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Moville and Greencastle Sewerage Scheme

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*Environmental Impact Statement
Volume 2 – Appendices*

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Water, Environment & Emergency Services
Donegal County Council
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Moville and Greencastle Sewerage Scheme

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MOVILLE – GREENCASTLE WASTE WATER TREATMENT PLANT, CO. DONEGAL

ECOLOGICAL ASSESSMENT OF TWO MARINE OUTFALL OPTIONS

August 2006

FINAL REPORT



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1. INTRODUCTION

1.1. Background

NATURA Environmental Consultants Ltd. was commissioned by J.B. Barry and Partners to provide an Environmental Assessment of two location options for a marine outfall for the proposed Moville – Greencastle Waste Water Treatment Plant (WWTP). This report provides a description of the terrestrial and marine ecology of the two outfalls and an assessment of the likely impacts of the outfalls on the terrestrial and marine ecological environment (i.e. the flora, fauna and habitats). The report does not address impacts of the outfall on water quality, which is being assessed by RPS Group. The two sites are located on the north shore of Lough Foyle; the first (option 1) is approximately 1.5km north-east of Moville pier while the second (option 2) is approximately 200m north-east of Greencastle pier. Figure 1 shows the location of the two outfall options.

This assessment has been carried out in compliance with the European Communities (Environmental Impact Assessment) Regulations, 1989-2000, and follows the *Guidelines on the Information to be Contained in Environmental Impact Statements* (Environmental Protection Agency, 2002).

1.2. Methodology

1.2.1. Desk study

A desk study was carried out to collate the available information on the ecological environment. The National Parks and Wildlife Service (NPWS) database of designated conservation areas and records of rare and protected plant species were checked with regard to the location of the proposed outfalls.

Aerial photographs (OS Aerial B/W, Scale 1:1000, 1995) were examined to make a preliminary assessment of the outfall sites and to determine dominant habitat types present in advance of the marine surveys.

An assessment of the potential for bird activity in the vicinity of both outfall options was undertaken using data from existing sources (see Section 1.2.3 below). As both surveys were undertaken during the summer period, bird activity in Lough Foyle was relatively low in comparison to the large aggregations of waders and wildfowl which occur during the winter months.

1.2.2. Marine survey

A dive survey of option 1 (Moville) was undertaken in July 2005 and of option 2 (Greencastle) in June 2006. The surveys were undertaken along the line of the proposed outfall pipeline using SCUBA with two divers operating in-water and a surface dive supervisor. The marine habitats were classified and evaluated in accordance with Fossitt (2000). Species composition, depth and substrate type were recorded at approximately 100m intervals from the shoreline at both outfall locations for a distance of 600m offshore for option 1 and for 300m offshore for option 2. While this does not comprise a comprehensive list of floral or faunal species, it is sufficient to describe the character of the habitat type and evaluate its ecological significance.

In this report, scientific and common names of marine flora and fauna follow Gibson *et al.* (2001). Terrestrial flora nomenclature follows Webb *et al.* (1996) and Scannell and Synnott (1987) respectively.

1.2.3. Consultations

The National Parks and Wildlife Service (NPWS) of the Department of Environment, Heritage and Local Government was consulted in relation to records of rare plants in the vicinity of the proposed site. The Northern Regional Fisheries Board (NRFB) and Loughs Agency were consulted regarding the fisheries value of Lough Foyle. Information on species of fauna and flora listed for protection under Annex II of the EU Habitats Directive (92/43/EEC), Annex I of the Birds Directive (79/409/EEC), Flora Protection Order (1999) and the Wildlife (Amendment) Act (2000) was also sought from both the NRFB and NPWS.

BirdWatch Ireland was consulted regarding previous data on bird activity (wintering waders and wildfowl) around the Moville-Greencastle area. Data were supplied by the Irish Wetland Bird Survey (I-WeBS), a joint scheme of BirdWatch Ireland, National Parks and Wildlife Service and The Wildfowl and Wetlands Trust.

1.2.4. Evaluation and impact assessment criteria

The ecological value of both outfall options were evaluated and given an overall significance rating on the basis of the criteria outlined in Appendix 1. The scale of the likely impacts was assessed on the basis of the area/length of the particular habitat that would be impacted, and the ecological value of that habitat.

2. EXISTING ENVIRONMENT

2.1. General description of the outfall option locations

Lough Foyle is a large sheltered sea lough/inlet which is of importance for wintering waterfowl. The coastal area near Moville and Greencastle, which are located towards the mouth of the Lough, runs in a generally south-west and north-easterly direction. The intertidal zone is quite narrow and predominantly rocky with occasional small sandy bays to the south of Greencastle.

The option 1 outfall is located approximately 1.5km north-east of Moville where it crosses an area of grassland with some woodland and a pedestrian pathway before meeting the shoreline in Glenburnie Bay. The coast at this point forms a small sandy bay flanked by out-cropping rock and the shores shelves gently on a predominantly sandy substrate within the inter-tidal zone. The outfall is proposed to discharge at a distance of approximately 300m off shore but a distance of 600m offshore has been investigated.

The option 2 outfall is located immediately north of Greencastle pier adjacent to a small slipway. The shoreline at this point is rocky and shelves steeply. The outfall at this location is proposed to discharge at a distance of approximately 300m offshore.

2.2. Designated areas

The proposed outfall location options are not covered by any nature conservation designation (see Figure 1). However, Lough Foyle as a whole is a site of high ornithological importance and a significant proportion of the area is covered by a

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number of nature conservation designations which fall under the jurisdiction of NPWS along the Co. Donegal Coast, and the Environment and Heritage Service within Northern Ireland. A summary of designated areas that occur at Lough Foyle is presented in Table 1.

A Special Protection Area (site code 004087) has been designated by NPWS along the western shore of Lough Foyle between Muff and White Castle, Co. Donegal approximately 11.50km south of the southern proposed outfall location. Over-wintering birds in this area were counted by the Irish Wetland Bird Survey (IWeBS) until 1999 and the area is known to support nationally important numbers of cormorant (Colhoun, 2001). A Special Protection Area is a statutory designation, which has legal basis in the EU Wild Birds Directive (79/409/EEC). One of the principal objectives of this designation is to prevent “pollution or deterioration of habitats or any disturbance whatsoever” affecting the birds which use the SPA.

The eastern shore of Lough Foyle is within Northern Ireland and the coastal area from Longfield west of Derry city to Magilligan Point is designated under a number of nature conservation headings. These are; Lough Foyle Area of Special Scientific Interest (ASSI), Special Protection Areas (SPA) and Ramsar site. Ramsar sites are wetlands of international importance designated under the Ramsar Convention in 1971. In addition, the coastal area around Magilligan point is designated as a candidate Special Area of Conservation (cSAC).

These areas of Lough Foyle qualify for the afore mentioned designations on the basis that they regularly support internationally important numbers of over wintering birds including, bar-tailed godwit, light bellied brent goose and whooper swan (Environment and Heritage Service, Northern Ireland). In addition the Ramsar designation criteria take into account that it is a particularly good example of a wetland complex including intertidal sand and mudflats with extensive sea-grass (*Zostera*) beds, salt-marsh, estuaries and associated brackish habitats.

Table 1. Designated areas for nature conservation within Lough Foyle

Site Code	Status	Responsible authority	Distance from outfall Option 1	Distance from outfall Option 2
004087	SPA	NPWS (Rep. Ireland)	11.1 km south	13.8 km south
-	ASSI (Lough Foyle)	Environment and Heritage Service (N. Ireland)	2.7 km east	1 km east
-	SPA	Environment and Heritage Service (N. Ireland)	2.7 km east	1 km east
7UK133	RAMSAR site	Environment and Heritage Service (N. Ireland)	2.7 km east	1 km east
	cSAC (Magilligan Point)	Environment and Heritage Service (N. Ireland)	2.7 km east	1 km east

2.3. Rare plants

According to the NPWS database of rare and protected flora, there are no rare/protected plant records for the grid square within which the study area occurs.

2.4. Habitats and associated flora

A general description of the principal terrestrial and marine habitats occurring along the proposed outfall pipeline route is given below. Figure 2 details the main habitats identified at outfall option 1 while Figure 3 details the main habitats identified at outfall option 2.

2.4.1. Option 1 - Merville

Terrestrial Habitats

This outfall option enters the sea after crossing a coastal path running adjacent to the shore. A narrow band of dry grassland (GS2) occurs alongside the path dominated by cock's-foot (*Dactylis glomerata*) and false oat-grass (*Arrhenatherum elatius*), Yorkshire fog, meadow grasses (*Poa* spp.), meadow foxtail (*Alopecurus pratensis*) with frequent creeping thistle (*Cirsium arvense*), hogweed (*Heracleum sphondylium*) and occasional knapweed (*Centaurea nigra*). Small areas of other habitats are present at this location, including mixed broadleaved woodland (WD1), scattered trees and parkland (WD5) and dry calcareous and neutral grassland. (GS1)

Marine Habitats

Marine habitats are classified according to biological zones (See Fig.4). The upper shore/splash zone, strandline and intertidal area are classified as the Littoral zone. The shallow sub-tidal area is classified as the Infralittoral zone (0 to -13m) and the near-shore, deeper sub-tidal zone is classified as Circalittoral zone (-13 to -80m) (Connor, 1997). Lough Foyle as a whole is classified under the heading *Sea inlets and Bays* (MW2).

Littoral zone

This sheltered rocky shore (LR3) is composed of exposed sandstone with small sandy embayment's (LS2) comprised of coarse sand and broken shell. The rock is characterised by the typical zonation of brown *Fucoid* seaweeds with spiral wrack (*Fucus spiralis*) and channel wrack (*Pelvetia canaliculata*) on the upper shore, bladder wrack (*F. vesiculosus*) on the mid-shore and serrated wrack (*F. serratus*) on the lower shore. Ephemeral green seaweeds including *Cladophora* and *Ulva* also occur along the lower shore.

The coarse sand supports little or no vegetation, but is likely to support burrowing bivalves (*Angulus tenuis*), isopod crustaceans (*Eurydice pulchra*) and polychaete worms (e.g. *Lanice conchilega*).

Sublittoral zone (Infralittoral and Circalittoral)

The sublittoral habitat types encountered from the shoreline to a distance of 600m offshore at the outfall location is comprised of a variety of sediment types which are described in Table 2. The habitats recorded along the outfall route are as follows:

- *Infralittoral gravels and sands* (SS1)
- *Infralittoral muddy sands* (SS2)
- *Infralittoral mixed sediments* (SS4)
- *Circalittoral muddy sands* (SS6)

The sediments ranged from coarse sand and broken shells close to shore (SS1), fine sand and silt (SS2) at approximately 330m from shore, sand/gravel with occasional boulders at 400m offshore (SS4) to silt/sand and broken shell (SS6) 500-600m offshore.

A band of common eelgrass (*Zostera marina*) approximately 50m in width occurs approximately 120m offshore. This parallel's the shore spanning the infralittoral gravels and sands (SS1) and muddy sands (SS2).

Table 2. Biota of the sublittoral habitats surveyed up to 600m offshore at Outfall Option 1, Moville, Lough Foyle.

Habitat Code (Fossitt)	Distance from shore	Depth (m)	Species recorded		Freq.*
			Common name	Scientific name	
SS1	100m	-1.40	Green algae	<i>Cladophera spp.</i>	O
				<i>Ulva lactuca</i>	O
			Common shrimp	<i>Crangon vulgaris</i>	F
	200m	-3.70	Shore crab	<i>Carcinus maenas</i>	F
			Hermit crab	<i>Pagurus bernhardus</i>	F
			Kelp	<i>Laminaria saccharina</i>	O
			Thongweed	<i>Chorda filum</i>	O
			Maerl	<i>(Lithothamnion spp.)</i>	R
			Filamentous algae	brown	O/R
			Eel grass	<i>Zostera marina</i>	F
			Pod razor	<i>Ensis siliqua</i>	O
			Tower shell	<i>Turitella communis</i>	A
			Bristle worm	<i>Lanice conchilega</i>	O/F
			Queen scallop	<i>Aequipecten opercularis</i>	O
			Spider crab	<i>Macropodia rostrata</i>	F
			Harbour crab	<i>Liocarcinus depurator</i>	F
			Common goby	<i>Gobius minutus</i>	A
SS2	300m	-6.00	Flat fish	<i>Pleuronectes spp.</i>	F
			Filamentous algae	brown	F
			Horse mussel	<i>Modiolus modiolus</i>	O/F
			Tube anemone	<i>Ceriantus lloydii</i>	O
			Brittle star	<i>Ophiura texturata</i>	R
			Edible crab	<i>Cancer pagurus</i>	O
			Spiny spider crab	<i>Maia squinado</i>	R
			Velvet swimmer crab	<i>Lionocarcinus puber</i>	F
			Goby	<i>Gobius spp.</i>	A
			Common dragonet	<i>Callionymus lyra</i>	O
SS4	400m	-9.00	Filamentous algae	brown	F
			Horse mussel	<i>Modiolus modiolus</i>	A/F
			Velvet swimming crab	<i>Necora puber</i>	F
			Sea mat (Bryozoan)	<i>Alcyonidium diaphranum</i>	O
SS6	500-600m	-15.5 to -17	Horse mussel	<i>Modiolus modiolus</i>	D/A
			Sea mat	<i>Alcyonidium diaphranum</i>	O
			Shore crab	<i>Carcinus maenas</i>	F
			Velvet swimmer crab	<i>Lionocarcinus puber</i>	F
			Spider crab	<i>Macropodia rostrata</i>	F
			Hermit crab	<i>Pagurus bernhardus</i>	F
			Common dragonet	<i>Callionymus lyra</i>	

* Freq = Frequency (DAFOR scale): D: dominant, A: abundant, F: frequent, O: occasional, R: rare.

2.4.2. Option 2 - Greencastle

Terrestrial Habitats

This outfall options enters the sea adjacent to a small slipway immediately north of the harbour at Greencastle. A small area of amenity grassland (GA2) occurs between the road and the shoreline.

Marine Habitats

Marine habitats are classified according to biological zones (See Section 2.4.1 above).

Littoral zone

This moderately exposed rocky shore (*LR2*) is composed of exposed sandstone with some lichens (*Ramalina* spp., *Xanthoria* spp. and *Verrucaria maura*) occurring in the splash zone. The brown seaweeds *Fucus spiralis*, *Pelvetia canaliculata*, *F. vesiculosus* and *F. serratus* are occasional while at the sub-littoral fringe kelp (*Laminaria digitata*) becomes abundant. Red seaweeds are frequent especially in crevices and include *Palmaria palmata*, *Chondrus crispus* and *Lithothamnion* spp.

Juvenile mussels (*Mytilus edulis*), barnacles (*Balanus* spp.) and limpets (*Patella vulgata*) are also frequent, with most mussels confined to crack lines on the exposed rock. Beadlet and dahlia anemones (*Actinia equina* and *Urticina felina*) are occasional in rock pools.

Sublittoral zone (Infralittoral and Circalittoral)

The sublittoral habitat types encountered from the shoreline to a distance of 300m offshore at the outfall location is comprised primarily of soft sediment types which are described in Table 3. The habitats recoded along the outfall route are as follows:

- *Moderately exposed infralittoral rock (SR2)*
- *Infralittoral gravels and sands (SS1)*
- *Infralittoral mixed sediments (SS4)*

The infralittoral rock (SR2) is confined to within approximately 5m of the shore extends to a depth of c5-8m. Thereafter, the seabed is comprised of fine sand with occasional small areas of rock outcrop (SS1). The bed initially shelves quite steeply for a distance of approximately 50m from the shore where the gradient lessens and the substrate becomes coarser. Coarse sand and shell with gravel and small cobble (SS4) extends from this point to the 300m mark. As the outfall location is within the narrow mouth of Lough Foyle, the area is subject to strong tidal flow.

Being a current swept site with mobile sediment, the biota of the area is limited to primarily mobile forms. Table 3 details the key species associated with the various habitat types.

Table 3. Biota of the sublittoral habitats surveyed up to 300m offshore at Outfall Option 21, Greencastle, Lough Foyle.

Habitat Code (Fossitt)	Distance from shore	Depth (m)	Species recorded		Freq.*
			Common name	Scientific name	
SR2	5m	-8.0	Oarweed	<i>Laminaria digitata</i>	A
			Red seaweed	<i>Palmaria palmata</i> ,	F
			Red seaweed	<i>Chondrus crispus</i>	F
			Shore crab	<i>Carcinus maenas</i>	F
			Beadlet anemone	<i>Actinia equina</i>	O
			Dahlia anemone	<i>Urticina felina</i>	O
			Maerl	(<i>Lithothamnion spp.</i>)	F
SS1	50m	-12.0	Dead mans fingers	<i>Alcyonium digitatum</i>	O
			Harbour crab	<i>Liocarcinus depurator</i>	F
			Shore crab	<i>Carcinus maenas</i>	O
			Sand goby	<i>Pomatoschistus minutus</i>	F
			Queen scallop	<i>Aequipecten opercularis</i>	O
			Hermit crab	<i>Pagurus bernhardus</i>	F
			Plaice	<i>Pleuronectes platessa</i> .	R
SS4	100m	-14.00	Dahlia anemone	<i>Urticina felina</i>	O
			Horse mussel	<i>Modiolus modiolus</i>	O
			Velvet swimming crab	<i>Necora puber</i>	F
			Hermit crab	<i>Pagurus bernhardus</i>	F
			Velvet swimmer crab	<i>Lionocarcinus puber</i>	F
			Spider crab	<i>Macropodia rostrata</i>	F
			Cowrie	<i>Trivia monacha</i>	R

* Freq = Frequency (DAFOR scale): D: dominant, A: abundant, F: frequent, O: occasional, R: rare.

2.4.3. Marine Birds

Lough Foyle is a site of high ornithological importance. In winter the eastern shore area (Co. Derry) and the south western shore regularly supports large numbers of birds (over 20,000) including internationally important numbers of bar-tailed godwit, light bellied brent goose and whooper swan.

A winter bird count was not conducted as part of the EIS. Irish Wetland Bird Survey volunteers have in the past conducted, bird counts between Moville and Greencastle. The most recent data is from 1994-1999 (See Appendix 3). The most commonly recorded species along this area of Lough Foyle were cormorant and oystercatcher. Curlew, redshank and turnstone were recorded infrequently as were red-throated diver and great northern diver. Neither outfall location is likely to support significant numbers of marine birds as they have limited intertidal areas which attract feeding waterfowl.

2.4.4. Fisheries (including shellfish)

Lough Foyle is an important shellfish area supporting various levels of aquaculture along its shores and also in areas of open water. Figure 5 (source: Loughs Agency, 2004) shows that the proposed outfall option 1 will impact on a small part of a natural oyster bed while both outfall options lie within a natural mussel seedbed. Lough Foyle is an open fishery i.e. there is no licensing control over the amount or location of harvesting areas. Thus is not possible to accurately delimit the areas of shellfish harvesting in the vicinity of the outfall. Oyster (*Ostra edulis*) beds in Lough Foyle were affected by an outbreak of the parasite *Bonamia Ostrea* in 2004 (Department of the Marine, 2004). This disease can cause significant mortality to affected oysters and only empty shells were recorded during the dive survey.

