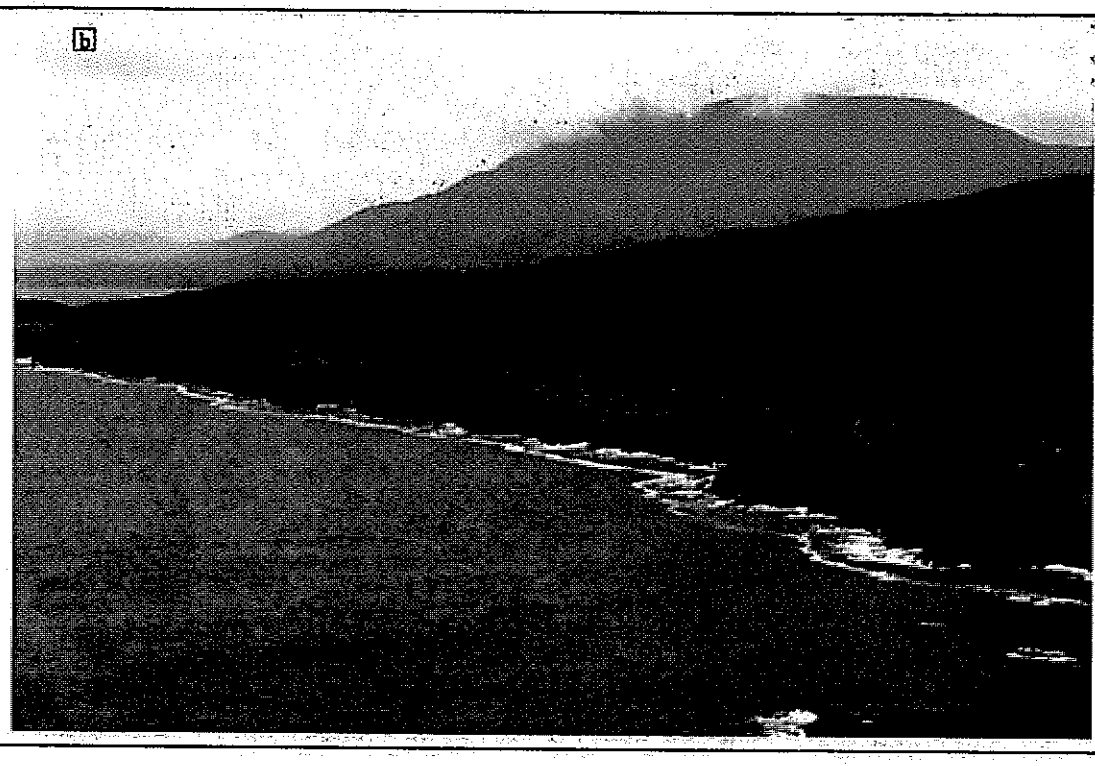
The Shoreline adjacent to the location of the proposed development was assessed by way of a walk-over investigation, supported by photography.

The shoreline inspection revealed:

- That the intertidal zone adjacent to the site of the proposed development is comprised of a near vertical to vertical rock cliff. (Figure 7b)
- That the upstanding remains of a deserted village survives at Mehal Head. (Figure 7c)
- That a path which once extended from the village to the shoreline survives, heavily eroded at its shoreline end. (Figure 7d)



b



d

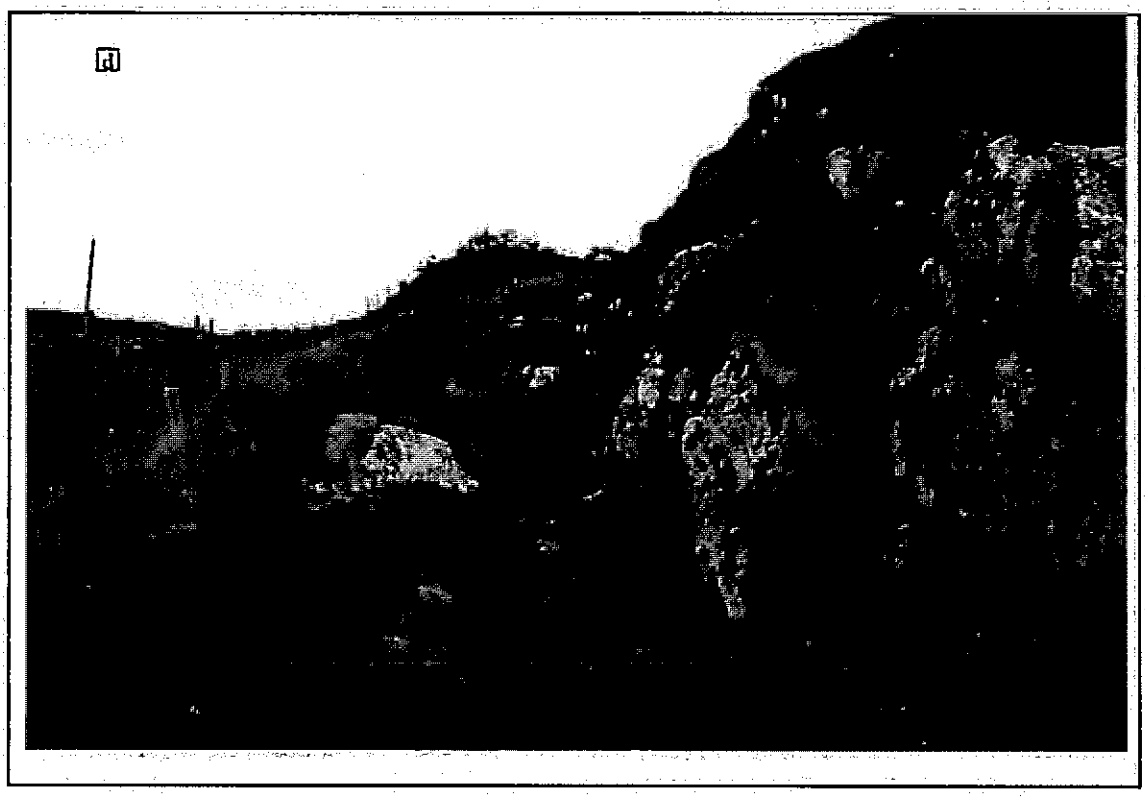


Figure 7:

(a) View of the proposed development site.

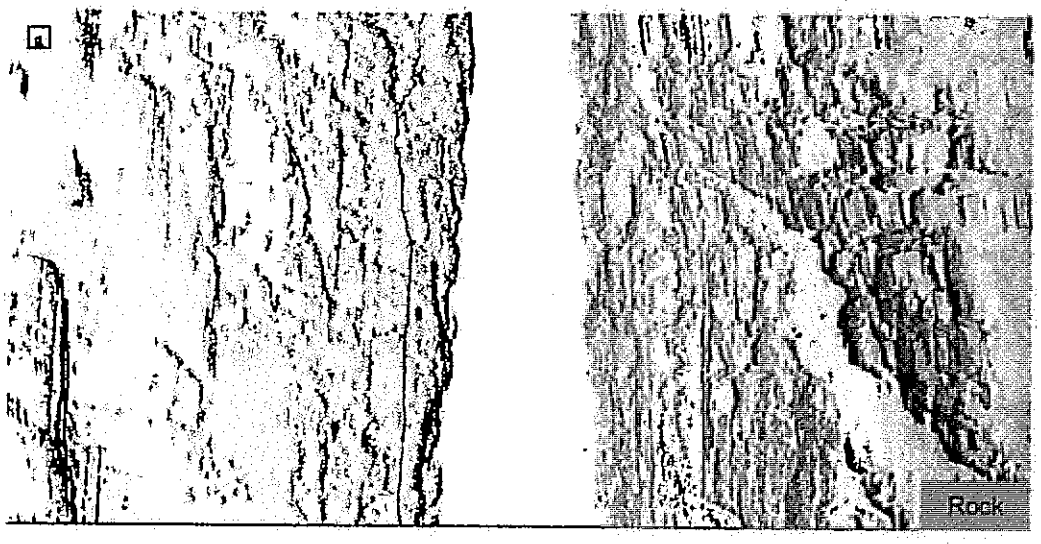
(b) View of the intertidal zone adjacent to the proposed development site.

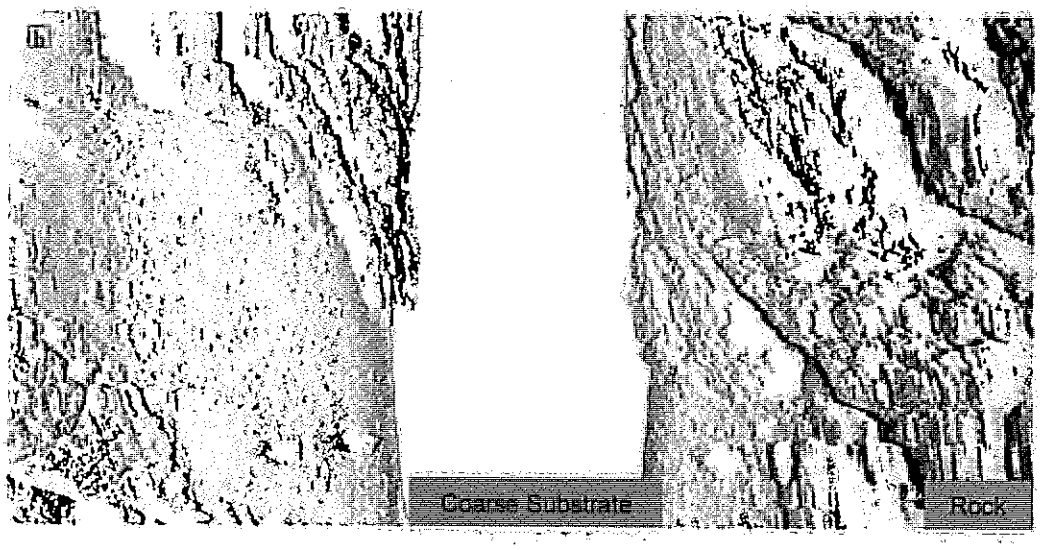
(c) View of a deserted village at Mehal Head (partial).