2.5. Evaluation of terrestrial habitats

Built surfaces such the coastal path are of little ecological value, however, the habitat that surrounds them (grassy verges and hedgerows) may be of moderate value. Dry calcareous and neutral grassland and dry meadows are locally important due to their species diversity and are of moderate ecological value. The area of mixed broad leaved woodland does not hold many native trees. However, all mature trees have the potential to act as bat roosts and this habitat is therefore considered of moderate local value.

2.6. Evaluation of marine habitats

Lough Foyle is a large shallow sea lough which includes estuaries of the rivers Foyle, Faughan and Roe. The site contains a complex of wetland habitats including estuary, extensive intertidal mudflats and sand flats, saltmarsh and associated brackish ditches. These habitats correspond loosely with a number of Annex 1 (EU Habitats Directive 92/43/EEC); estuaries (1130), large shallow inlets and bays (1160), sandbanks which are slightly covered by sea water all the time (1110), and are to a large extent covered by a nature conservation designation where they occur (within Lough Foyle). Neither outfall option impacts directly on any designated site. A negative impact within part of the designated site has the potential to impact on the entire area.

Option 1 – Moville:

The presence of a submerged eel grass beds along the shoreline in the vicinity of the Moville outfall option is the most significant feature of this site. Recent initiatives arising from the EU Habitats Directive and the Convention on Biological Diversity have led to eelgrass habitats being specifically targeted for conservation and restoration (Wynne et al., 1995). It acts as host to others species and typically supports a diverse range of faunal species and algal flora of algae (e.g. *Entocladia perforans*, a green alga; *Rhodophysema georgii*, a crustose red alga; and brown algae *Halothrix lumbricalis* (Tyler-Walters, 2004)).

Option 2 – Greencastle:

The outfall option at Greencastle runs through a relatively homogenous stretch of seabed which is characterised by the strong tidal current that flows through the mouth of the Foyle. The mobile sediment substrate supports a typical biotic community associated with mixed sediments and no habitats or species of significant conservation concern were noted.

2.7. Evaluation of outfall options for Marine Birds

Lough Foyle is of international importance for birds and considerable parts of the lough are designated conservation areas on account of wintering waders and waterfowl. However, neither outfall option is suitable for supporting significant numbers of marine birds as they have limited intertidal areas which attract feeding waterfowl.

2.8. Evaluation of outfall options for Fisheries

Lough Foyle is an important shellfish area supporting considerable aquacultural activity. The narrows at the mouth of the lough support a natural seed mussel bed, while oyster beds are extensive further inshore. The oyster population has suffered a substantial set back following an outbreak of Bonaemia in 2004.

3. DESCRIPTION OF LIKELY SIGNIFICANT IMPACTS

The main impacts associated with this development are related to the construction phase and impacts of discharged treated effluent into the sea lough. The installation of the treated effluent outfall pipeline will be by open trenching overland (including the intertidal area), to a depth of 1m. However, once past the low water level, the pipe will be laid directly on the Lough bed. Some re-profiling of the sea bed may be necessary to even the surface for outfall pipe installation.

3.1. Designated areas

The proposed sewage outfall options are not within a designated conservation area, though large areas of Lough Foyle are designated as SPA, SAC, ASSI and Ramsar sites. A permanent negative impact affecting the integrity of an internationally important site constitutes a severe negative impact (See Appendix 2). A temporary impact within an internationally designated site, such as the installation of an outfall pipeline, could result in a moderate negative impact. As the outfall options are both outside of the designated site however, the only impacts potentially arising relate to alterations in the trophic status of the site through a deterioration in water quality from effluent discharge.

3.2. Terrestrial Habitats

Any impacts on the grassy verges, the calcareous and neutral grassland and dry meadows, as well as on the scattered trees and other terrestrial habitats will be minor negative to neutral.

3.3. Marine Habitats

The main impacts on the marine environment would be associated with excavation and pipe-laying during the construction phase.

At either outfall option location, there would be temporary moderate to minor impacts on the littoral zone (rocky shore and sandy shore) depending on the method of construction. The shifting sediment of the sandy shore at Moville (Option 1) would reinstate rapidly after installation of the outfall pipeline. There may be permanent impacts on exposed rock if excavation (or blasting) is required for installation at either location, however, these impacts would be more visual than ecological in nature.

There would be temporary moderate negative impacts on the sublittoral habitats at both outfall option locations. However, the shifting sediments of these habitats would reinstate rapidly after installation of the outfall pipeline.

There would be moderate negative impacts on the area of eelgrass at Moville (Option 1) during the outfall pipe installation as the route passes through the eelgrass bed. Eelgrass (*Zostera marina*) is very sensitive to disturbance from substratum loss and smothering by sediments and moderately sensitive to abrasion and physical disturbance (Tyler-Walters, 2004). Sediment disturbance, siltation, erosion and turbidity resulting from coastal engineering and dredging activities have been implicated in the decline of seagrass beds world wide. Seagrass' are not physically robust and rhizomes are likely to be damaged during pipe-laying. Disturbance and removal of plants can lead to increased patchiness and destabilization of the seagrass bed, which in turn can lead to reduced sedimentation, increased erosion and loss of larger areas of eelgrass. However, in this instance, the area of disruption would be confined to a narrow swathe of the eelgrass bed as a whole. Once the outfall pipe is in

place and sediments settle around it, the rhizomes of the plants should regenerate and re-mesh to join up the eelgrass bed.

There would be temporary negative impacts on fauna during the construction stage as a result of disturbance to habitats though these impacts will not be significant due to the relatively sparse faunal assemblages and the mobility of most species. Recovery of the marine sediment habitat is likely to be swift following installation of the pipeline at either outfall option location due to the mobility of both the sediment and associated organisms. Once constructed the outfall pipeline would be quickly colonised by various sedentary marine organisms and algae.

3.4. Birds

Data from past IWeBS counts show that both outfall locations hold low numbers of winter birds when compared to other areas within Lough Foyle. Impacts on birds would depend on the time of year construction is due to take place. Disturbance would be greatest during winter months when concentrations of wintering waterfowl and waders are at their greatest.

3.5. Fisheries

Outfall option 1 at Moville will impact on a small part of a natural oyster bed. However, oysters within Lough Foyle have decreased dramatically following an outbreak of *Bonaemia* in 2004 and there was no evidence of live oysters at this location during the dive survey. Both outfall options lie within a natural mussel seedbed. As Lough Foyle is an open fishery, there is no licensing control over the amount or location of harvesting areas and it is not possible to accurately delimit the areas of shellfish harvesting in the vicinity of the outfall options. An un-buried outfall pipe at either outfall location option could snag mussel or oyster dredging gear. The shellfish industry within Lough Foyle demands good water quality and increased nutrient inputs could amplify the risk of algal blooms within the lough. However, the risk of this scenario is higher with the currently untreated waste entering the lough from the Moville and Greencastle areas.

4. MITIGATION

4.1. Designated Areas

No designated area is directly impacted by either proposed outfall location. The proposed waste water treatment plant will provide a higher level of sewage treatment than the existing scenario which should result in an improvement in overall water quality within Lough Foyle. No special mitigation measures are required to protect designated areas.

4.2. Marine habitats

The main priority during the construction phase would be to minimise the level of disturbance to eelgrass at outfall Option 1. It would be necessary to conduct pipe installation from a barge during high water in the vicinity of the eelgrass bed to minimise tracking disturbance to this important habitat type.

No specific mitigation would be required in relation to the laying of an outfall pipe at either Moville (Option 1) or Greencastle (Option 2) other than to reduce the working way leave to a minimum on the shoreline. All machinery operating on or within close proximity to the sea should be mechanically sound and free from leaks or other

risks of pollution. Appropriate pollution clean-up facilities should be maintained on-site during the entire pipe-laying exercise.

4.3. Birds

To avoid disturbance to wintering waterfowl and waders, pipe-laying should be carried out between months April to September.

4.4. Fisheries

The proposed waste water treatment plant will provide a higher level of sewage treatment than existing discharges and should result in an overall improvement in water quality within Lough Foyle. The laying of the outfall pipeline on the sea-bed may snag bottom dredging for seed mussels or oysters, and discussion may be required with fishermen to determine the need for specific mitigation.

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6. APPENDICES

APPENDIX 1: ECOLOGICAL SITE EVALUATION CRITERIA

<i>Rating</i>	<i>Qualifying Criteria</i>
A	Internationally important Sites designated (or qualifying for designation) as SAC* or SPA* under the EU Habitats or Birds Directives. Undesignated sites containing good examples of Annex I <u>priority</u> habitats under the EU Habitats Directive. Major salmon river fisheries. Major salmonid (salmon, trout or char) lake fisheries.
B	Nationally important Sites or waters designated or proposed as an NHA* or statutory Nature Reserves. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). Undesignated sites containing <u>significant numbers</u> of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. Major trout river fisheries. Water bodies with major amenity fishery value. Commercially important coarse fisheries.
C	High value, locally important Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. Small water bodies with known salmonid populations or with good potential salmonid habitat. Sites containing <u>any</u> resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
D	Moderate value, locally important Sites containing some semi-natural habitat or locally important for wildlife. Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any water body with unpolluted water (Q-value rating 4-5).
E	Low value, locally important Artificial or highly modified habitats with low species diversity and low wildlife value. Water bodies with no current fisheries value and no significant potential fisheries value.

*SAC = *Special Area of Conservation*

SPA= *Special Protection Area*

NHA= *Natural Heritage Area*

APPENDIX 2: CRITERIA FOR ASSESSING IMPACT SIGNIFICANCE ON TERRESTRIAL SITES.

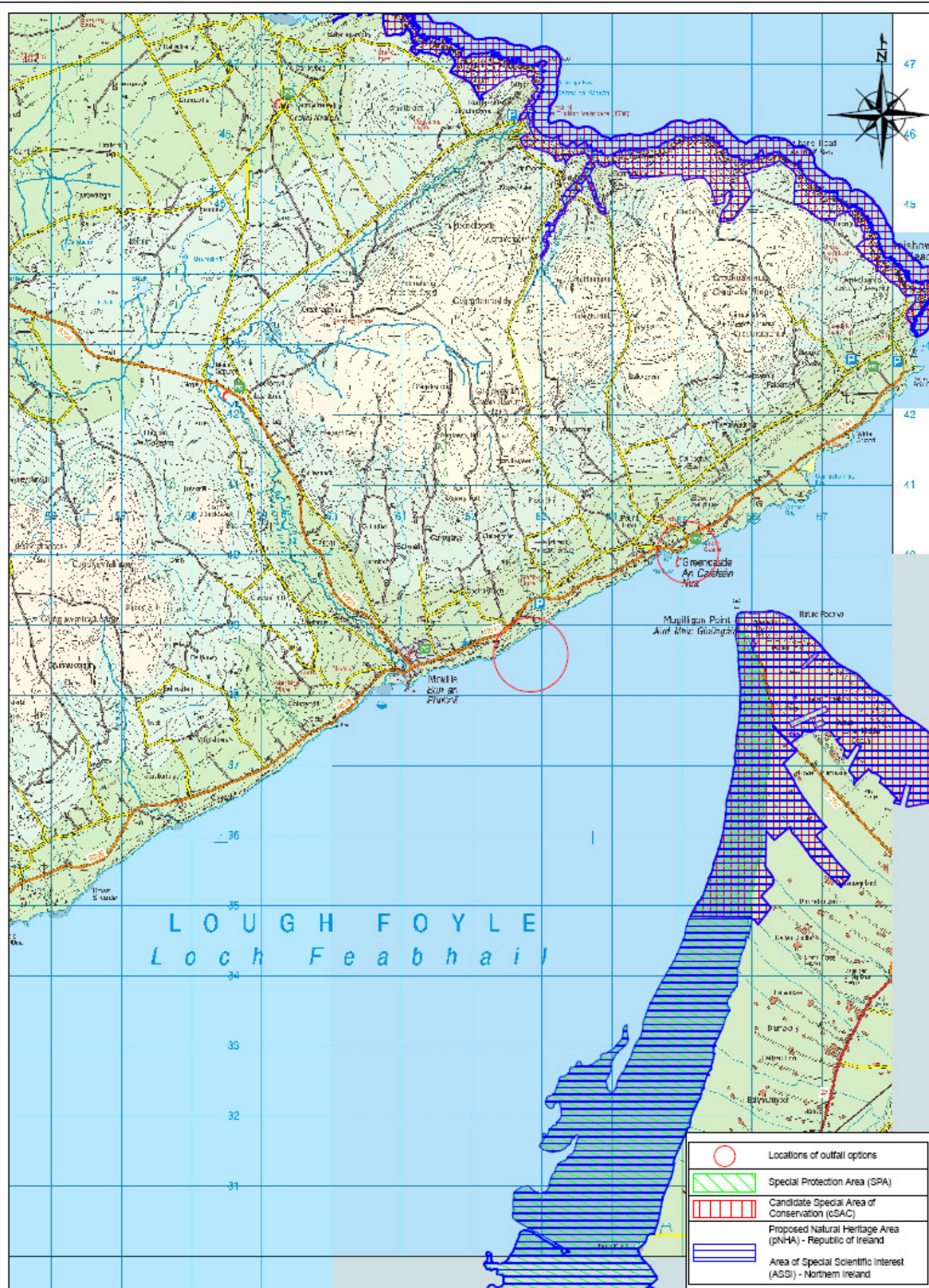
Site category* ► Impact level ▼	A sites Internationally important	B sites Nationally important	C Sites High value, locally important	D sites Moderate value, locally important	E sites Low value, locally important
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

* Site categories A to E are defined in Table 2a.

APPENDIX 3: SUMMARY OF WINTER BIRD DATA FROM THE MOVILLE-GREENCASTLE SECTION OF LOUGH FOYLE (DATA FROM IWeBS*).

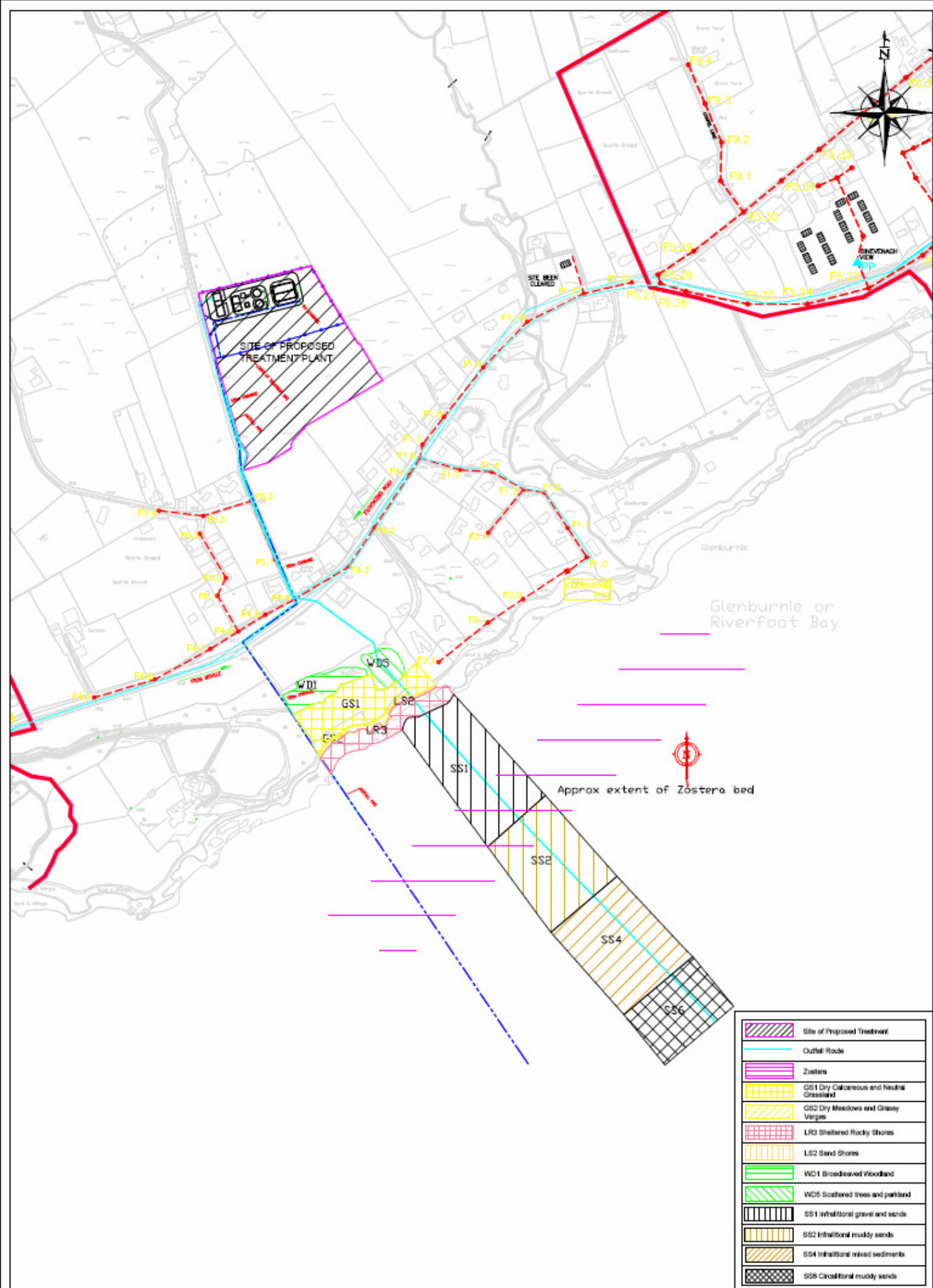
Species Name	1994/95	1996/97	1997/98	1998/99	Peak	Mean
Red-throated diver		3		1	3	1
Great northern diver	1	4		3	4	2
Cormorant	12	19	5	3	19	10
Eider	6			2	6	2
Red-breasted merganser	4		2	1	4	2
Oystercatcher	19	19	5	4	19	12
Curlew	1				1	0
Redshank	2			1	2	1
Turnstone	4			2	4	2
Black-headed gull			18	32	32	13
Lesser black-backed gull				2	2	1
Herring gull				16	16	4
Iceland gull	1				1	0
Glaucous gull	1				1	0
Great black-backed gull				7	7	2

* I-WeBS, the Irish Wetland Bird Survey, is supported by BirdWatch Ireland, the Department of Environment Heritage and Local Government and the Wildfowl and Wetlands Trust.