(d) View of a shore access path extending from the deserted village, at Mehal Head.

3.2.2. Seabed sediments.

A type image of the seabed substrate at the proposed Shot Head development site is displayed in Figure 8. The substrate is comprised of bedrock, coarse material and a finer material. The coarse material is interpreted as gravels and the finer material interpreted as a fine sand or mud. A substrate distribution map derived from the survey data is depicted in Figure 9.





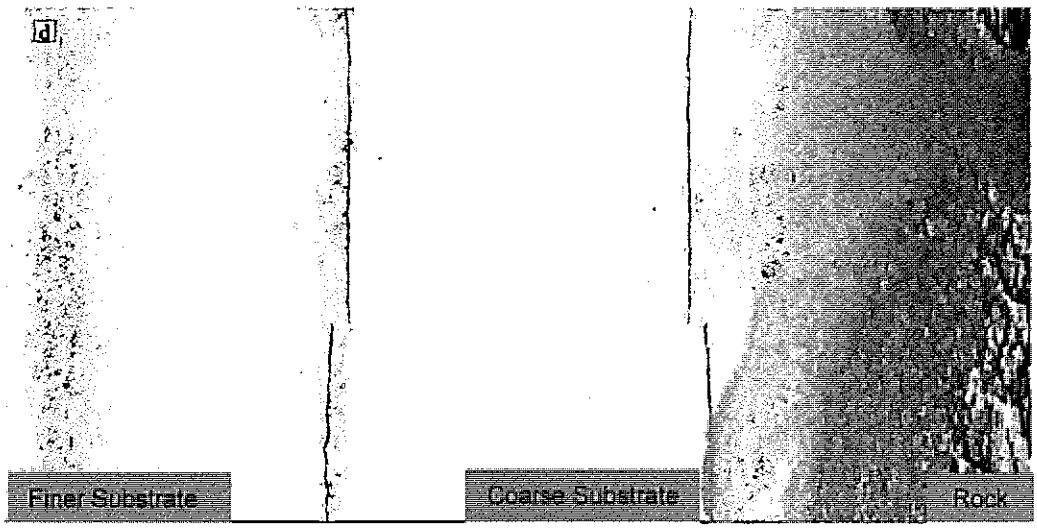


Figure 8: Sonagraph image from the Shot Head survey area indicating the backscatter Substrate returns.

(a) Image of the rock cliff face which extends from the surface to a depth of 25m
(b) Image of a coarse substrate overlaying bedrock
(c) Image of a finer substrate extending to a coarser substrate and bedrock