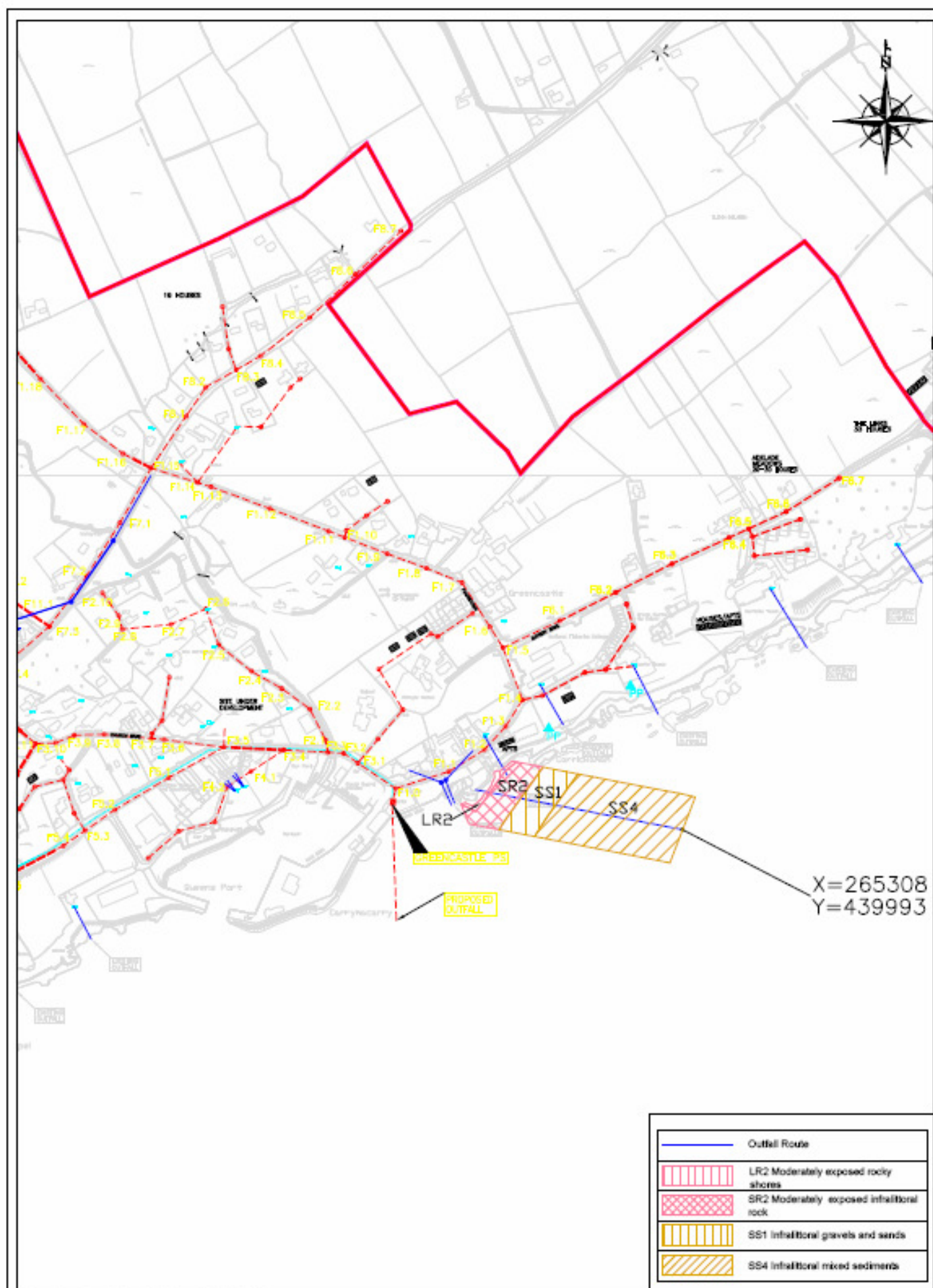


All mapping produced under O.S. Licence No EN 0036606

Figure 1: Location Map and Designated Areas



All mapping produced under O.S. Licence No EN 0036606



All mapping produced under O.S. Licence No EN 0038906

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Moville-Greencastle
Underwater Survey

Figure 3: Option 3-Greencastle Outfall

Drawn by: NC	Project no: 1114G
Checked: MH	Scale: 1:5000
Sheet no: 1 of 1	Rev: 1
Date: 03.08.2006	

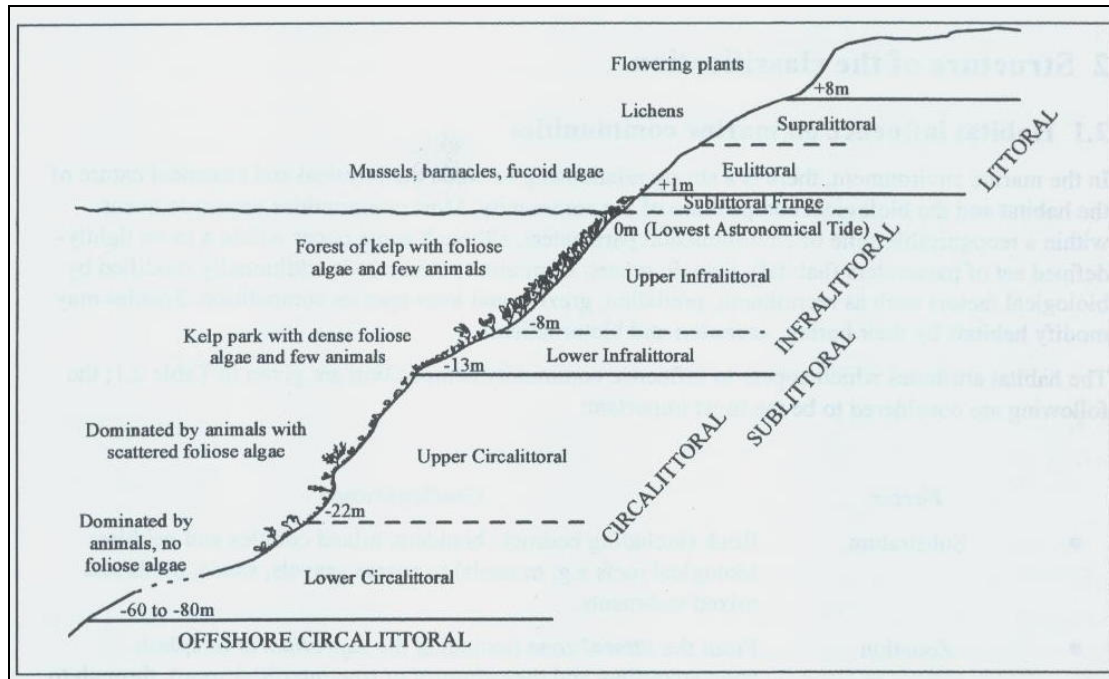


Figure 4. Profile of a rocky shore and seabed showing the biological zones (From Connor, 1997).

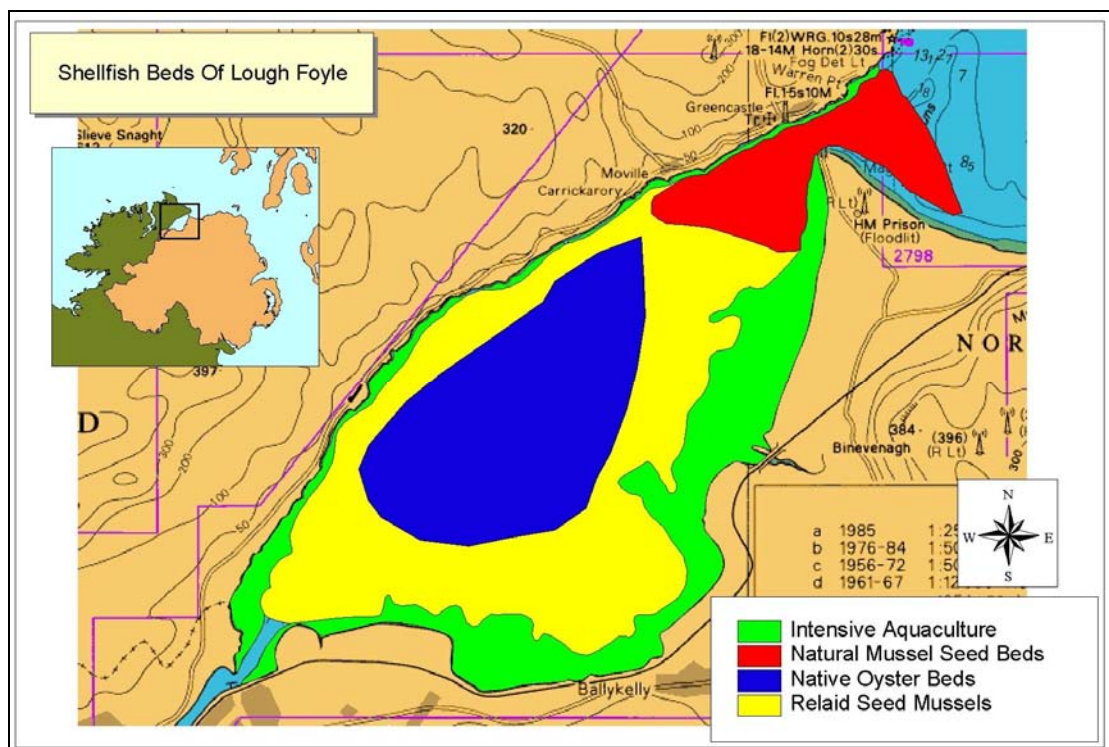


Figure 5. Shellfish beds of Lough Foyle (Loughs Agency, 2004).

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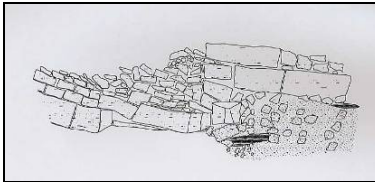
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Appendix B

Archaeology Appendices

- a. Underwater Archaeology Assessment - Outfall Located North of Greencastle Harbour
- b. Archaeology Bibliography
- c. Receiving Environment
- d. Catalogue of Archaeological Sites,
- e. Catalogue of Architectural Heritage
- f. Catalogue of Industrial Archaeological Heritage
- g. Catalogue of Areas of Archaeological Potential
- h. Catalogue of Shipwreckings
- i. Plates



**UNDERWATER ARCHAEOLOGICAL ASSESSMENT,
MOVILLE & GREENCASTLE WASTEWATER SCHEME,
INISHOWEN PENINSULA, MOVILLE,
CO. DONEGAL**

**OUTFALL LOCATED NORTH OF GREENCASTLE
HARBOUR**

06D046, 06R101

Client: JB Barry & Partners Ltd.

THE ARCHAEOLOGICAL DIVING COMPANY LTD.

**UNDERWATER ARCHAEOLOGICAL ASSESSMENT,
MOVILLE & GREENCASTLE WASTEWATER SCHEME,
INISHOWEN PENINSULA, MOVILLE,
CO. DONEGAL**

**OUTFALL LOCATED NORTH OF GREENCASTLE
HARBOUR**

06D046, 06R101

Client: JB Barry & Partners Ltd.

19th July 2006

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THE ARCHAEOLOGICAL DIVING COMPANY LTD.

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2.0 PROPOSED DEVELOPMENT	4
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SUMMARY

The Archaeological Diving Company Ltd. was appointed by JB Barry and Partners Ltd, consulting engineers for Donegal County Council, to undertake an archaeological assessment of a proposed effluent outfall pipeline as part of the Moville and Greencastle Wastewater Scheme, Greencastle, County Donegal. It is proposed to insert a 375mm diameter effluent outfall pipe, 150m north of Greencastle Harbour, entering Lough Foyle at NGR: 265026E/ 440047N.

Systematic visual inspection and magnetometer survey of the seabed and the attendant foreshore was undertaken along the proposed pipeline route. No archaeologically significant material was revealed within the immediate survey area at this location. The work was carried out under licence from the DoEHLG on 5th July 2006.

This report recommends that further archaeological assessment in advance of construction works is not required. However, it is recommended that archaeological monitoring of all ground disturbances during construction be undertaken, with the proviso to resolve fully any archaeological material observed at that point.

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- Figure 1: Discovery Series Map showing location of ADCO Survey Area at Greencastle.
- Figure 2: Extract of Project Drawing showing an earlier proposed route for the Effluent Outfall Pipeline located at Moville (Option B).
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- Figure 4: Extract from RMP Sheet 22 (OS 6") showing ADCO Survey Area and surrounding townlands.
- Figure 5: Project Drawing showing ADCO underwater survey area at the proposed location of the Greencastle Effluent Outfall Pipe.
- Figure 6: Distribution map of metal detection targets across the ADCO survey area.

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- Plate 1: Satellite image of Inishowen Peninsula showing entrance to Lough Foyle; Greencastle Survey Area indicated.
- Plate 2: West-facing view of shoreline in vicinity of proposed pipeline route.
- Plate 3: Southeast-facing view of Greencastle Fortification (RMP:022-003)
- Plate 4: Southeast-facing view of Martello Tower located adjacent to Greencastle fortification.
- Plate 5: East-facing view of steep slope located beneath bedrock drop-off at start of survey.
- Plate 6: General view of thick kelp and bedrock outcropping located beneath bedrock drop-off at start of survey area.
- Plate 7: Exemplar shot of coarse sand and cobble seabed located between 20m-100m from the survey start point (as indicated in Figure 5).
- Plate 8: Exemplar shot of crushed/broken shell deposit located over much of the survey area (as indicated in Figure 5).
- Plate 9: Shot of disused lobster pots located c.80 from start of survey area.

1.0 INTRODUCTION

The Archaeological Diving Company Ltd (ADCO) was appointed by JB Barry and Partners Ltd, consulting engineers for Donegal County Council, to undertake a non-disturbance underwater archaeological assessment of the proposed route for a 3.75mm diameter outfall pipeline. The proposed development focuses on a coastal area of northeast Donegal on the Inishowen Peninsula, between Moville and Greencastle (Figure 1, Plate 1). A desktop survey and field assessment of the land element of the proposed development was undertaken by Valerie J. Keeley Ltd and is currently being complied¹. The proposed treatment plant is to be located c.2 km to the northeast of Moville town in the townland of Garnagarve, on the north side of the R241 as it travels northeast to Greencastle. It was initially proposed to construct an outfall pipe to the southwest of the treatment plant, entering the sea at NGR: 26280E/ 438780N, and an underwater assessment of this route was undertaken in June 2005² (Figure 2). However, following additional engineering consideration, this location was not deemed suitable and a new outfall location has been proposed to the north of Greencastle harbour (Figure 3, Plate 2). This pipeline will enter the Lough Foyle at NGR: 265026E/ 440042N and run in a southwesterly direction for a distance of approximately 300m. A pipe trench measuring 1m in width and 1.5m in depth will be excavated to accommodate the proposed treated effluent pipe at this location.

The archaeological survey sought to identify and record the location, nature and dimensions of any archaeological features, fabric or artefacts that may be impacted by the proposed development. Assessment was concentrated within the immediate impact area, although a sizeable buffer zone was incorporated into the archaeological survey, extending the survey up to 20m either side of the proposed pipeline corridor.

The assessment was carried out on 5th July 2006 by a team of two maritime archaeologists and a certified dive supervisor under licence from DoEHLG, licences: 06D046, 06R101.

The following report addresses the known and potential archaeological environment; assesses the actual and proposed impacts on that environment from the works programme; and makes recommendations to resolve any further archaeological requirements during/ following the works programme.

¹ Currently being complied: Tom Joyce MA, Archaeological and Architectural Assessment, Moville and Greencastle Sewage Scheme, Inishowen Peninsula, Co. Donegal.

² 05D085, 05R084: Rex Bangerter (June 2005), Underwater Archaeological Assessment, Moville and Greencastle Wastewater Scheme, Inishowen Peninsula, Moville, Co. Donegal, ADCO Ltd.

2.0 PROPOSED DEVELOPMENT³

Moville and Greencastle are located on the Inishowen Peninsula in the northeast of Co. Donegal. Currently, Moville has a small combined sewerage network that discharges untreated sewage through multiple outlets to the Bredagh River and Lough Foyle. Greencastle has no formal drainage system and individual septic tanks serve the majority of houses from the area. The sewerage scheme involves the construction of a Waste Water Treatment Plant (WWTP) and the associated sewer network to treat effluent from Moville and Greencastle. The WWTP will be located between Moville and Greencastle, and pumping stations situated around Moville and Greencastle will pump raw effluent to the WWTP. The WWTP will provide secondary treatment of the effluent, which will outfall to a location situated 301.7m from the Lough Foyle shoreline (NGR: 265306E/ 439993N, Figure 3, Plate 2). A pipe trench measuring 1m in width and 1.5m in depth will be excavated, using backhoe dredging, to accommodate a 375mm diameter effluent pipe at this location. The precise location of the end of the outfall pipeline will depend on the hydraulic characteristics and rate of dispersion present within the Lough. These will be determined through on-site flow-measurements and hydraulic modelling.

A detailed archaeological desktop survey of the proposed development, supplemented by visual inspection of the development sites, has been undertaken by Valerie J. Keeley Ltd.⁴ ADCO was contracted to assess the proposed impact area relating to the placement of the effluent pipeline into the Foyle Estuary.

3.0 THE RECEIVING ENVIRONMENT

The following is an overview of the available information relating to the Inishowen peninsula and the settlements at Moville and Greencastle. For a detailed description of the background to the area the reader is directed to the archaeological assessment in the main text of the EIS⁵

County Donegal, with its extended coastline, features a physical landscape of upland mountain ranges, rivers, lakes, bays, inlets and blanket bogs that cover much of the

³ This is an overview of the available information, forwarded by JB Barry Ltd., and does not relate to specific engineering details.

⁴ Currently being compiled: Tom Joyce MA, Archaeological and Architectural Assessment, Moville and Greencastle Sewage Scheme, Inishowen Peninsula, Co. Donegal.

⁵ Tom Joyce, Archaeological and Architectural Assessment Moville and Greencastle Sewage Scheme, Inishowen Peninsula, Co. Donegal.

county. Located in northeast Donegal, the Inishowen Peninsula (*Inis Eoghain* - Owen's Island) is surrounded by Lough Foyle to the east, Lough Swilly to the west, and the Atlantic sea to the north. The area is said to take its name from Owen, son of Niall of the Nine Hostages, one of the ancient Uladh tribe who captured St. Patrick and brought him to Ireland. Inishowen was part of the great northern kingdom of Ui Neill and was ruled from the royal seat at Grianan Aileach, a hill-top enclosure commanding views over Lough Foyle and Lough Swilly. From the fifth to the twelfth century AD it served as the royal seat of the O'Neill sept of Aileach, until it was destroyed in 1101 by Murtoigh O'Brien, king of Munster. To make the demolition complete, the king ordered each of his soldiers to take away a stone from the fort. For seven centuries Inishowen was ruled by the O'Doherty family who had close alliances with the O'Donnells of West Donegal and the O'Neills of Tyrone.

Moville and Greencastle are two of the many fishing villages scattered around the Inishowen Peninsula. They are overlooked by the Knockaulin mountain range and separated by c.5 km of coastline. Both are located in a strategic position on the south-west of the Peninsula on the entrance to Lough Foyle. Moville is derived from the Gaelic *Maigh Bhile* ("the place of the sacred tree" or "the plain of the ancient tree") but the Gaelic name today is *Bun an Phobail* (pronounced bunafobble) ("the foot, or end, of the parish"). This may be a deviation of *Bunafebhall* ("the town at the mouth of the Foyle"). Greencastle takes its name from the impressive castle situated on the coast there. This fortification was built in the mid-thirteenth century and consisted of a rectangular tower and two-storey wing with reinforced corners and irregularly shaped curtain wall (Plate 3). A small section of the curtain wall is still visible today. In addition, a large ditch surrounded the northern side of the castle. The Castle was destroyed in 1556 during conflict between the King of the O'Donnells and his son, Calvagh O'Donnell.

A Martello tower is located c.50m north of the Greencastle fortification and is part of a pair constructed in 1812 to protect the approach to Lough Foyle (Plate 4). The second tower is located on the southern side of the seaway at Magilligan Point in County Derry. A small force of artillerymen was stationed at Greencastle and an artillery block is located adjacent to the Martello tower.