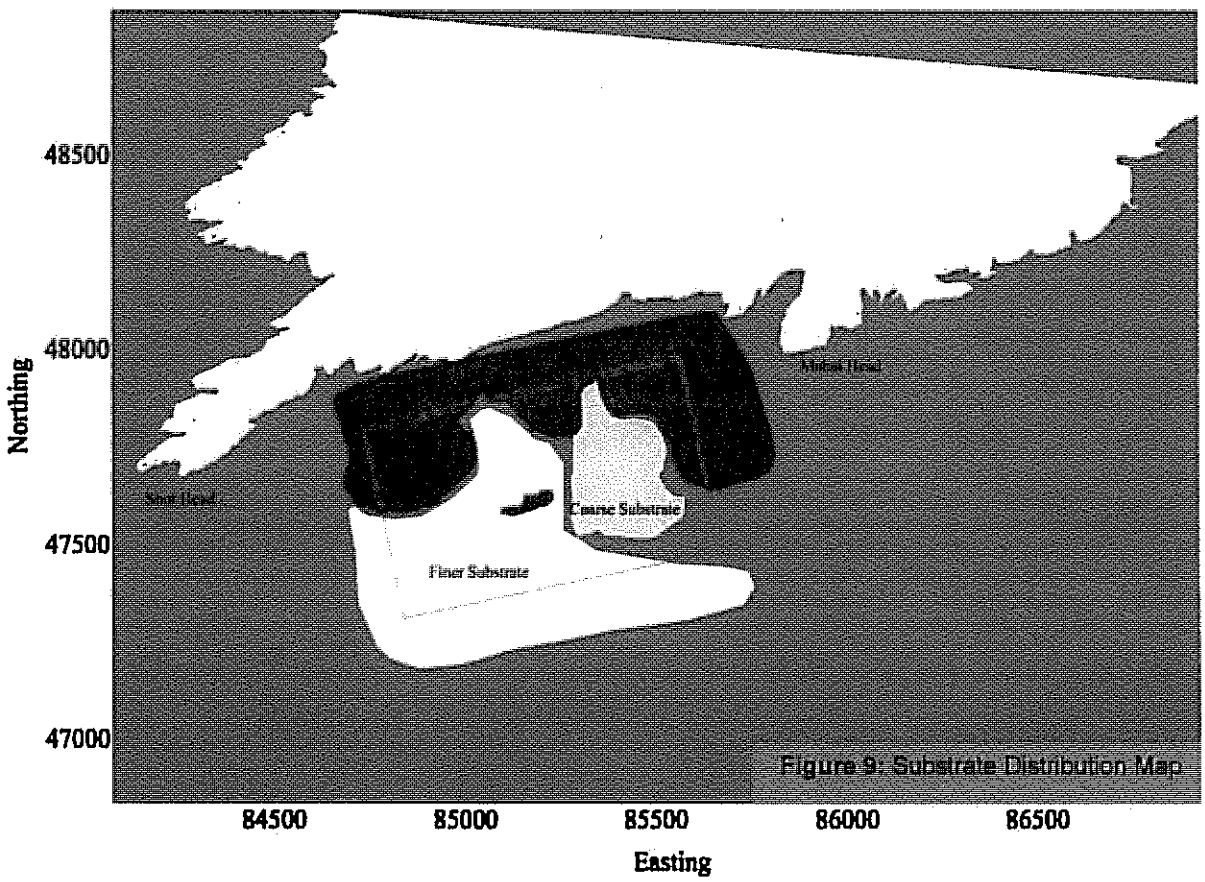


Figure 9: Substrate Distribution Map

3.2.3. Bathymetric Data.

The contoured, digitised bathymetric data for the Shot Head site are displayed overlaid on the site boundary line, relative to the shoreline in figure nine and overlaid on a bottom type base map derived from the sidescan survey data in Figure 10.

Bathymetry ranges from 5m on the northwest margins of the survey site to depths of up to 37m to the south of the site. The northern one third of the site is located over a steeply sloping seabed descending from a shallow of 5m to a deep of 30m over a distance of some 200m. The remaining two thirds of the site is located over a relatively level seabed at a depth of some 37m.

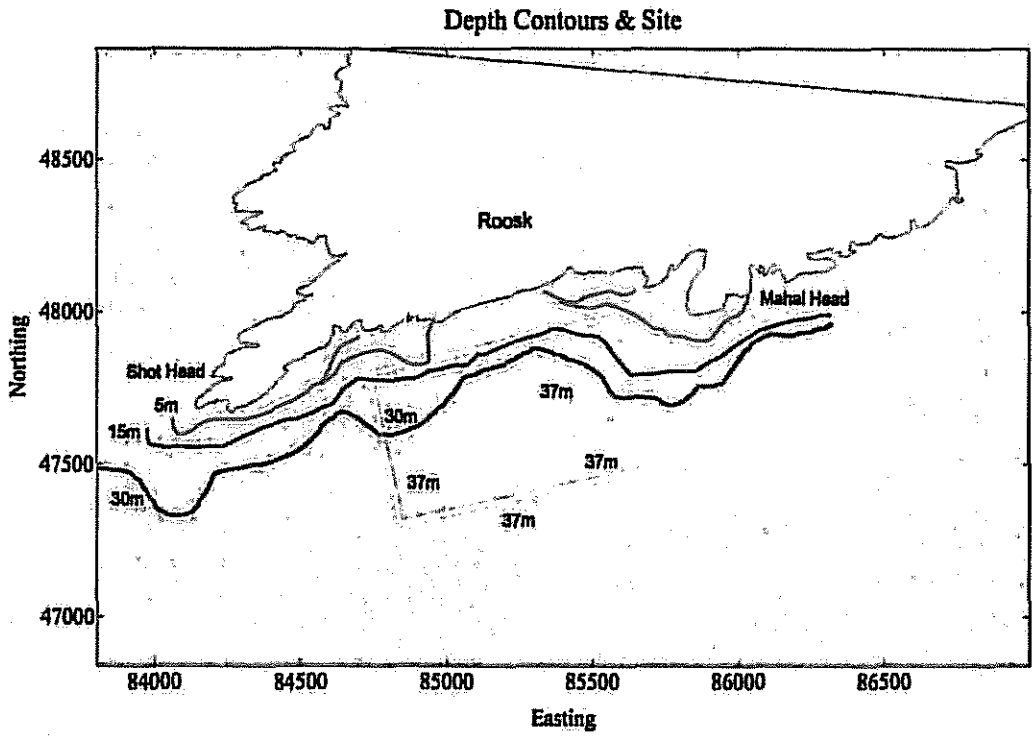


Figure 9: Bathymetric contours overlaid on an outline of the Shot Head survey area Co-ordinates are in Irish National Grid.

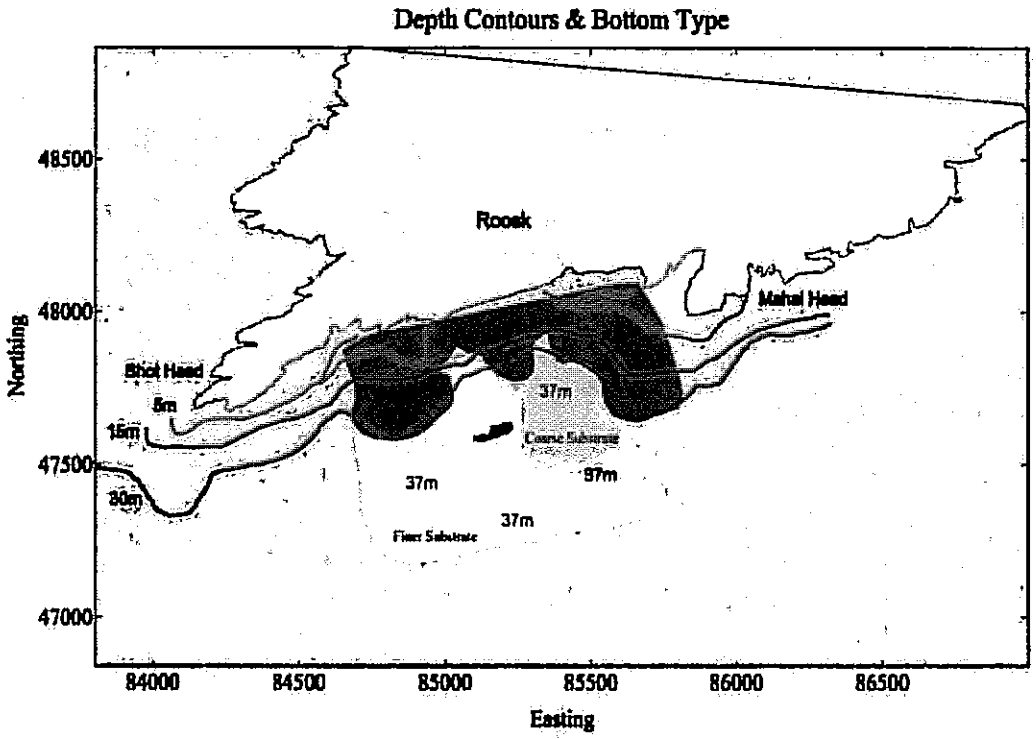


Figure 10: Bathymetric contours overlaid on a map of bottom type from the Shot Head survey are. Co-ordinates are in Irish National Grid.

3.2.4. Magnetometer Data.

The results obtained from the magnetometer survey at the proposed Shot Head development site are displayed overlaid on the survey track line, relative to the shoreline in Figure 11.

A two-dimensional contour plot of the results obtained within the survey area are provided in Figure 12 with a three-dimensional contour plot of magnetic deviation provided in Figure 13.

The results of survey range from -6nT in the north, to 30nT in the southeast of the survey area with a total range differential of 36Nt. The results revealed the site to be magnetically quiet with the survey results indicating changes in the seabed substrate.

No readings which could be interpreted as indicating the presence of archaeological materials were identified from the data acquired over the proposed Shot Head development site.

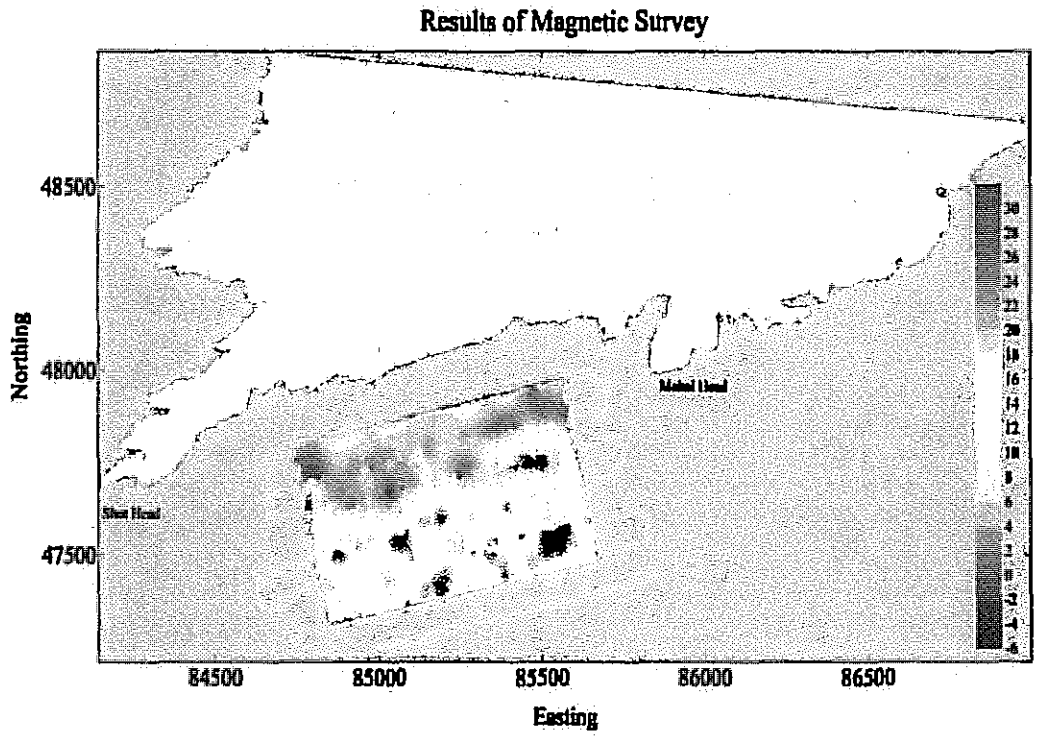


Figure 11: Magnetic contours derived from data acquired over the Shot Head survey area displayed relative to the shoreline. Co-ordinates are in Irish National Grid.