The recovery of Mesolithic flint and stone artefacts attests to the antiquity of activity within county Donegal. In addition, the distribution of megalithic structures throughout the county provides evidence for the establishment of permanent settlement within Donegal. These structures range from Neolithic passage tombs (c. 4000BC) to Bronze Age wedge tombs (c.2500BC). Evidence for Iron Age activity is best witnessed in the hilltop enclosures and associated tumuli located within the county.

The emergence of Christianity in the fifth century played an important role in the development of the cultural landscape of the county. Monuments from this period include ringforts, churches, and other religious sites; many of which commemorate St Collmille, the Donegal Saint allegedly responsible for converting Scotland to Christianity. The twelfth century, and the Anglo-Norman arrival, saw the wide-scale emergence of castle building throughout the county, a tradition continued by the Gaelic Irish in the form of tower houses. Moreover, the county's importance as a strategic military point and centre of commerce is attested to by the number of military fortifications at coastal locations, many of which were constructed or reoccupied during the Tudor re-conquest and Cromwellian periods.

Moreover, the number of vessels listed in the Shipwreck Inventory for this area confirms the level of maritime activity along the coastline of north-east Donegal (see Appendix 1)⁶. A total of 35 wrecks are listed for Lough Foyle and the waters surrounding the Inishowen Peninsula. These range in date from the sixteenth to the twentieth century, although most date from the latter part of the nineteenth century.

One of the most notable wrecks from these waters is that of the *Trinada Valencera* (Lost 1588). The *Trinidad Valencera* was one of five Venetian traders requisitioned by Spanish authorities in Sicily for use as an armed transport with the Spanish Armada. She was fitted with 28 Bronze guns, four King's Guns, and carried a compliment of 79 seamen and 281 Neapolitan soldiers. The ship was caught in a storm off the north coast of Donegal and, leaking badly, came to anchor in Glenagivney Bay. Two days later, she split in two and sank.

A number of monuments are listed in the Record of Monuments and Places (Figure 4) from the townlands surrounding the development and are tabulated in Appendix 2⁷. Only one RMP site is located in close proximity to the proposed outfall and is tabulated below:

RMP Number:	022-003
Site Type:	Castle
Townland:	Eleven Ballyboes
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22
National Grid Reference:	-----

⁶ List compiled from the Shipwreck Inventory prepared by the Underwater Archaeological Unit DEHLG. The Inventory provides a listing of inshore wreckings as noted from the middle of the eighteenth century, when systematic recording of such incidents in Irish waters began.

⁷ Record of Monuments and Places for County Donegal, Department of Environment, Heritage and Local Government, 1998.

4.0 SURVEY METHODOLOGY

Visual inspection and magnetometer survey by hand-held underwater metal-detection was employed to assess the archaeological potential of the seabed and attendant shoreline across the proposed impact zone. A 400m long, weighted, baseline was laid along the pipeline footprint to facilitate a systematic dual-diver survey of the seabed. The survey area constituted a 40m by 400m search area, extending the survey 19m either side of the pipeline corridor and 100m south of the outfall end-point (Figure 5). The shoreline was also inspected to ascertain its archaeological potential. A finds retrieval strategy dealing with conservation issues, cataloguing, and locational recording was in place to deal with any artefacts recovered during each of the surveys.

A detailed description was made of the seabed topography and bottom composition along the proposed route. In addition, a metal-detection survey was undertaken and yielded a concentrated hit ratio, within the first 80m-100m of the survey. This hit ratio dropped off to the south. A distribution map of metal-detection targets was produced (Figure 6).

A maximum water depth of 18m was encountered for the southernmost section of the proposed outfall pipeline. A medium-high, south-westerly, drift-current was recorded on the day of survey. Underwater visibility ranged between 3-4m. Diving operations were carried out to HSA/HSE standard using surface supplied equipment, supported with suitable boat cover and VHF communications to the relevant authorities, in accordance with the Safety in Industry (Diving Operations) Regulations 1981, SI 422.

5.0 ARCHAEOLOGICAL ASSESSMENT

Foreshore/ Seabed Topography

The foreshore survey area consists of shelving limestone bedrock, which typifies much of the Greencastle coastline. The bedrock drops vertically to the seabed for a distance of 5m, at which point it shelves at a 45° angle for a distance of 20m to a water depth of 10m (Plate 5). A soft silt/sand deposit overlies this bedrock to a depth of 0.40m+ and is inter-dispersed with frequent limestone boulders and extensive kelp growth (Plate 6). The remainder of the survey area slopes gently (2° angle) from the base of the bedrock to the central navigation channel and is composed of coarse sand (1mm-2mm grain size) with frequent crushed shell and sub-angular cobbles (Plate 7). Approximately 100m from the survey start point the intensity of

broken/crushed shell greatly increases to form a primary seabed deposit, overlying the hard sand and cobble bottom (Plate 8). Occasional limestone boulders were visible along the outer survey area and provide anchoring points for marine vegetation.

Visual Survey and Assessment

A systematic visual survey of the seabed was conducted along the identified survey area and extended beyond the boundaries of the pipeline impact area. Considerable man-made debris was visible on the seabed surface for much of the survey area. This debris included disused lobster pots, mooring lines/cables, broken bottles, modern ceramic fragments, and butchered bone (Plate 9). No further archaeological material or structures were encountered as part of the survey.

Magnetometer Survey

The sandy bottom composition and good visibility present provided ideal conditions for magnetometer use. A high hit ratio of targets was encountered for the first 100m of the survey and constituted a ratio of 1 target for every 1m-2m squared. This ratio fell to 1 target every 3-4m squared for the southern half of the survey area (Figure 5). Over 90% of the hits encountered were located sub-surface. All material identified was of modern origin. Inspection of the surface targets included fragments of iron piping, narrow gauge link-chain, mooring cable, wheel hubs used as sinkers, disused lobster pots, and miscellaneous debris from fishing vessel activity.

Conclusion

The assessment was comprehensive and extended beyond the site boundaries as indicated. While, no archaeologically significant materials/ structures were observed during either the in-water or intertidal assessment, it should be remembered that the possibility that archaeological materials/ structures lie buried within the seabed still remains. In fact, Lough Foyle may be considered to be of high archaeological potential, given the long maritime use of these waters and the number of wrecks listed for this area.

6.0 PROPOSED IMPACTS⁸

Specific engineering details relating to the pipe insertion are currently not available for consultation, however, it is understood that a pipe trench measuring 1 width, 1.5m in depth, and approximately 300m in length will be excavated to accommodate the effluent pipe⁹. The excavation will be carried out using a backhoe dredger (or similar). This process will necessitate a direct impact on the seabed that will result in significant disturbance. However, based on the evidence acquired to date, no visible, surface, archaeological material of structures will be impacted by the pipe trench.

7.0 RECOMMENDATIONS

Pre-construction Measures

No further ameliorative measures are recommended in advance of the construction Works commencing.

Construction Phase Measures

ARCHAEOLOGICAL MONITORING. Archaeological monitoring licensed to the Department of the Environment, Heritage and Local Government is recommended during all foreshore/ seabed disturbances. A suitably qualified archaeologist with experience in marine environments should be present on board the dredging platform during excavation of the pipe trench and should be allowed to inspect all excavated seabed. The archaeological monitoring should be undertaken with the proviso for full excavation of any archaeologically significant material uncovered as part of the operation.

RETAINING AN ARCHAEOLOGIST/S. An archaeologist should be retained for the duration of the relevant works.

THE TIME SCALE for the construction phase should be made available to the archaeologist, with information on where and when ground disturbances and dredging will take place.

SUFFICIENT NOTICE. It is essential for the developer to give sufficient notice to the archaeologist/s in advance of the construction works commencing. This will allow for prompt arrival on site to monitor the ground disturbances. As often happens,

⁸ Based on information forwarded by JB Barry and Partners Ltd.

⁹ Personal communication: Caitriona Cunningham, JB Barry and Partners Ltd.

intervals may occur during the construction phase. In this case, it is also necessary to inform the archaeologist/s as to when ground disturbance works will recommence.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeological features or material being uncovered during the construction phase, it is crucial that any machine work cease in the immediate area to allow the archaeologist/s to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once the presence of archaeologically significant material is established, full archaeological recording of such material is recommended. If it is not possible for the construction works to avoid the material, full excavation would be recommended. The extent and duration of excavation would be a matter for discussion between the client and the licensing authorities.

ARCHAEOLOGICAL TEAM. It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This would be complimented in the event of a full excavation.

ARCHAEOLOGICAL DIVE TEAM. It is recommended that an archaeological dive team be on standby to deal with any underwater rescue excavation. This team will carry the necessary commercial dive insurance, be fully certified to HSA requirements, and will conduct its work according to Safety in Industry (Diving Operations) Regulations 1981, SI 422.

SECURE SITE OFFICES and facilities should be provided on or near those sites where excavation is required.

FENCING/BUOYING of any such areas would be necessary once discovered and during excavation.

ADEQUATE FUNDS to cover excavation, post-excavation analysis, and any testing or conservation work required should be made available.

MACHINERY TRAFFIC during construction must be restricted as to avoid any of the selected sites and their environs.

PLEASE NOTE: All of the above recommendations are based on the information supplied for Moville and Greencastle Wastewater Scheme, Co. Donegal. Should any alteration occur, further assessment maybe required.

PLEASE NOTE: Recommendations are subject to the approval of The Department of the Environment, Heritage and Local Government, and of the National Museum of Ireland at the Department of Arts, Tourism, and Sport.

8.0 ACKNOWLEDGEMENTS

Thanks are extended Caitriona Cunningham, JB Barry and Partners Ltd. The survey team included Rex Bangerter (Project Maritime Archaeologist), Jimmy Lenehan (Maritime Archaeologist), and Brian MacAllister (Dive supervisor). The report was written by Bangerter and edited by Dr. Niall Brady (Project Manager).

Appendix 1: Inventory of Shipwrecks surrounding Inishowen Peninsula.

Name	<i>Albatross</i>
Date of Loss:	Unknown
Location:	150m from Broomhall Light, off Moville
Position:	N/a
Wreck no.:	N/a
Description:	This vessel sank after colliding with the <i>Mayflower</i> .
Sources:	Bourke, 1994, 202
Name:	<i>Anna</i>
Date of Loss:	9 th January 1852
Location:	Off Redcastle, Lough Foyle
Position:	N/a
Wreck no.:	N/a
Description:	This 174-ton <i>brig</i> was en route from Ibrail to Londonderry, with nine crewmembers and a cargo of corn. She became stranded in a NNW force 9 wind and was a total loss. Three lives were lost.
Sources:	CSP, 1852-3, Vol. XCVIII, 6/ CSP, 1861, Vol. LXIII, 39.
Name:	<i>Assurance</i>
Date of Loss:	18 th October 1941
Location:	Bluick Rock, north of Greencastle
Position:	55 13 00N, 06 56 12W
Wreck no.:	N/a
Description:	The wreck of this Admiralty <i>tug</i> is a regular dive site.
Sources:	Bourke, 1994, 215; Bourke, 1998, 163
Name:	Black Duck

Position:	23 rd October 1894
Location:	Near Moville
Position:	N/a
Wreck no.:	N/a
Description:	This wooden fishing <i>cutter</i> was 12 years old. The master and owner J. Butcher of Magilligan, Co. Londonderry. This vessel was lying moored in Lough Foyle, with no one aboard, when she was lost.
Sources:	CSP, 1896, Vol. LXXV, 124.
Name:	<i>Cock</i>
Date of Loss:	10 th August 1896
Location:	Moville
Position:	N/a
Wreck no.:	N/a
Description:	This eight-year old wooden fishing <i>smack</i> weighed two tons. The master and owner was T. Steed of Moville. The vessel was moored at Moville, with no one aboard, when she was lost.
Sources:	CSP, 1989, Vol. LXXXIII, 119.
Name:	<i>Eagle</i>
Date of Loss:	4 th January 1854
Location:	At new pier, Moville
Position:	N/a
Wreck no.:	N/a
Description:	This eighteen-ton <i>smack</i> of Moville was out fishing with four men aboard. She encountered an easterly force 8 wind with snow showers. She was wrecked due to the stress of weather and 'absence of crew'. The estimated loss on the vessel was £50.
Sources:	CSP, 1854, Vol. XXXIV, 12-3

Name:	<i>Eliza Anne</i>
Date of Loss:	21 st August 1892
Location:	West side of Moville pier
Position:	N/a
Wreck no.:	N/a
Description:	This ten-year old wooden fishing <i>cutter</i> weighed 2 tons. The owner and master was G. Steen of Moville. The ship was lying at Moville, with no one aboard, when she sank.
Sources:	CSP, 1895, Vol. LXXXVII, 107
Name:	<i>Fanny</i>
Date of Loss:	22 nd October 1853
Location:	Near new pier, Moville
Position:	N/a
Wreck no.:	N/a
Description:	This ten-ton <i>smack</i> of Culmore was en route from fishing grounds to Moville, in ballast, with four men aboard. She encountered a SSE force 10 wind and was abandoned by the crew. She became a wreck due to the stress of the weather and negligence. The estimated loss on the vessel was £60.
Sources:	CSP, 1854, Vol. XLII, 60-1.
Name:	<i>Fred</i>
Date of Loss:	1 st October 1882
Location:	Close to Moville coastguard station
Position:	N/a
Wreck no.:	N/a

Description:	This twenty nine year old wooden <i>schooner</i> of Cardiff weighed 78 tons. She was owned by M. Boyle of Rutland Is., Co. Donegal, and the master was J. Boyle. She was en route from Ardrossan to Killybegs, with four crewmembers and a cargo of coal. She became stranded in a SW force 10 gale and was a total wreck. There was no loss of life.
Sources:	Bourke, 1994, 216/ CSP, 1884, Vol. LXXXI, 'Standings', 102
Name:	<i>Gally</i>
Date of Loss:	21 st August. 1892
Location:	Greencastle
Position:	N/a
Wreck no.:	N/a
Description:	This three-year old wooden fishing <i>smack</i> weighed tree tons. The owner was Col. Stephenson of Co. Donegal. There was no one on board when she went down.
Sources:	CSP, 1895, Vol. LXXXVII
Name:	<i>Gazelle</i>
Date of Loss:	October 1897
Location:	Teere, Lough Foyle
Position:	N/a
Wreck no.:	N/a
Description:	This twenty two year old wooden fishing <i>smack</i> weighed fourteen tons. The master and owner was Mr. R. Stewart of Teere, Co. Donegal. She was lying on the beach at Teere, Lough Foyle when she was lost.
Sources:	CSP, 1899, Vol. LXXXVII, 125
Name:	<i>Gute Hoffnung</i>
Date of Loss:	December 1814
Location:	Tuns Bank, off Moville
Position:	N/a

Wreck no.:	N/a
Description:	N/a
Sources:	Bourke, 1994, 202
Name:	<i>Harmony</i>
Date of Loss:	14 th March 1853
Location:	Greencastle
Position:	N/a
Wreck no.:	N/a
Description:	This thirty-seven ton <i>schooner</i> of Londonderry was en route from Lough Swilly to Glasgow with a crew of three and a cargo of Chemical stuffs. She encountered a force 9 wind with thick and rainy conditions. The ship became stranded on the rocks due to the stress of the weather, the dark night, and the minimal crew numbers. The crew survived and the vessel was got off the following July. The estimated loss on the vessel was £100 and she was not insured. The estimated loss of cargo was £130, which was insured with Lloyd's for £140.
Sources:	CSP, 1854, Vol. XLII, 22-3
Name:	<i>Jabez</i>
Date of Loss:	7 th December 1851
Location:	Moville Bay
Position:	N/a
Wreck no.:	N/a
Description:	This Greenock <i>sloop</i> was en route from Derry to Killybegs when she struck a bank and sprung a leak. She was taken to Derry to discharge.
Sources:	CSP, 1852, Vol. XLIX, 274-75
Name:	<i>Kathleen</i>
Date of Loss:	23 rd October 1856
Location:	North of Greencastle

Position:	N/a
Wreck no.:	N/a
Description:	This two hundred and sixteen ton vessel of Portsmouth was en route from Alexandria with a cargo of wheat when she went ashore.
Sources:	Bourke, 1988, 141
Name:	<i>Lady Hill</i>
Date of Loss:	18 th February 1809
Location:	Moville Bay
Position:	N/a
Wreck no.:	N/a
Description:	This vessel was under the command of Balfour when she went ashore.
Sources:	L.L. No. 4331, 28 th February 1809
Name:	<i>Lyle</i>
Date of Loss:	19 th February 1879/ 18 th March 1878
Location:	Lough Foyle
Position:	N/a
Wreck no.:	N/a
Description:	Lough Foyle (Co. Donegal?), Official No. 44,794. This fifteen year old iron <i>steamship</i> of Glasgow weighed thirty-two gross and twenty-six net tons. She was built in Maryhill, Lanark, and measured 63 x 11,9 x 5.9 feet. She had 14hp engines. The owner was R> Moffat of Paisley and the master was J. Prearty. She was en route from Ramelton to Derry or vice versa with twenty six crew and a cargo of manure, slate, and timber. She developed a leak, was brought up and sank at her anchor. The casualty was attributed to the vessel's defective hull.
Sources:	CSP, 1878-79, Vol. LXIV, 'Foundering's/ CSP, 1880, Vol. LXVI, 18-19.
Name:	<i>Mary</i>
Date of Loss:	6 th February 1822

Location:	Moville
Position:	N/a
Wreck no.:	N/a
Description:	This vessel was en route from Liverpool, under Captain McLish, when she went ashore.
Sources:	Bourke, 1998, 148
Name:	<i>Mary Anne</i>
Date of Loss:	9 th November 1882
Location:	Strabreaga Bay (Trabreaga, Inishowen)
Position:	N/a
Wreck no.:	N/a
Description:	This twenty-two year old wooden <i>schooner</i> of Liverpool weighed 136 tons. She was owned by Job Bros. Of Liverpool and the master was D.B. Clarke. She was en route from Liverpool to Heart's Content. N.F.L with eight crewmembers and a general cargo. She became stranded in a NNW force 9 gale and was a total wreck. There was no loss of life.
Sources:	Bourke, 1994, 201/ CSP, 1884, Vol. LXXI, 'Strandings', 107
Name:	<i>Mary Jane</i>
Date of Loss:	19 th August 1893
Location:	Shrove, Lough Foyle
Position:	N/a
Wreck no.:	N/a
Description:	This one-year old wooden fishing <i>smack</i> weighed two-tons. The master and owner was J. Smith of Shrove. There was no crew aboard when she became stranded.
Sources:	CSP, 1895, Vol. LXXXVII, 118
Name:	<i>Mary Sproat</i>