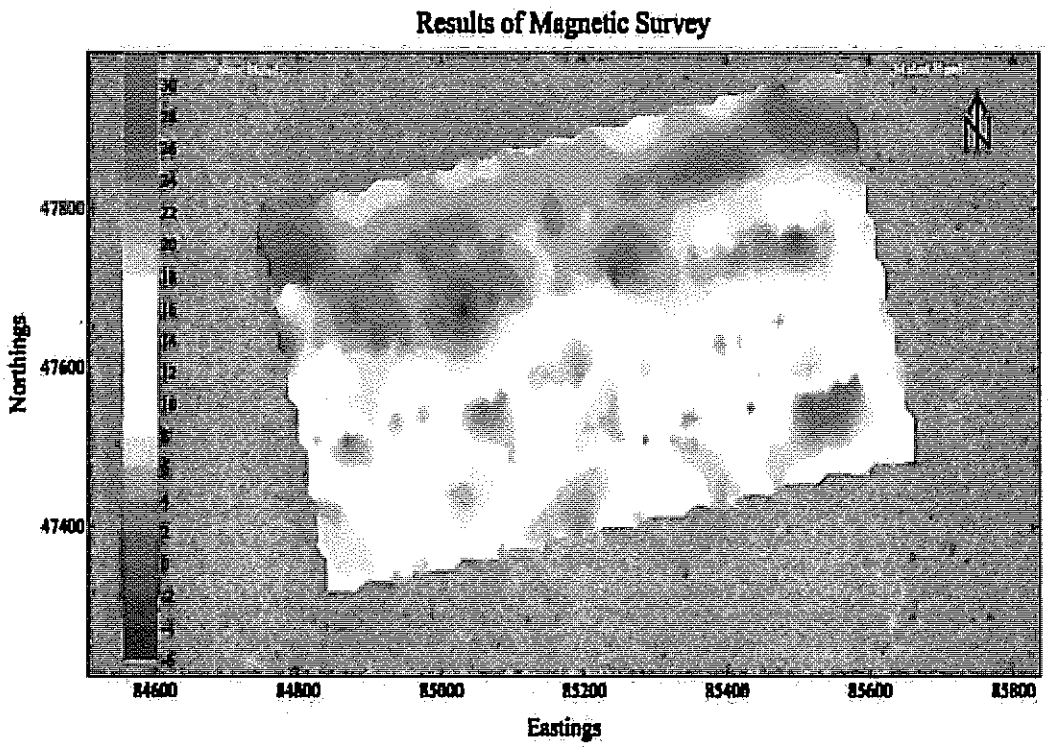


Figure 12: Two dimensional plot of magnetic deviation derived from data acquired over the Shot Head survey area. Co-ordinates are in Irish National Grid.

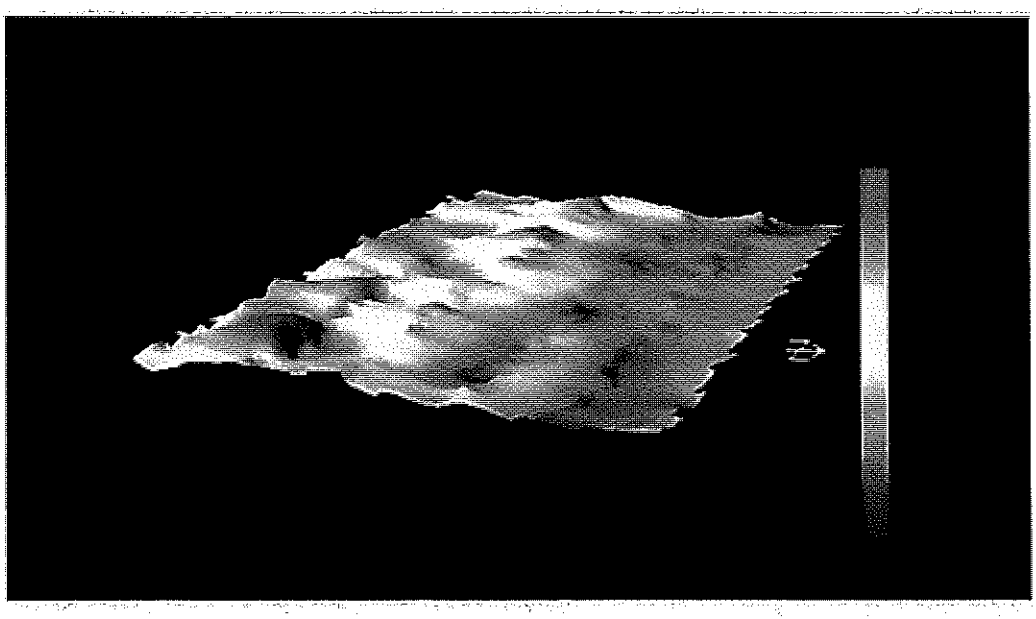


Figure 13: Three-dimensional contour plots of magnetic deviation derived from data acquired over the Shot Head survey area. Co-ordinates are in Irish National Grid.