Date of Loss:	1889
Location:	Moville Bay
Position:	N/a
Wreck no.:	N/a
Description:	This <i>brigantine</i> was noted by the Light-keeper at Inishowen East. She was later run down by a steamer and sank in the bay.
Sources:	CSP, 1894, Vol. LXXVI, 'Floating Derelicts', 85
Name:	<i>Mayflower</i>
Date of Loss:	Unknown
Location:	c.150m from Broomhall Lighthouse, Moville
Position:	N/a
Wreck no.:	N/a
Description:	The vessel sank after colliding with the <i>Albatross</i> .
Sources:	Bourke, 1994, 202
Name:	<i>Napoleon</i>
Date of Loss:	8 th November 1876
Location:	West side of Inishowen, near mouth of Lough Foyle
Position:	N/a
Wreck no.:	N/a
Description:	This ten-year old wooden <i>schooner</i> of Aberystwyth weighed 54 tons. She was classed by Llyod's as 'A1, Red, 9.76, S.S. Abs. 76, 5 years'. The vessel was owned by Mr. R. Lewis of Aberdovey. The master was Roberts. She was en route from Derry to Gloucester with three crew and a cargo of oats. She became stranded in an easterly force 6 wind.
Sources:	CSP, 1877, Vol. LXXV, 'Strandings', 95
Name:	<i>North Esk</i>

Date of Loss:	30 th September 1847
Location:	Ennishowne (Inishowen?)
Position:	N/a
Wreck no.:	N/a
Description:	This tow hundred and eight ton vessel was on the shore.
Sources:	CSP, 1851, Vol. LII, 30.
Name:	<i>Opreisning</i>
Date of Loss:	29 th December 1816
Location:	Near Moville
Position:	N/a
Wreck no.:	N/a
Description:	This vessel was en route from Drondheim to Derry, under Captain Hanson, when she went ashore.
Sources:	Bourke, 1988, 142
Name:	<i>Petrel</i>
Date of Loss:	21 st August 1892
Location:	West side of Moville Pier, Lough foyle
Position:	N/a
Wreck no.:	N/a
Description:	This nine-year old wooden fishing boat weighed two-tons. The owner and master was J. Boyce of Moville. The vessel was lying at the west side of Moville Pier, Lough Foyle.
Sources:	CSP, 1895, Vol. LXXXVII, 107
Name:	<i>Rob Roy</i>
Date of Loss:	12 th April 1905

Location:	Near Greencastle Station
Position:	This unregistered wooden fishing <i>cutter</i> weighed seven tons and was three years old. The master and owner was D. Begley of Greencastle. She was moored at Greencastle, in ballast, with no one aboard. She became stranded on rocks in a southerly force 10 wind and was a total wreck.
Wreck no.:	N/a
Description:	N/a
Sources:	CSP, 1906, Vol. CVIII, 137 (627); Report on the Sea and Inland Fisheries of Ireland for 1905, xxiv
Name:	<i>Sardinian</i>
Date of Loss:	10 th May 1878
Location:	Moville
Position:	
Wreck no.:	
Description:	This tree-year old iron <i>steamship</i> of Glasgow weighed 2,577 tons. The vessel was owned by R.G. Allan of Liverpool and the master was J.E. Dutton. She was en route from Liverpool to Quebec with 103 crew, 415 passengers and a general cargo. There was an explosion in her main hold, caused by escaping gas from the ship's coal supply. The vessel was a total loss and three crewmembers and one passenger were lost.
Sources:	CSP, 1878-79, Vol. LXIV, 127
Name:	<i>Sealer</i>
Date of Loss:	10 th March 1875
Location:	Moville Bay
Position:	N/a
Wreck no.:	N/a

Description:	This thirty-two ton old wooden <i>brigantine</i> of Londonderry weighed ninety-tree tons. The vessel was owned by Mr. T. Lindsay and the master was J. Duffy. She was en route from Moville to Irvine, in ballast, with five crewmembers aboard. She was stranded in a SE force 8 gale.
Sources:	Bourke, 1994, 216/ CSP, 1875, Vol. LXX, 'Strandings', 65
Name:	<i>Stipey</i>
Date of Loss:	Unknown
Location:	Outside Moville
Position:	55 11N, 07 02W
Wreck no.:	N/a
Description:	This wooden vessel was left unattended while at anchor. The vessel caught fire and sank in 10 meters of water. All the crew were ashore.
Sources:	Bourke, 1994, 203; Bourke, 1998, 163
Name:	<i>Trinidad Valencera</i>
Date of Loss:	16 th September 1588
Location:	Glenagivney Bay, near Kinnagoe, Inishowen
Position:	55 15 42N, 07 00 18W
Wreck no.:	006001634
Description:	This 1,100-ton Venetian merchant ship was allocated to Martin de Bertendona's Levant Squadron of the Spanish Armada. She carried her own armament of 28 pieces, a large Turkish gun and 3 big siege guns. Her 32 bronze guns, crew of 79 seamen and a contingent of 281 troops made her the fourth largest unit in the fleet. She was constructed of oak with 13mm diameter iron fastenings with 25mm diameter heads. The wreck was located by the Derry Sub-Aqua Club in 1971. A pre-disturbance survey was carried out in 1971 and the site was excavated in the period between 1973 and 1983. 'No coherent remains of the hull survived, apparently because of rusting of the iron bolts, exacerbated by wave and current action, brought about its total disintegration in a relatively short time.' Sealed scour pits contained organic debris including splinters, hull components, wood, leather, bone, and textile objects, metal, stone, and pottery artefacts. It is thought that the bell at the Churh of Ireland at Carndonagh may be from this vessel.

Sources:	Admiralty Data 1996/ Bourke, 1994, 205/ Flanagan, L. 1988/ McCaughan, M & Appleby, 61-70.
Name:	<i>Vixen</i>
Date of Loss:	21 st August 1892
Location:	Greencastle
Position:	N/a
Wreck no.:	N/a
Description:	This two-year old wooden fishing <i>smack</i> weighed two tons. The owner was Nolan of Greencastle. There was no one on board when she sent down.
Sources:	CSP, 1895, Vol. LXXXVII, 107
Name:	<i>Woolton</i>
Date of Loss:	1 st October 1882
Location:	Near Moville
Position:	N/a
Wreck no.:	N/a
Description:	This 194-ton <i>barque</i> was en route from Newcastle upon Tyne to Kingston with a cargo of coal.
Sources:	Bourke, 1994, 215
Name:	<i>Unknown</i>
Date of Loss:	30 th June 1907
Location:	½ mile east of Moville Light
Position:	N/a
Wreck no.:	N/a

Description:	This new unregistered wooden sailing <i>yacht</i> weighed around one-ton. The vessel was owned by G. MacDonald of Moville. The vessel was operating out of Moville, on a pleasure trip, in ballast. She capsized in a NNE force 5 wind but was later recovered. Five people were aboard and one life was lost.
Sources:	CSP, 1908, Vol. XCVI, 155, 623

Appendix 2: Sites listed in the Record of Monuments and Place for the townlands surrounding the proposed development.

RMP Number:	DL 022-001
Site Type:	Rectangular Enclosure
Townland:	Carrowtrasna
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22/03/02
National Grid Reference:	26757E, 44197N
RMP Number:	DL 022-002
Site Type:	Ecclesiastical Remains
Townland:	Carrowtrasna
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22/03/01
National Grid Reference:	26713N, 44164N
RMP Number:	DL 022-002/01
Site Type:	Church Site and Graveyard
Townland:	Carrowtrasna
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22/03/01
National Grid Reference:	26713N, 44164N
RMP Number:	DL 022-002/02
Site Type:	Cross-Slab
Townland:	Carrowtrasna
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22/03/01
National Grid Reference:	26713N, 44164N
RMP Number:	DL 022-002/03
Site Type:	Quern Stone
Townland:	Carrowtrasna
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22/03/01
National Grid Reference:	26713N, 44164N
RMP Number:	DL 022-002/04
Site Type:	Cross
Townland:	Carrowtrasna
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22/03/01
National Grid Reference:	26713N, 44164N
RMP Number:	022-003
Site Type:	Castle
Townland:	Eleven Ballyboes
County:	Donegal

OS 6" Sheet:/ Plan/ Trace:	22
National Grid Reference:	-----
RMP Number:	022-004
Site Type:	Church
Townland:	Eleven Ballyboes
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22-06-2
National Grid Reference:	-----
RMP Number:	022-005
Site Type:	Standing Stone
Townland:	Ballybrack
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22-5-3
National Grid Reference:	26329E, 43967N
RMP Number:	022-006
Site Type:	Standing Stone
Townland:	Carnagrove
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22-5-5
National Grid Reference:	26276E, 43924N
RMP Number:	022-007
Site Type:	Holly Well
Townland:	Eleven Ballynally
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22-12-3
National Grid Reference:	26082E, 43863N
RMP Number:	021-011
Site Type:	Cross Slab
Townland:	Cooley
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22
National Grid Reference:	26138E, 43851N
RMP Number:	21-010
Site Type:	Ecclesiastical Remains
Townland:	Cooley
County:	Donegal
OS 6" Sheet:/ Plan/ Trace:	22
National Grid Reference:	-----



Plate 1: Satellite image of Inishowen Peninsula showing entrance to Lough Foyle; Greencastle Survey Area indicated.

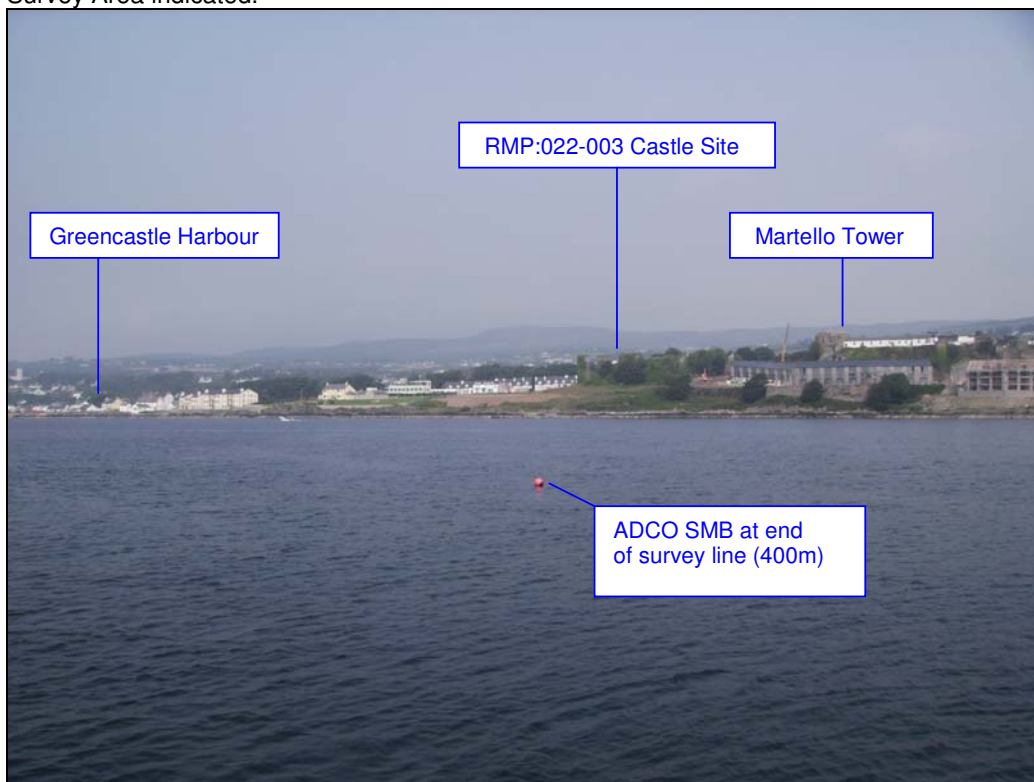


Plate 2: West-facing view of shoreline in vicinity of proposed pipeline route.



Plate 3: Southeast-facing view of Greencastle Fortification (RMP:022-003).



Plate 4: Southeast-facing view of Martello Tower located adjacent to Greencastle fortification.



Plate 5: East-facing view of steep slope located beneath bedrock drop-off at start of survey (as Indicated in Figure 5).

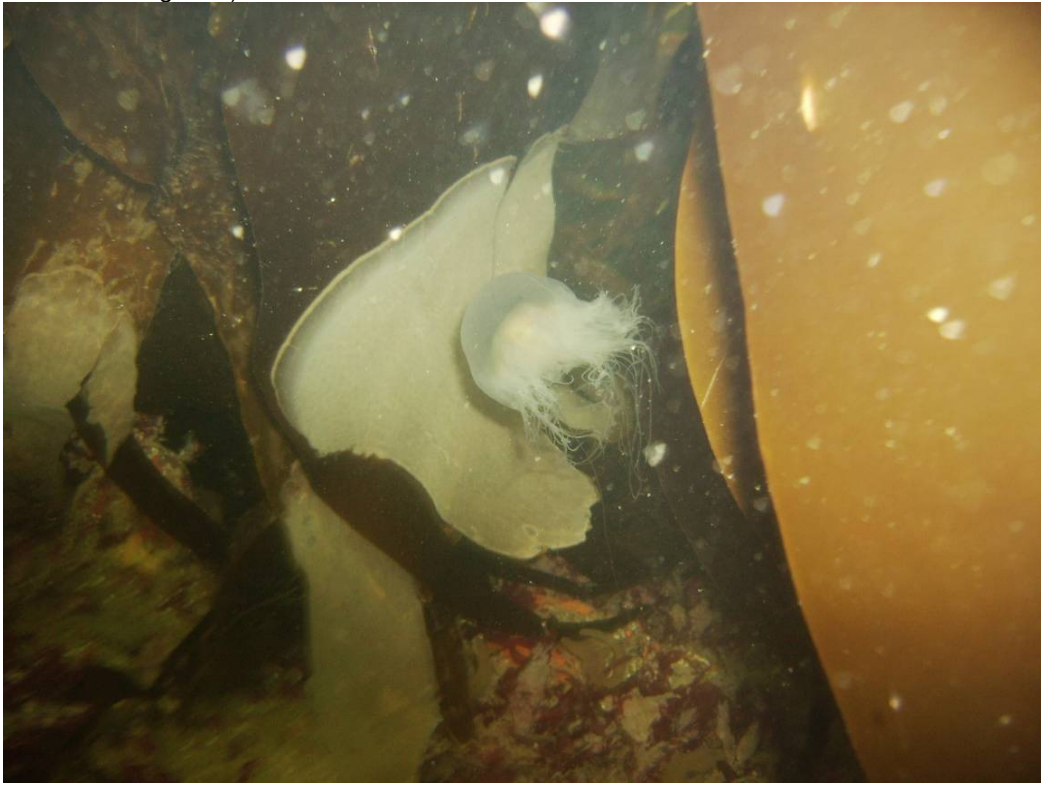


Plate 6: General view of thick kelp and bedrock outcropping located beneath bedrock drop-off at start of survey area (as indicated in Figure 5)

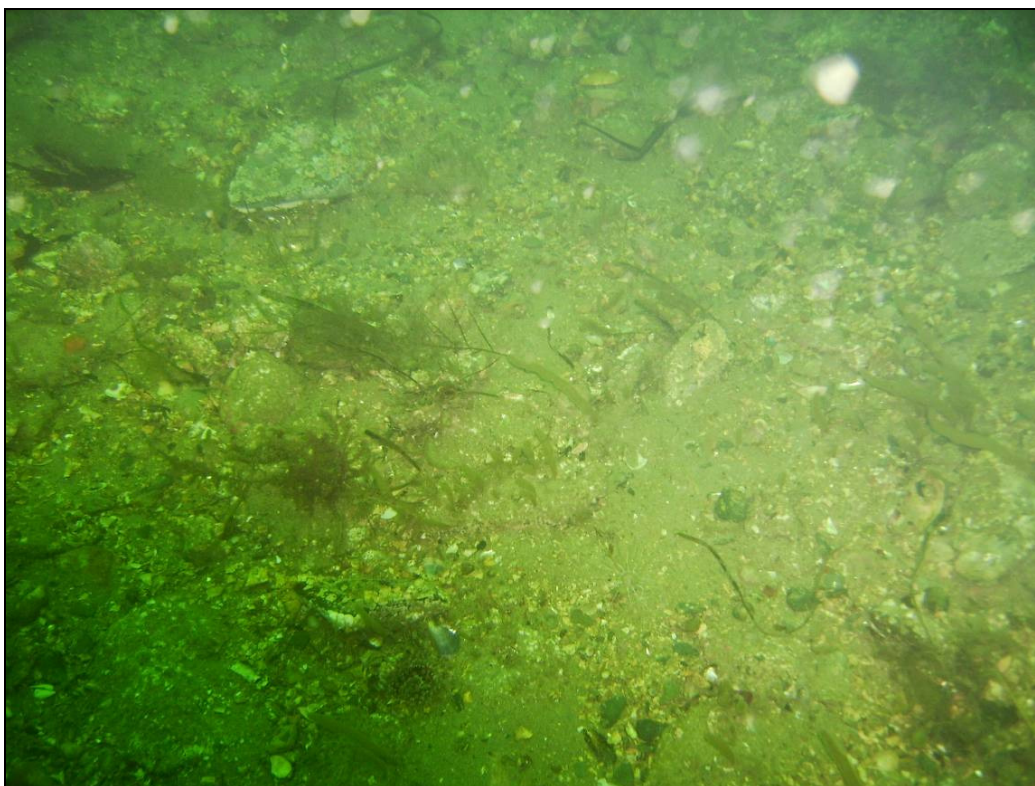


Plate 7: Exemplar shot of coarse sand and cobble seabed located between 20m-100m from the survey start point (as indicated in Figure 5).



Plate 8: Exemplar shot of crushed/broken shell deposit located over much of the survey area (as indicated in Figure 5).



Plate 9: Shot of one of the disused lobster pots located c.80 from start of survey area.



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Client
JB Barry & Partners Ltd.

Project
Moville - Greencastle Sewerage Scheme

Notes

Job/Exc No.
06D046

Compiled by
R.Bangerter

CAD reference
Walnut - ADCO

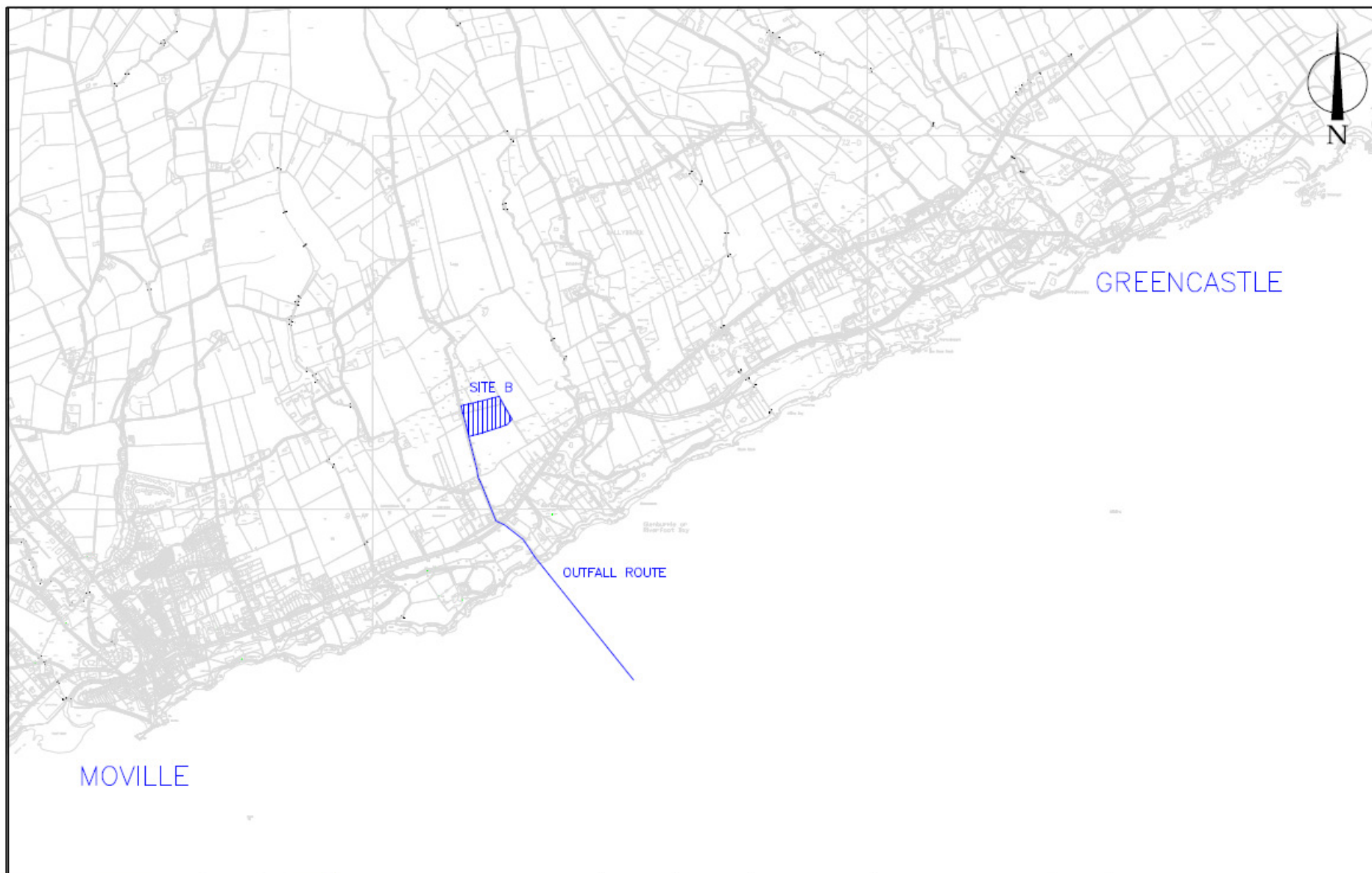
Title

Figure 1- Discovery Series Map showing location of ADCO Survey Area, north of Greencastle Harbour.

Date
July 2006

Scale
nts

Drawing No.
Fig. 1



**THE ARCHAEOLOGICAL
DIVING COMPANY LTD.**
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Notes
This outfall location was surveyed by ADCO Ltd
in June 2005 (Licence 05D085).

Job/Exc No.
06D046

Compiled by
R.Bangerter

CAD reference
Walnut -ADCO

Client
JB Barry & Partners Ltd.

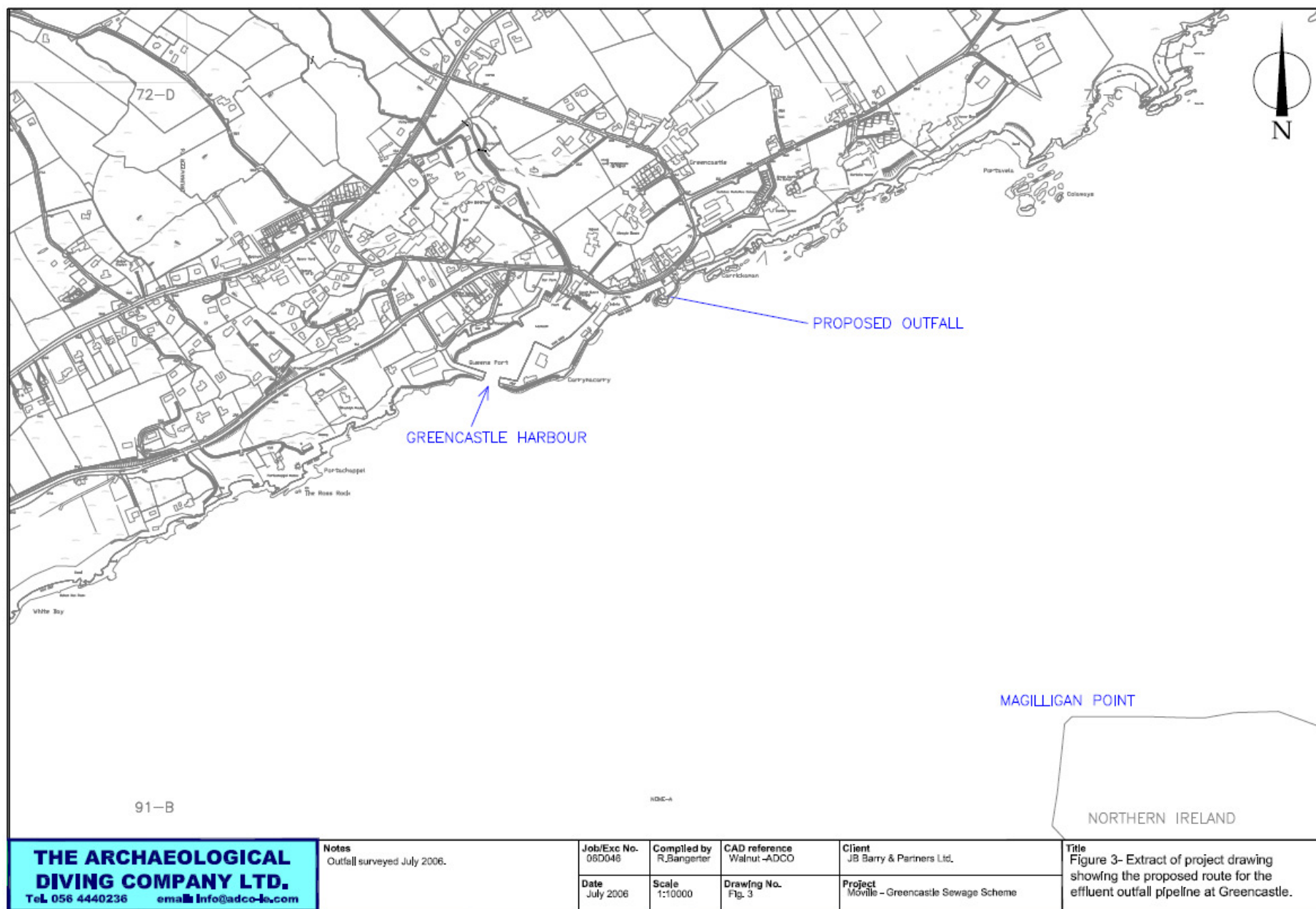
Date
July 2006

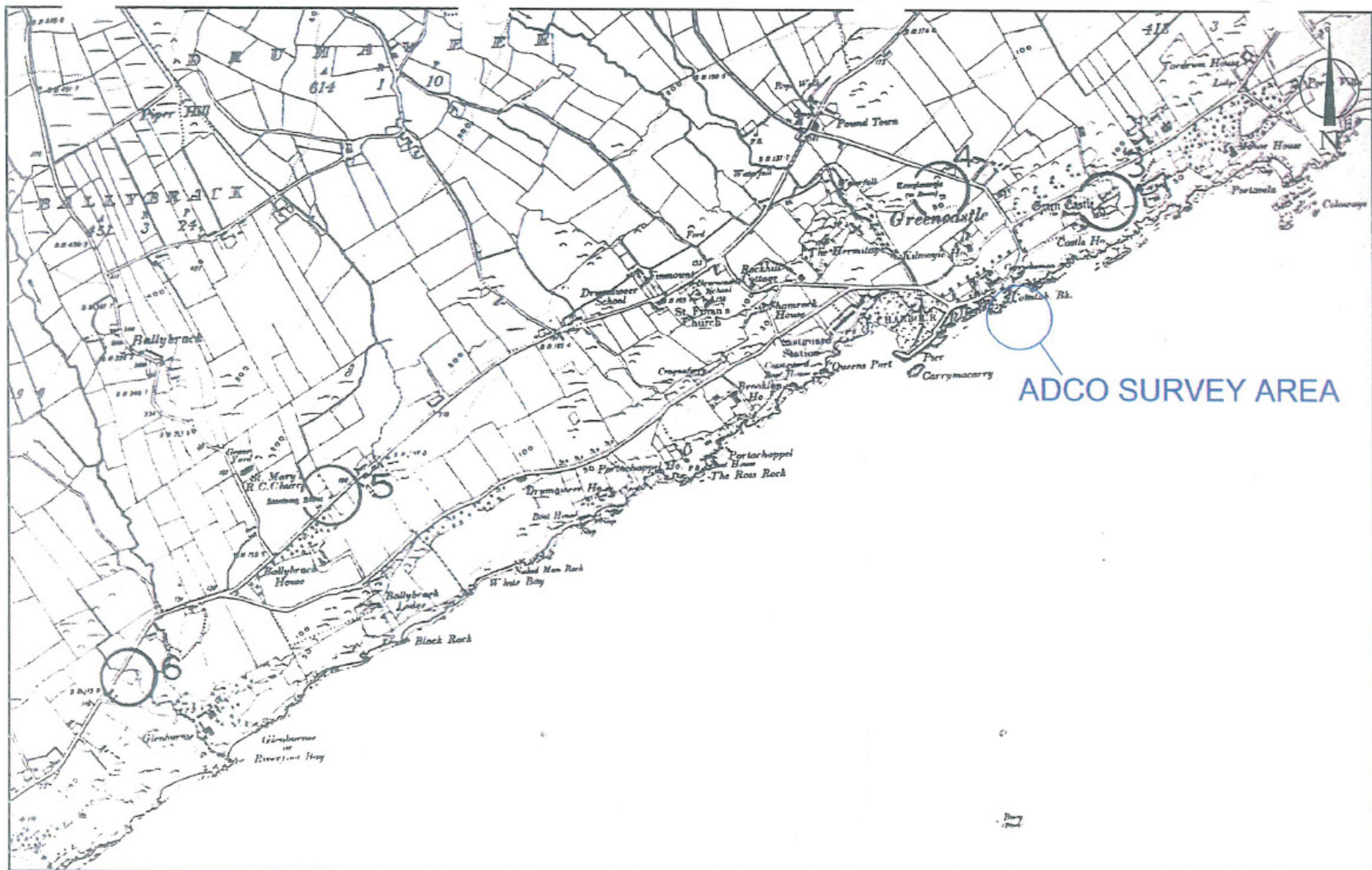
Scale
1:20000

Drawing No.
Fig. 2

Project
Moville - Greencastle Sewage Scheme

Title
Figure 2- Extract of project drawing
showing earlier route of proposed effluent
outfall pipeline at Moville (Option B).





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Notes

Job/Exc No.
06D046

Compiled by
R. Bangerter

CAD reference
Walnut-ADCO

Client
JB Barry & Partners Ltd.

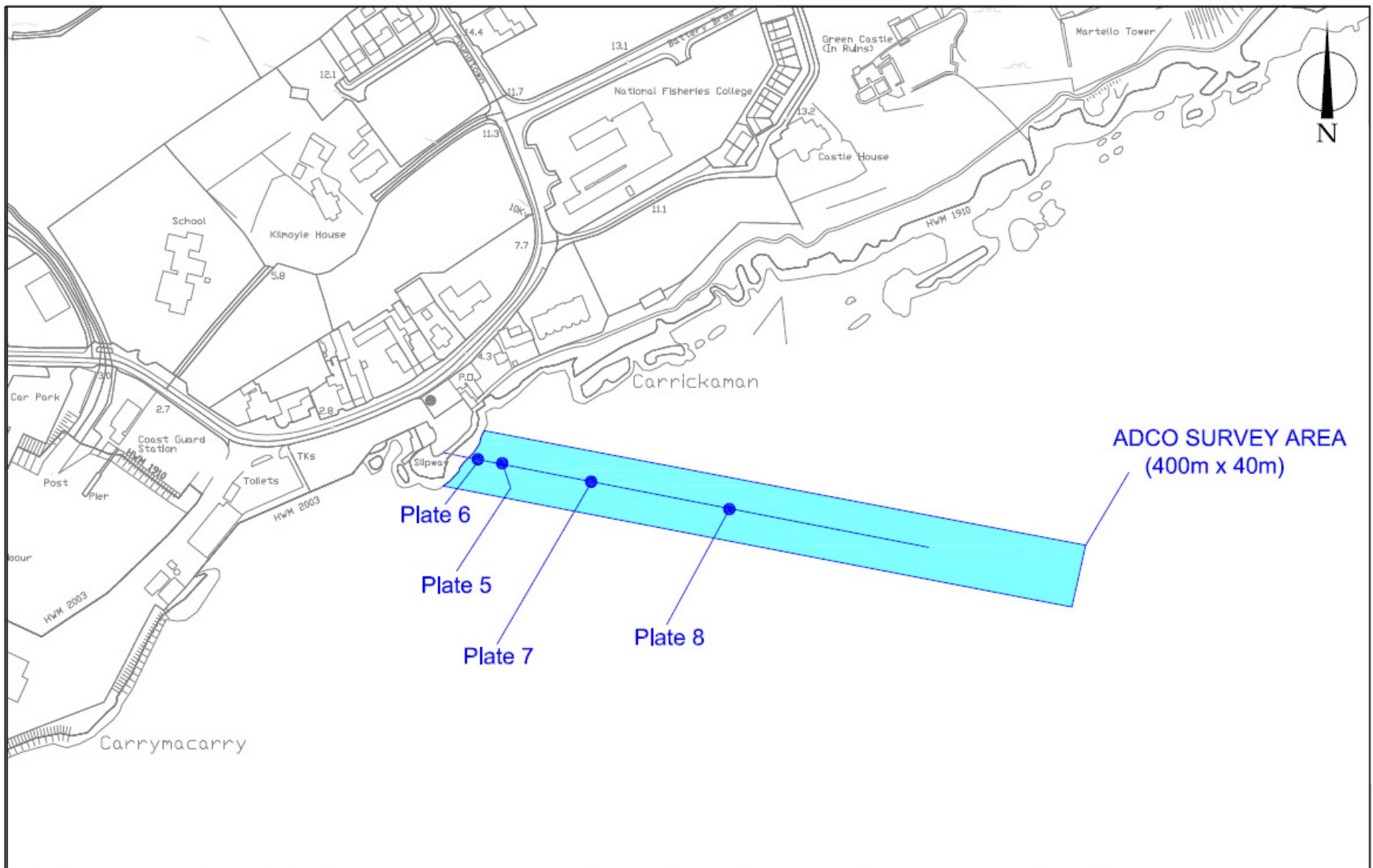
Date
July 2006

Scale
nts

Drawing No.
Fig. 4

Project
Moville - Greenacres Sewerage Scheme

Title
Figure 4- Extract from RMP sheet 22
(OS 6") showing ADCO survey area and
surrounding townlands.



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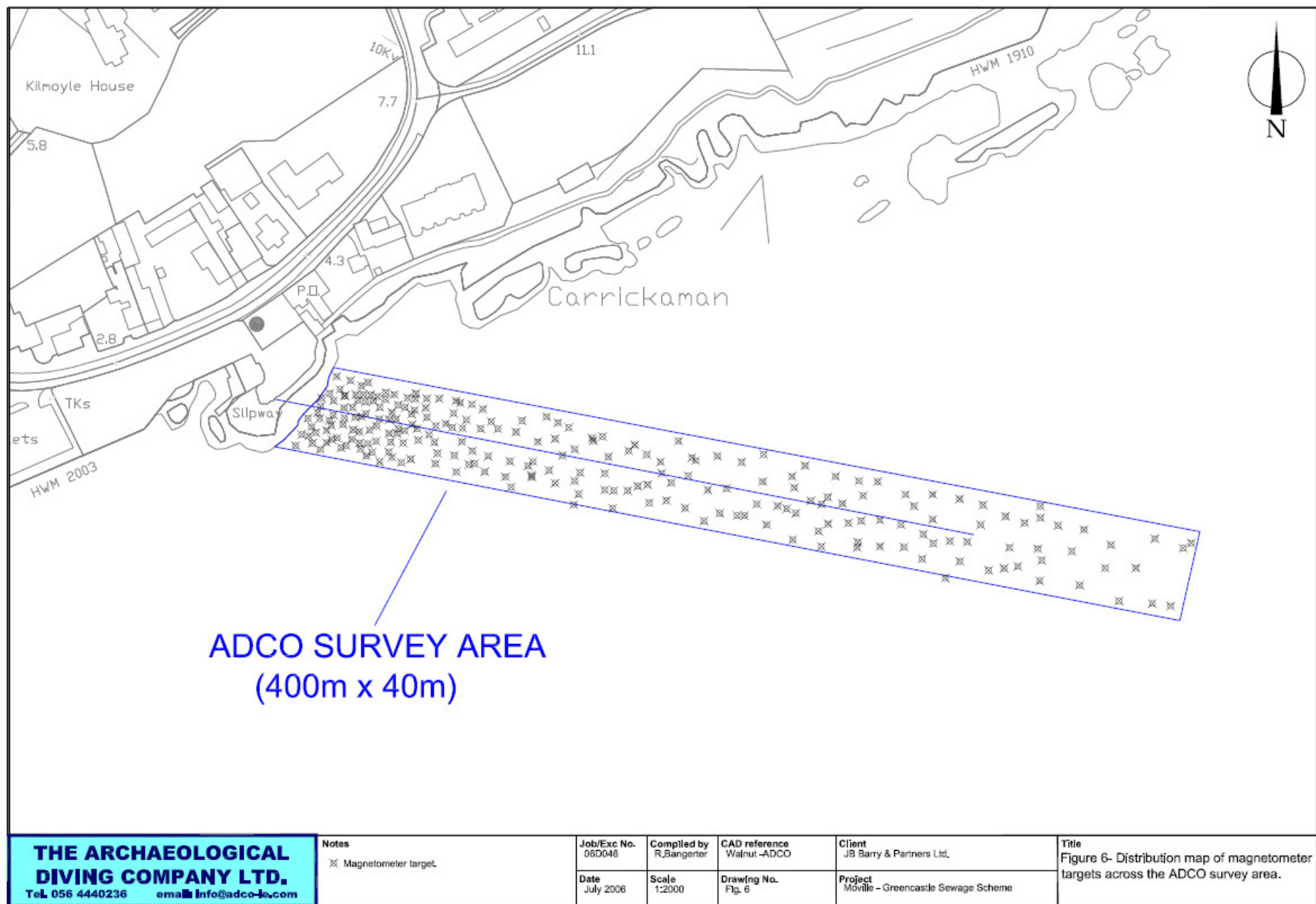
Title
Figure 5- ADCO underwater survey area
at the proposed location of the Greencastle
effluent outfall pipeline.