3.2.5. Side scan Sonar Data.

The results obtained from the sidescan survey at the proposed Shot Head development site are displayed overlaid on an outline of the survey area, relative to the shoreline in Figure 14 and as a mosaic of sidescan data in Figure 15.

Line by line of analysis of the sidescan data recorded at the proposed Shot Head development site revealed no features which would indicate the presence of upstanding or submerged archaeological remains.

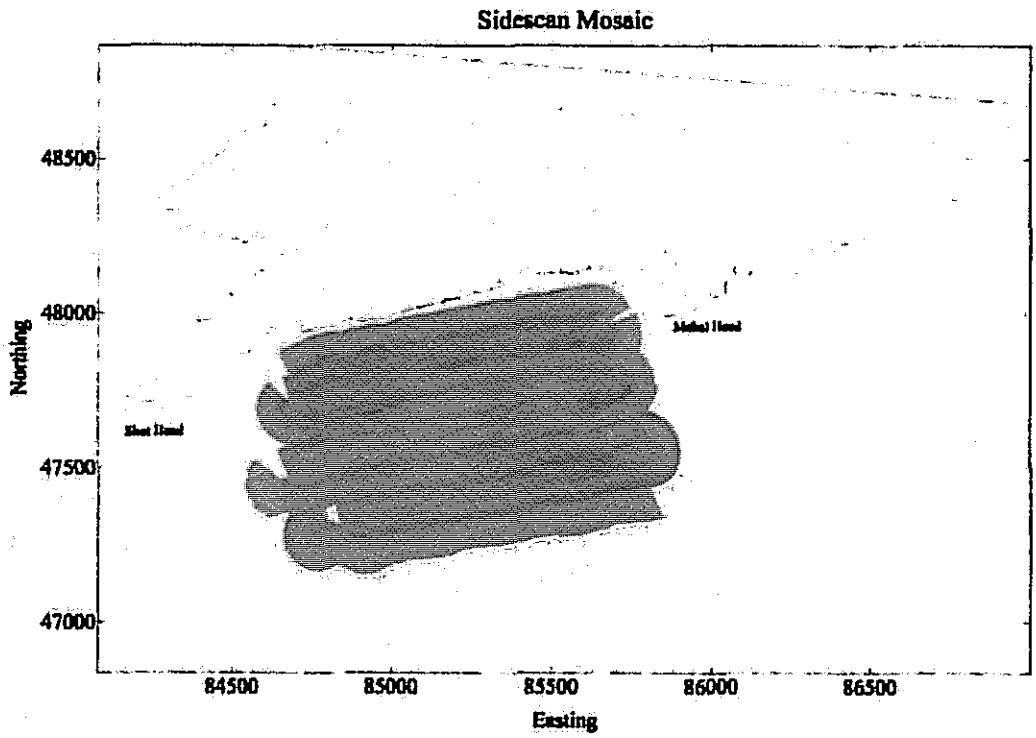


Figure 14: Sidescan Sonar mosaic derived from data acquired over the Shot Head survey area displayed relative to the shoreline. Co-ordinates are in Irish National Grid.