Date
July 2006

Scale
1:3000

Drawing No.
Fig. 5

Project
Merville - Greencastle Sewage Scheme



b. Bibliography

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c. RECEIVING ENVIRONMENT

County Donegal on the northwest coast features a physical landscape of upland mountain ranges, rivers, lakes, bays, inlets and blanket bogs which cover much of the county. The archaeological record of stray finds of flint artefacts from around the county tells us it has been a location of human activity for c.9, 000 years. The first evidence of permanent human settlement in the area is well represented by the number of megalithic structures distributed throughout the county from the passage tombs of the Neolithic from c. 4000BC to the wedge tombs of the Bronze Age from c.2500BC. Evidence for Iron Age activity is best witnessed in the hilltop enclosures and associated tumuli. Christianity arrived in the 5th century and would play an important role in the development of the cultural landscape of the county. The monuments of this era include ringforts, churches and other religious sites, many commemorating St Patrick and St Collmille, the Donegal man who allegedly converted Scotland to Christianity. The Anglo Norman arrival in the 12th century saw the emergence of castle building, a tradition that was continued by the Gaelic Irish in the form of tower houses from the end of the 14th century. Gaelic Chieftans would have been heavily involved in patronising many of the ecclesiastical houses that emerged right up to the 17th century. Donegal's importance as a strategic military point and centre of commerce is attested to by the number of military fortifications at coastal locations, many of which were constructed or reoccupied during the Tudor Reconquest and Cromwellian periods, and the ports that facilitated travelling merchants from prehistory right to the present day.

The Inishowen Peninsula (Inis Eoghain - Owen's Island) is surrounded by Lough Foyle to the east and Lough Swilly to the west with the Atlantic forming its northern border, water bodies that have played pivotal roles in the development of the region. There are a large number of megalithic monuments, standing stones and stone rows distributed throughout the higher ground in the area, particularly on the west side of the peninsula. The area is said to take its name from Owen, son of Niall of the Nine Hostages, one of the ancient Uladh tribe who captured St. Patrick and brought him to Ireland. Inishowen was part of the great northern kingdom of Uí Neill and was ruled from the royal place at Grianan Aileach, a hill-top enclosure commanding views over Lough Foyle and Lough Swilly dating back to 1700 B.C. Legend attributes the site to the Tuatha de Danann. From the 5th to the 12th century AD it served as the royal seat of the O'Neill sept of Aileach until it was destroyed by Murtoigh O'Brien, king of Munster in 1101. To make the demolition complete, the king ordered each of his soldiers to take away a stone from the fort. For seven centuries Inishowen was ruled by the O'Doherty family who had close alliances with the O'Donnells of West Donegal and the O'Neills of Tyrone.

Moville and Greencastle are just two of the many coastal port towns along the Inishowen peninsula. These two fishing villages, overlooked by the Knockaulin mountain range and separated by c.5 km of coastline are located in a strategic position on the south- west of the peninsula on the entrance into Lough Foyle. Moville takes its name from the Gaelic *Maigh Bhile* ("the place of the sacred tree" or "the plain of the ancient tree") but the Gaelic

name today is *Bun an Phobail* (pronounced bunafobble) ("the foot, or end, of the parish"). This may be a deviation of *Bunafebhall* ("the town at the mouth of the Foyle"). Greencastle takes its name from the impressive castle situated on the coast there. The available documentary evidence tells us that the area has been the focus of cultural activity from prehistory with a number of recorded RMP sites in the area. The earliest evidence we have for human occupation of this area comes from a number of flint finds from Greencastle (Richard Crumlish, Archaeological Services Unit Ltd, Purcell House, Oranmore, Co. Galway, Excavations 2000).

d. CATALOGUE OF ARCHAEOLOGICAL SITES

This catalogue details the archaeological sites recorded during the paper survey and the field inspection. It consists of nine sites, eight of which are recorded in the Record of Monuments and Places (RMP), one site of identified during field inspection and cartographic evidence. The catalogue entries provide locational information, a description, an outline of the potential impact of the development and recommendations towards the mitigation of this impact. The locations of all of the sites in proximity to the proposed development areas are shown on Figures 2- 6.

SITE A1	Figure 1, Pl.2
TOWNLAND	Eleven Ballyboes
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22
NGR	-
IDENTIFICATION	Cartographic, Extant, Donegal County Development Plan 2003 (Draft), Reg No. 4092202
SITE TYPE	Martello Tower & Barracks
R.M.P. NO.	-
PROXIMITY	c. 20m south of route of gravity sewer
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is marked on the 1st edition OS map (1837) as Greencastle Fort. It is located in Greencastle village on the western shore of Lough Foyle on a rock outcrop overlooking the cliffs with a strategic command of this section of the Foyle. The site consists of a Martello tower with a curved and vaulted chamber below gun platform over basement and a 2 storey former barracks to the north- east.

At the beginning of the 19th century a large number of Martello towers were built in order to defend against the threat of an invasion of Ireland by Napoleon. Six were constructed around Lough Swilly and two at the mouth of Lough Foyle from 1801, one at Magilligan and one in Greencastle. They were built in six short months at a cost of £1,800 and were each armed with cannon. When the Battle of Trafalgar had ended in 1805, the Martello Tower in Greencastle was extended to a Fort and completed in 1812. The building consisted of a lower and upper fort each armed with cannons. In 1838 the Fort was turned into a barracks when more than eighty men were stationed there. The last commander of the Fort was Captain Dunlop, who retired in 1870. During the latter half of the century the Fort was used as a recruiting depot but in 1891 it was considered obsolete. The Donegal Militia was the last military force to be stationed there.

The site is currently undergoing development with a number of modern dwellings in construction to the north of the tower and barracks structure.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE A2	Fig. 1, Pl. 3
TOWNLAND	Eleven Ballyboes
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22
NGR	-
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Castle
R.M.P. NO.	022-003
PROXIMITY	c. 10m south of route of Gravity Sewer in Greencastle
IMPACT CLASSIFICATION	Impact on Environs

DESCRIPTION

This site is marked on all editions of the OS maps. It is located in Greencastle village on the western shore of Lough Foyle on a rock outcrop overlooking the cliffs with a strategic command of this section of the Foyle. It consists of a much ruined Anglo- Norman castle with remnants of a curtain wall, keep and corner turrets including a polygonal tower at northeast.

The history of the castle is well documented. In 1305 the Red Richard de Burgo, the Red Earl of Ulster, erected a fortress in Inishowen, which the Irish called Newcastle, now known by the name of Greencastle. Locally the tradition had it that the Red Earl built this fortress as a protection against the O'Doherty's but the de Burgos came over with the Anglo- Normans in the time of Henry II, and were rewarded by the gift of Inishowen which, had been taken from the O Doherty's. It was also called Northburgh, and mentioned as such in the history of the Scottish invasion, under Edward Bruce, in 1315. Bruce does not seem to have held it long, for in 1332 we find the Dun Earl de Burgo, son of the Red Earl, in possession.

It was in the hands of the O'Donnell's by the 15th century. However, fighting within the O'Donnell clan resulted in a conflict during which help was procured from the Scotch and the castle was badly damaged by cannon in the ensuing war. The castle then fell into the hands of Chichester during the plantation in 1611 but eventually fell into disuse.

In 1996 archaeological excavations were undertaken close to the castle in advance of a proposed chalet development (Excavations 1996:060). Nine long, narrow trenches located north and west of the castle were excavated both by machine and by hand, down either to the depth of proposed disturbance, undisturbed natural or archaeological layers, whichever most appropriate. Two trenches produced archaeological strata.

Trench 3, approximately 15m north-west of the castle, yielded a layer of cobbles and medieval pottery, possibly representing a formalised routeway into the castle. The findings from this trench suggest that the castle gatehouse was approached from the north, close to the route of the proposed gravity sewer along the R241 north of the castle. It was recommended in consultation with the OPW, that development in the area of Trench 3, close to the castle be rerouted and ground disturbance in the area be avoided.

Trench 7, approximately 50m west of the castle had evidence of a disturbed ditch running north-east/south-west, cut into the subsoil. . It had a

maximum width of 8.4m across the top and 7.2m across the base. Within the ditch, undisturbed stratigraphy survived to a maximum depth of 0.74m. The ditch cut survived most completely to the north-west, but no evidence of an internal bank or associated features survived modern damage. The ditch fills were mostly silty organic gravels, out of which were recovered sherds of both glazed and unglazed, locally produced medieval pottery, along with fragments of tile, iron, worked stone and slag from the 13th and 14th centuries AD.

IMPACT

The proposed work will have a potential impact on the environs of this site.

RECOMMENDATIONS

Archaeological investigation in the form of controlled trial trenching is recommended for Site **A2**. Should any features or material of archaeological significance be uncovered, further mitigation measures will follow. The implementation of these mitigation measures should be conducted in advance of the construction phase. This will allow for the full establishment of the nature and extent of any remains at an early stage will allow for the implementation of a calculated and controlled mitigation programme and will assist in minimising the risk of delays at construction phase.

SITE A3	Figure 1, Pl. 4.
TOWNLAND	Eleven Ballyboes
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22-06-2
NGR	-
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Church
R.M.P. NO.	022-004
PROXIMITY	c. 20m west of route of Gravity Sewer in Greencastle
IMPACT CLASSIFICATION	Impact on Environs

DESCRIPTION

This site is marked on all editions of the OS maps. It is located in pasture land that rises to the north, north of Greencastle village on the west side of the third class road to Pound Town.

The site consists of a ruined church orientated east- west with walls surviving at south, east, and north to a height of c. 3.5m. The south wall shows evidence for an entrance at south- west, and for a possible window. The east wall also has a large window opening, as does the north wall close to the centre c. 2m from ground level. External buttress protrudes from all 3 extant walls at 1.5- 2m.

During field inspection it was noticed that this the road to the east curves significantly adjacent to the church. This curvature may well represent the bounds of an enclosure, commonly found surrounding ecclesiastical sites.

IMPACT

The proposed work will have a potential impact on the environs of this site.

RECOMMENDATIONS

Archaeological investigation in the form of controlled trial trenching is recommended for Site **A3**. Should any features or material of archaeological significance be uncovered, further mitigation measures will follow. The implementation of these mitigation measures should be conducted in advance of the construction phase. This will allow for the full establishment of the nature and extent of any remains at an early stage will allow for the implementation of a calculated and controlled mitigation programme and will assist in minimising the risk of delays at construction phase.

SITE A4	Figure 2, Pl. 8
TOWNLAND	Ballybrack
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22-5-3
NGR	26329/43967
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Standing Stone
R.M.P. NO.	022-005
PROXIMITY	5m north of route of Gravity Sewer
IMPACT CLASSIFICATION	Impact on Environs

DESCRIPTION

This site is indicated on the 1st and 3rd editions of the OS maps. It is located in a small field of pasture north of the old road from Moville to Greencastle c. midway between the two locations.

The site consists of a limestone standing stone orientated east- west and leaning to the south. The stone measures 1.93m in height, it's face is 0.92m and it is 0.27m thick with a rounded top. The stone has a number of stratified grooves and hollows which could merely represent water erosion.

IMPACT

The proposed work will have a potential impact on the environs of this site.

RECOMMENDATIONS

Archaeological investigation in the form of controlled trial trenching is recommended for Site **A4**. Should any features or material of archaeological significance be uncovered, further mitigation measures will follow. The implementation of these mitigation measures should be conducted in advance of the construction phase. This will allow for the full establishment of the nature and extent of any remains at an early stage will allow for the implementation of a calculated and controlled mitigation programme and will assist in minimising the risk of delays at construction phase.

SITE A5	Figure 3, Pl. 14
TOWNLAND	Carnagrave
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22-5-5
NGR	26276/43924
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Ringfort
R.M.P. NO.	022-006
PROXIMITY	c. 5m from gravity sewer
IMPACT CLASSIFICATION	Impact on Environs

DESCRIPTION

This site is indicated on the 1st and 3rd editions of the OS maps. It is located in the elbow of a stream west of Site **A7** on the north side of the new road (R238) from Moville to Greencastle and just to the southeast of proposed development Site B.

The 1st and 2nd ed. OS maps indicate a double banked enclosure at this location while the 3rd edition indicates a single banked enclosure. Today it consists of a single banked ringfort 50m in diameter with remnants of a second bank at north- west. The ditch is now filled. It is likely that the ringfort was partially destroyed during the construction of the road.

IMPACT

The proposed work will have a potential impact on the environs of this site.

RECOMMENDATIONS

Archaeological investigation in the form of controlled trial trenching is recommended for Site **A5**. Should any features or material of archaeological significance be uncovered, further mitigation measures will follow. The implementation of these mitigation measures should be conducted in advance of the construction phase. This will allow for the full establishment of the nature and extent of any remains at an early stage will allow for the implementation of a calculated and controlled mitigation programme and will assist in minimising the risk of delays at construction phase.

SITE A6	Figure 4
TOWNLAND	Ballynally
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22-09-1
NGR	-
IDENTIFICATION	Literary, Cartographic
SITE TYPE	Holy Well
R.M.P. NO.	022-007
PROXIMITY	c.100m south of gravity sewer on east side of Moville
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is indicated on the 1st and 3rd eds. OS maps. It is located on the coast on the east side of Moville. The site consists of a holy well associated with St. Columkille and is now a modern water- spout.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE A7	Figure 4
TOWNLAND	Cooley
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22
NGR	26138/43851
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Cross Slab
R.M.P. NO.	021-011
PROXIMITY	50m from gravity sewer on east side of Moville
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is not indicated on the 1st and 3rd eds. OS maps. Its site is located at the parochial house close to Moville town centre, on the north side of the R241 as it travels east towards Greencastle.

The site consists of a Latin wheeled cross slab, 0.61m x 0.15m that tapers to 0.08m at the end. The cross is not at its original location and came from Glenagivney where it was dug from the ground at a depth of 3 feet. It is most likely used as a grave marker.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE A8	Figure 5
TOWNLAND	Glencros
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22-12-3
NGR	26082/43863
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Bridge
R.M.P. NO.	021-009
PROXIMITY	On Bredagh River c.100m from gravity sewer on west side of Moville
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is indicated on the 1st and 3rd eds. OS maps. It is located northeast of Moville in the private grounds of Gulladoo House on the Bredagh river just south of proposed development Site A.

The site consists of a bridge claimed to have been erected in the 6th century. It would have served the community down to the erection of a new one around 1775. Wattle and daub marks are still visible on its arch. The bridge was most likely erected when Cooley Church was built, in order that people living on the left bank of the river might most conveniently cross to the right bank in all weathers for their worship.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE A9	Figure 5
TOWNLAND	Cooley
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22
NGR	-
IDENTIFICATION	Literary, Cartographic, extant
SITE TYPE	Ecclesiastical Remains
R.M.P. NO.	21-010
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is indicated on the 1st and 3rd eds. OS maps. It's site is located on good land on a steep hill that overlooks Lough Foyle and Moville, northwest of the town to the west of Bredagh Glen just southwest of proposed development Site A.

The site consists of Cooley cross and skull house. The site is said to be that of an early Christian monastery founded by St. Finian. The cross stands on the entrance to the graveyard. It dates back to before 1098. Within the grounds of the graveyard are remaining walls of a Monastery. Uncarved, the cross contains a pierced ring and a hole. Cooley Cross is a plain undecorated cross compared to others found in Inishowen. There is a footprint on the base stone which is supposed to be St. Patrick's.

The skull house is a stone structure closely modelled on a beehive hut. It was originally used as an oratory and then a mortuary. There are still bones to be seen inside and close by is a small stone inscribed with a cross. Although the graveyard is of fairly recent origin the skull house and the cross are the survivors of an earlier tradition.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

e. CATALOGUE OF ARCHITECTURAL HERITAGE

This catalogue details fifteen sites of architectural heritage (**AH**) significance within the area of the proposed works. The catalogue entries provide locational information, a description of the site, an outline of the potential impact of the development and recommendations towards the mitigation of this impact. The locations of all of the sites are indicated on Figures 2- 6.

SITE AH1	Fig 2, Pl. 1
TOWNLAND	Eleven Ballyboes
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Manor/ Country House
STATUS	Donegal County Development Plan 2003 (Draft), Reg No 40902201
PROXIMITY	Boundary 5m from gravity sewer
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in Eleven Ballyboes townland east of Greencastle village. It consists of Manor House, constructed in 1856 by the M'Clellan family on top of the site of a cottage called "Crows Nest". It is a detached six- bay, two storey over basement house with extensions to the north- west and the north- east. The area to the north and east of the property has a number of associated outbuildings. The property is included in the RPS of the Donegal County Development Plan 2003 (Draft).

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE AH2	Fig. 2, Pl. 11
TOWNLAND	Ballybrack
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Greencastle Maritime Museum/ Former Coastguard Station
STATUS	Donegal County Development Plan 2003 (Draft) Reg No. 40902205
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in on the coast just to the west of Greencastle village. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of Greencastle Maritime Museum/ Former Coastguard Station, a terrace of 6, 3- bay two storey houses with gabled entrance porches and breakfronted former coastguard station to the centre. The structure built in 1857 is now uses as private residences, a museum and a café.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE AH3	Fig. 3, Pl. 5
TOWNLAND	Tullynavin
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	St. Finians Church of Ireland
STATUS	Protected- Donegal County Development Plan 2003 (Draft), Reg No. 40902204
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in Greencastle village. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of St Finian's Church of Ireland, detached, with chancel to the east, projecting porch to the west and vestry to the north- east corner. The proposed gravity sewer in Greencastle village passes c. 5- 10m north of its boundary.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH4	Fig 3, Pls. 6 & 7
TOWNLAND	Ballybrack
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22
IDENTIFICATION	Cartographic, Extant
SITE TYPE	Complex of farm buildings
STATUS	-
PROXIMITY TO ROUTE	10m
IMPACT	None

DESCRIPTION

A complex of buildings including at least 5 rectangular buildings are depicted on the OS 1st ed. in a linear fashion c.10m to north of the proposed foul sewer west of Greencastle Village. During the field inspection it was established that a number of these buildings are extant and inhabited private properties.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE AH5	Fig. 3, Pl. 9
TOWNLAND	Ballybrack
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	St. Marys RC Church & Graveyard
STATUS	Protected- Donegal County Development Plan 2003 (Draft) Reg No. 40902204
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in Ballybrack townland. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of St Mary's Roman Catholic Church, a detached, 5- bay, single storey structure with internal choir gallery. The tower is attached to the north- east with the chancel and sacristy at south- west and north- east respectively. There is a graveyard to the northwest of the church.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE AH6	Fig. 4, Pl. 13
TOWNLAND	Glenburnie
COUNTY	Donegal
O.S. 6" SHEET	21
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Country House
STATUS	-
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located to the between Moville and Greencastle in Glenburnie Townland.

The site consists of Glenburnie House, a detached, 3- bay, 2- storey over basement house of 1880.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH7	Fig. 4
TOWNLAND	Carnagarve
COUNTY	Donegal
O.S. 6" SHEET	21
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Country House
STATUS	Donegal County Development Plan 2003 (Draft) Reg No. 40902209
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located between Moville and Greencastle. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of Carnagarve House, a detached, 3- bay, 2- storey over basement house of 1830.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH8	Fig. 4
TOWNLAND	Carnagarve
COUNTY	Donegal
O.S. 6" SHEET	21
IDENTIFICATION	Cartographic, Literary, Extant

SITE TYPE	Country House
STATUS	
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located between Moville and Greencastle in Carnagarve Townland. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of Carrick House, a detached, 5- bay, 2- storey house depicted on the OS map of 1841.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH9	Fig 5
TOWNLAND	Ballynally
COUNTY	Donegal
O.S. 6" SHEET	21
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Church of Ireland & Graveyard
STATUS	Protected- Donegal County Development Plan 2003 (Draft) Reg No. 40902210
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in Moville town, south- east of proposed development Site A along the R241 east to Greencastle. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of St. Columbs Church of Ireland, a detached, 5- bay, single storey structure with projecting entrance porch to south- east, spire over chancel to the north- east and vestry to the northeast corner. It was built in 1858. The proposed gravity sewer in Moville town will pass c.5- 20m from its southern boundary.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH10	Figure 5, Pls. 22, 23 & 24
TOWNLAND	Ballynally
COUNTY	Donegal
O.S. 6" SHEET	21
IDENTIFICATION	Cartographic, Literary, Extant

SITE TYPE	Group of structures
STATUS	Protected- Donegal County Development Plan 2003 (Draft), Reg No. 40902208
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in Moville town, south- east of proposed development along the R241 east to Greencastle.