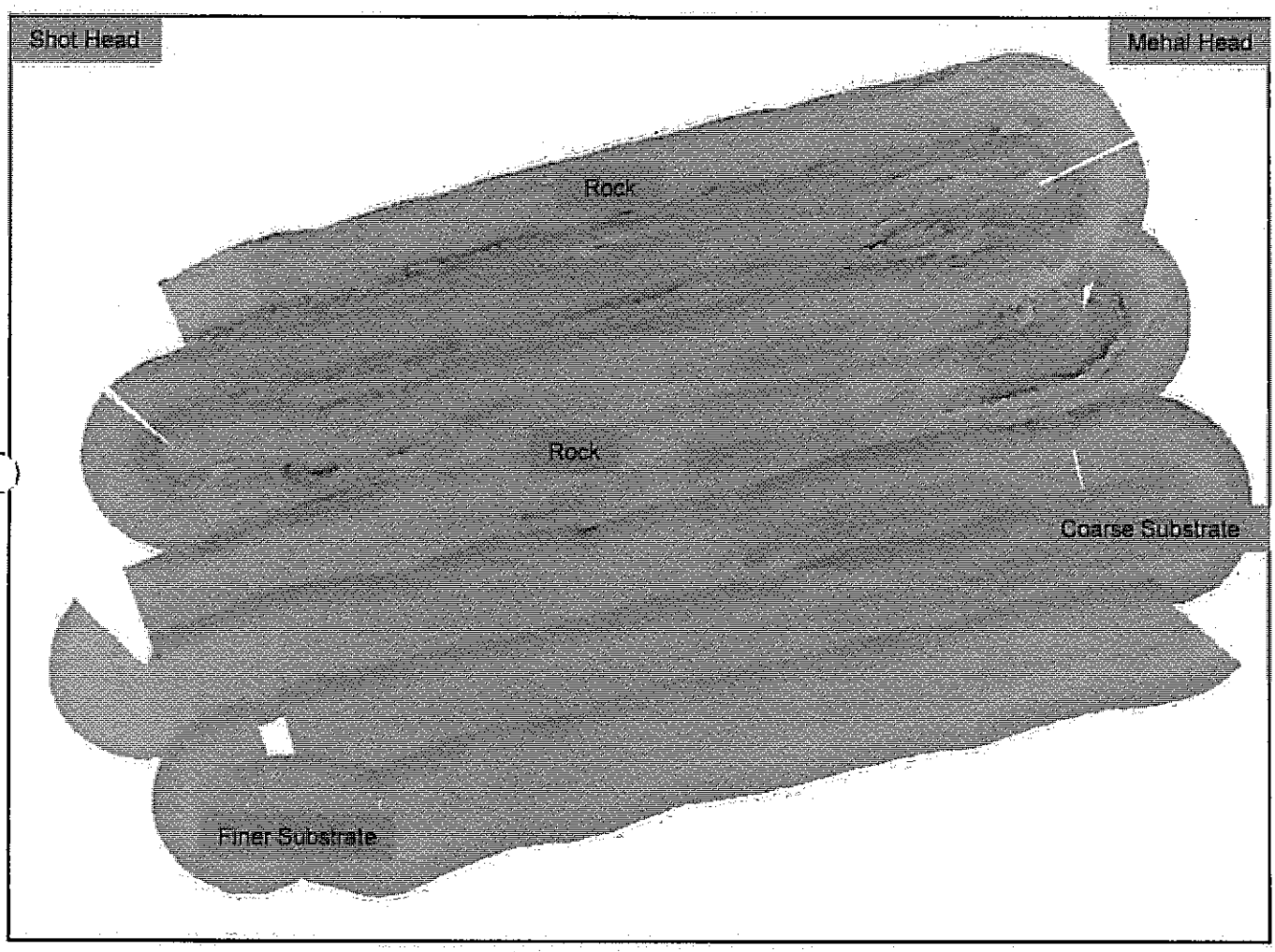


Figure 15: Sidescan Sonar mosaic derived from data acquired over the Shot Head survey area.

3.2.7. Results of Survey.

The desktop survey revealed:

- Two archaeological sites listed in the Townland of Roosk.
- No record of archaeological finds in the Townland of Roosk.
- No recorded wreck sites or sites of possible wreckage within or adjacent to the proposed development site.
- No record or archaeological excavation in the Townland of Roosk.

The archaeological sites listed for the townland of Roosk will not be impacted by the proposed development.

The site surveys revealed:

- The remains of a deserted village and a shore access path at Mehal Head.
- That the northern one third of the proposed development site is located over a steeply sloping seabed comprised of rock and a coarse substrate in water depths of 15m to 30m. This substrate is deemed to have a low to medium potential to retain archaeological material.
- The central and southern area of the site is located over a relatively level seabed comprised of a finer substrate at a depth of some 37m. This substrate is deemed to have a high potential to retain archaeological material.
- The distribution of the coarse and finer substrate may indicate that the seabed at this location is subject to hydraulic forces created by storm forces, the impact of which would decrease greatly the survivability of archaeological material within the site.
- Analysis of the sidescan survey data revealed no features which would indicate the presence of archaeological remains.
- Analysis of the magnetometer survey record revealed no readings which could be interpreted as indicating the presence of archaeological materials.

The shoreline path and deserted village located at Mehal Head will not be impacted by the proposed development. The site surveys provided no features or readings which revealed or indicated the presence of archaeological material. There remains the possibility of archaeological material lying within the finer substrate which comprises the greater area of the proposed development site at Shot Head.

4. CONCLUSIONS

- The seabed at the location of the proposed development will be impacted by the laying and bedding of twenty six substantial anchors.

- The walkover and photographic inspection of the shoreline adjacent to the seabed survey site revealed the upstanding remains of a deserted village and the eroded remains of a shore access path leading from the village towards the shoreline.

- The substrate material as visualised by the 500kHz side-scan sonar survey would indicate that the seabed at the site of the proposed development is impacted by hydraulic forces generated by storm forces.

- The rock substrate is interpreted as having a low potential for the retention of archaeological material. The coarse substrate is interpreted as having a low to medium potential for the retention of archaeological material. The finer substrate is interpreted as having a high potential for the retention of archaeological material.

- No anomalies were identified from the 500kHz side-scan sonar survey conducted over the proposed development site.

- No anomalies were identified from the magnetic survey conducted over the proposed development site.

5. RECOMMENDATIONS

1. The proposed fish farm development at the Shot Head site should proceed.

2. A further sidescan survey should be conducted over the Shot Head site following the installation of the anchors to determine if their installation has revealed the existence of submerged archaeological material.

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