The site consists of a group of structures of archaeological significance including Church of St Pius X (listed in the Record of Protected Structures for Co. Donegal), a detached, 7- bay, single storey structure with choir gallery, large polygonal lantern over, chancel, sacristy to the rear and a nuns gallery overlooking the altar. The proposed gravity sewer in Moville town will pass c.5- 20m from its southern boundary.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH11	Figure 6
TOWNLAND	Glencrow
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Country House
STATUS	
PROXIMITY	-
IMPACT CLASSIFICATION	No Impact

DESCRIPTION

This site is indicated on the 1st and 3rd eds. OS maps. It is located northeast of Moville in the on the Bredagh river just south of proposed development Site A.

The site consists of Gulladuff House, formerly known as Gulladoo House and currently in use as a guest house.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE AH12	Fig 6, Pl. 33
TOWNLAND	Ballynally
COUNTY	Donegal
O.S. 6" SHEET	21

IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Presbyterian Church & Boundary Wall
STATUS	-
PROXIMITY	-
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is located in Moville village centre. The site consists of Moville Presbyterian Church. It is surrounded by an outer boundary wall of limestone to random courses.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will not impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended

SITE AH13	Figure 6, Pls. 29, 30 & 31
TOWNLAND	Carrownaff
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Country House
STATUS	
PROXIMITY	-
IMPACT CLASSIFICATION	Direct Impact

DESCRIPTION

This site is located in on the coast just in Moville village, just north of Moville Pier.

The site consists of a detached, two storey, 19th century house with various single and 2 storey extensions and two single story structures to the front (west) including a small cottage type structure (Pl. 30) as well as a small rectangular building of limestone to random courses (Pl. 31).

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have a direct impact on this site.

RECOMMENDATIONS

It is recommended that a written and photographic recording is should be undertaken. This will consist of a photographic record with a written description of the site.

SITE AH14	Figure 6, Pl. 35
TOWNLAND	Ballybrack
COUNTY	Donegal
O.S. 6" SHEET	21
IDENTIFICATION	Cartographic, Literary, Extant

SITE TYPE	Moville Coastguard Station, Coastguard and Customs House
STATUS	Donegal County Development Plan 2003 (Draft) Reg. No. 40902209 & Reg. No. 40902108
PROXIMITY	-
IMPACT CLASSIFICATION	No Impact

DESCRIPTION

This site is located in on the coast just to the west of Moville village. It is listed in the Record of Protected Structures for Co. Donegal.

The site consists of Moville Coastguard Station, a detached, 8- bay two storey over basement house of 1850. A two- storey over basement, two-bay bow is located to the centre of the south- east elevation with another two- storey extension to the northwest.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have no impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE AH15	Figure 6, Pl. 37
TOWNLAND	Carrownaff
COUNTY	Donegal
O.S. 6" SHEET	22
IDENTIFICATION	Cartographic, Literary, Extant
SITE TYPE	Country House
STATUS	
PROXIMITY	-
IMPACT CLASSIFICATION	No Impact

DESCRIPTION

This site is located in on the coast just west of Moville village and north of Carrickarory pier north. The site consists of Carrickarory House, a detached, three bay, three storey of c 1820 with two storey split level extension to the rear.

POTENTIAL IMPACT OF DEVELOPMENT

The proposed development will have no impact on this site.

RECOMMENDATIONS

No specific ameliorative measures are recommended.

F . CATALOGUE OF INDUSTRIAL ARCHAEOLOGICAL HERITAGE

This catalogue details seven sites of industrial archaeological (IA) significance within the area proposed for development. The catalogue entries provide locational information, a description of the site, an outline of the potential impact of the development and recommendations towards the mitigation of this impact. The locations of all of the sites are indicated on Figures 2-6.

SITE IA1	Figure 1, Pl.10
TOWNLAND	Eleven Ballyboes
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	22
NGR	-
IDENTIFICATION	Cartographic, Extant
SITE TYPE	Bridge
R.M.P. NO.	-
PROXIMITY	Crossed by Gravity Sewer
IMPACT CLASSIFICATION	Direct

DESCRIPTION

This site is located in the centre of Greencastle Village. A bridge site is indicated at this location on the 1st ed. OS maps. During the field inspection it was established that the current bridge is of concrete and would have replaced the bridge depicted on the OS 1st ed. However it is likely that much of the fabric of the old bridge has been incorporated.

POTENTIAL IMPACT OF DEVELOPMENT

Direct Impact

RECOMMENDATIONS

It is firstly recommended that this site and the environs of the site be avoided by the proposed development. Should there be substantial grounds that ensure this is not possible, a detailed architectural survey of the structure should be conducted prior to the commencement of the construction phase. This will take the form of a measured survey and architectural assessment of the structure impacted, including plans and elevations.

SITE IA2	Figure 4, Pls. 18 & 19
TOWNLAND	Ballynally
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	21
NGR	-
IDENTIFICATION	Field Inspection
SITE TYPE	Culvert
R.M.P. NO.	-
PROXIMITY	Crossed by Gravity Sewer
IMPACT CLASSIFICATION	Direct

DESCRIPTION

This site is located in the northeast of Moville Village. The site consists of a stone culvert running along a field boundary.

POTENTIAL IMPACT OF DEVELOPMENT

Direct Impact

RECOMMENDATIONS

It is firstly recommended that this site and the environs of the site be avoided by the proposed development. Should there be substantial grounds that ensure this is not possible, a detailed architectural survey of the structure should be conducted prior to the commencement of the construction phase. This will take the form of a measured survey and architectural assessment of the structure impacted, including plans and elevations.

SITE IA3	Figure 6, Pl.25
TOWNLAND	Glencros
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	21
NGR	-
IDENTIFICATION	Literary, Cartographic
SITE TYPE	Bridge (site of)
R.M.P. NO.	
PROXIMITY	0m
IMPACT CLASSIFICATION	Direct

DESCRIPTION

This site is indicated on the eds. OS map. It is located on the R238 northeast of Moville adjacent to Gulladuff/ Gulladoo House on the Bredagh River.

It is recorded that in 1775, a bridge was required was built which crossed the river at a spot about 100 yards down river from the 6th century bridge (Site **A8**). In the grounds of Guladoo House. This bridge was swept away in 1828 by the greatest flood that has ever been recorded in the Moville River. This current bridge replaced it and was built in 1829.

POTENTIAL IMPACT OF DEVELOPMENT

Direct Impact

RECOMMENDATIONS

It is firstly recommended that this site and the environs of the site be avoided by the proposed development. Should there be substantial grounds that ensure this is not possible, a detailed architectural survey of the structure should be conducted prior to the commencement of the construction phase. This will take the form of a measured survey and architectural assessment of the structure impacted, including plans and elevations.

SITE IA4	Figure 6, Pl.26
TOWNLAND	Moville
COUNTY	Donegal

O.S. 6" SHEET/PLAN/TRACE	22
NGR	-
IDENTIFICATION	Cartographic, Extant
SITE TYPE	Bridge
R.M.P. NO.	-
PROXIMITY	5m
IMPACT CLASSIFICATION	Possible Impact on Environs

DESCRIPTION

This site is located in the centre of Moville Village. A bridge site is indicated at this location on the 1st ed. OS maps crossing the River Bredagh just northwest of Moville Pier. During the field inspection it was established that the current bridge is of a single arches bridge of limestone blocks and is likely to be the bridge depicted on the OS 1st ed.

POTENTIAL IMPACT OF DEVELOPMENT

Possible Impact on Environs

RECOMMENDATIONS

This site should be protected from damage during construction.

<i>SITE IA5</i>	Figure 6
TOWNLAND	Moville
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	21
NGR	-
IDENTIFICATION	Cartographic, Extant
SITE TYPE	Pier
R.M.P. NO.	-
PROXIMITY	0m
IMPACT CLASSIFICATION	Direct

DESCRIPTION

This site is located in the centre of on the coast in Moville Village. It consists of Moville Pier depicted on the OS 1st ed.

POTENTIAL IMPACT OF DEVELOPMENT

Direct Impact

RECOMMENDATIONS

A written and photographic recording is recommended for Site **IA5**. This will consist of a photographic record and a written description of the site.

<i>SITE IA6</i>	Figure 6
TOWNLAND	Moville
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	21
NGR	-
IDENTIFICATION	Literary, Cartographic, Extant

SITE TYPE	Saw Mill
R.M.P. NO.	-
PROXIMITY	20m
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is indicated on the 1st and 3rd ed. OS maps. It's site is located northeast of Moville on the R238, below the big corn store south of proposed development Site A, metres north of Site IA1.

This saw mill indicated on the 1837 OS map was most likely built by Samuel Montgomery in around the same time as Site IA1.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development

RECOMMENDATIONS

No specific ameliorative measures are recommended.

SITE IA7	Figure 6
TOWNLAND	Glencrow
COUNTY	Donegal
O.S. 6" SHEET/PLAN/TRACE	21
NGR	-
IDENTIFICATION	Literary, Cartographic, Extant
SITE TYPE	Corn Mill and Associated Mill race
R.M.P. NO.	-
PROXIMITY	30m
IMPACT CLASSIFICATION	None

DESCRIPTION

This site is indicated on the 1st and 3rd ed. OS maps. It is site is located northeast of Moville on the R238, below the big corn store.

This corn mill indicated on the 1837 OS map was built by Samuel Montgomery in 1774. It was called the Eighth Mill Ballyboe.

POTENTIAL IMPACT OF DEVELOPMENT

This site is not impacted by the proposed development

RECOMMENDATIONS

No specific ameliorative measures are recommended.

g. CATALOGUE OF AREAS OF ARCHAEOLOGICAL POTENTIAL

The areas of archaeological potential, as defined, have been presented as an indication of the archaeological potential of the landscape through which the works are proposed. Through the combination of an assessment of terrain potential and an examination of the type, density and distribution of the archaeological sites within that landscape, very general areas of high archaeological potential can be identified within the constraints area. These include wetland areas, prominent ridges, gravel ridges and areas in proximity to clusters of sites, as these have the potential for the discovery of archaeological material. Though these areas have been selected as having archaeological potential this does not lessen the possibility of the presence of archaeological material in any of the other areas to be affected by the proposed works. The proposed works will impact on 9 Areas of Archaeological Potential. The following section presents the catalogue of areas of archaeological potential (AP) impacted by the Preliminary Design numbered consecutively from East to West. Impacts are identified and mitigation measures proposed.

AREA	AP1
SITE TYPE	River/ Stream and Flood Plain
DESCRIPTION	A stream meanders downhill from the north of and through the west side Greencastle Village, crossing under a bridge depicted on the OS 1 st ed. map and exiting into the sea to the west of Greencastle Harbour.
TOWNLAND	Eleven Ballyboes
IMPACT	Direct
MITIGATION	It is recommended that a bankside inspection be undertaken by a suitable and experienced underwater archaeologist to assess the archaeological potential of the river. It is further recommended that a wading survey or dive survey depending on the depth of water be undertaken. Underwater survey will determine whether further investigation is required. After this inspection further mitigation measures may be required.
AREA	AP2
SITE TYPE	Waterlogged Area
DESCRIPTION	Wet marshy area to the north of Poundtown
TOWNLAND	Drumaweir
IMPACT	Direct
MITIGATION	Archaeological investigations in the form of test trenching. Further mitigation measures may be required if deemed necessary.

AREA	AP3
SITE TYPE	Waterlogged Area
DESCRIPTION	On the road that runs parallel to the coast towards Moville from Greencastle, the gravity sewer leaves the road to the south and runs along a field boundary in a wet waterlogged area.
TOWNLAND	Drumaweer
IMPACT	Direct
MITIGATION	Archaeological investigations in the form of test trenching. Further mitigation measures may be required if deemed necessary.
AREA	AP4
SITE TYPE	Stream/ Waterlogged Area
DESCRIPTION	As the proposed pipeline continues west close to the coast on the R241 from Greencastle to Moville, it enters pasture roughly between the villages. The route runs along a small stream that flows south downhill through an overgrown and sometimes forested area to the sea, before levelling off in a wet marshy area close to the outfall on the sea (Pl. 16).
TOWNLAND	Carnagarve
IMPACT	Direct
MITIGATION	Archaeological investigations in the form of test trenching. Further mitigation measures may be required if deemed necessary.
AREA	AP5
SITE TYPE	Waterlogged Area
DESCRIPTION	To the rear of a group of these properties northeast of Moville, the proposed route of the pipeline crosses a wet area (Pl. 21). A large mound of earth in this area is modern and most likely associated with the construction of the houses to the south.
TOWNLAND	Ballynally
IMPACT	Direct

MITIGATION	Archaeological investigations in the form of geophysical survey, where suitable, followed by test trenching. Further mitigation measures may be required if deemed necessary.
AREA	AP6
SITE TYPE	River & Flood Plain
DESCRIPTION	A stretch of pipeline continues west- southwest passing south of a bridge over the River Bredagh to the north of Moville harbour (Pl. 26). The route of the pipeline follows the south bank of the River Bredagh along River Row to the location of a proposed pumping station (Pl. 27). The pipeline also crosses the River Bredagh north at this location while another stretch of pipeline continues following the coastline at the rear of River Row (Pl. 28).
TOWNLAND	Moville
IMPACT	Direct
MITIGATION	Archaeological investigations in the form of test trenching is recommended for the flood plain and location of the proposed pumping station. It is also recommended that a bankside inspection be undertaken by a suitable and experienced underwater archaeologist to assess the archaeological potential of the river. It is further recommended that a wading survey or dive survey depending on the depth of water be undertaken. Underwater survey will determine whether further investigation is required. After this inspection further mitigation measures may be required. Further mitigation measures may be required if deemed necessary.
AREA	AP7
SITE TYPE	Waterlogged Area
DESCRIPTION	On the north bank of the River Bredagh the route of the pipeline mainly takes two routes where the road forks at the Presbyterian Church. Northwest of this location the pipeline enters greenfield, with one stretch rising steeply northeast to the south of a football pitch, the other stretch turning northwest across a wet marshy area (Pl 34).
TOWNLAND	Glencrow

IMPACT	Direct
MITIGATION	Archaeological investigations in the form of test trenching. Further mitigation measures may be required if deemed necessary.
AREA	AP8
SITE TYPE	Waterlogged Area
DESCRIPTION	On the coast road R241 west of Moville, the route it passes south of the old Coastguard Station before the route terminates at a proposed pumping station in a wet marshy area (Pl. 36) northeast of Carrickarory Pier and Carrickarory House.
TOWNLAND	Carrickarory
IMPACT	Direct
MITIGATION	Archaeological investigations in the form of geophysical survey, where suitable, followed by test trenching. Further mitigation measures may be required if deemed necessary.
AREA	AP9
SITE TYPE	Waterlogged Area
DESCRIPTION	On the east side of Moville the pipeline takes one route north up a narrow lane (Pl 17) before entering Greenfield adjacent to a stone culvert and possible well (Site IA2 , Pls. 18 & 19) before entering a wet, marshy area (Site AP9 , Pl. 20) to the north.
TOWNLAND	Ballynally
IMPACT	Direct
MITIGATION	Archaeological investigations in the form of geophysical survey, where suitable, followed by test trenching. Further mitigation measures may be required if deemed necessary.

h. CATALOGUE OF SHIPWRECKINGS

The Shipwreck Inventory prepared by the Underwater Archaeological Unit of *Dúchas* provides a listing of inshore wreckings as noted from the middle of the eighteenth century, when systematic recording of such incidents in Irish waters began. The Inventory is not without its limitations however. It does not claim to reveal the nature and pattern of foundering before the mid-1750s. It can usually only offer the location of the wrecking incident (and this in relation to the nearest topographical feature such as a headland or a sandbar), rather than where the wreck might lie. More precise information tends to be available to the archaeological community only by reports from fishermen of where their nets habitually foul, or by geophysical and diver survey. The latter can yield the most informative result, but it is the most labour-intensive and the slowest to accumulate. Also the inventory lists a number of wrecks where names, date of loss and exact location are unknown that may fall within the marine outfall areas. Consequently, the list of such wreckings that can be generated by the Inventory in the vicinity of the Moville/Greencastle outfalls does not offer the precise provenances or natures of these wrecks (Table 1). Only wrecks with potential impacts are listed here.

TABLE 1: SHIPWRECKINGS PROVENANCED MOVILLE/ GREENCASTLE

Source: Shipwreck Inventory, Co. Donegal. Unpublished archive of the Underwater Archaeology Unit, *Dúchas*

NAME	DATE	Location	INFORMATION
<i>Albatross</i>	Unknown	150m from Broomhall Light, off Moville	<i>Sank after collision with Mayflower</i>
<i>Anna.</i>	09/01/1852	Off Redcastle, Lough Foyle	174 tonne brig en route from Ibrail to Derry with crew of 9 and cargo of corn. 3 lives lost.
<i>Assurance.</i>	18/10/1941	Bluick Rock, north of Greencastle 55 13 00N, 06 56 12W	Admiralty tug, regular dive site
<i>Black duck</i>	23/10/1894	Near Moville	12 year old wooden fishing cutter, lost with no one aboard
<i>Cock</i>	10/08/1874	Moville	2 ton, 8 year old fishing smack, lost with no one aboard
<i>Eagle</i>	04/01/1854	At new pier, Moville	18 ton smack, wrecked by weather and 'absence of crew'
<i>Eliza Anne</i>	21/08/1892	West side of Moville pier	2 ton fishing boat. Sunk
<i>Fanny</i>	22/10/1853	Near new pier, Moville	10 ton smack abandoned by crew became a wreck due to negligence
<i>Fred</i>	01/10/1892	Close to Moville coastguard station	29 year old schooner became stranded and was wrecked
<i>Gally</i>	21/09/1892	Greencastle	3 ton fishing smack went down with no one aboard
<i>Gazelle</i>	10/1897	Lough Foyle	22 year old fishing smack, lost in Lough foyle
<i>Gute Hoffnung</i>	12/1814	Tuns Bank, off Moville	-
<i>Harmony</i>	14/03/1853	Greencastle	37 ton schooner became stranded on rocks in gale
<i>Jabez</i>	07/12/1851	Moville Bay	Greenock sloop struck rocks
<i>Kathleen</i>	23/10/1856	North of Greencastle	216 ton Portsmouth vessel ran ashore

NAME	DATE	Location	INFORMATION
<i>Lady Hill</i>	18/02/1809	Moville Bay	Under command of Balfour when ran ashore
<i>Lyle</i>	19/02/1879 or 28//03/1878	Lough Foyle	Steamship of Glasgow sprung leak and sank
<i>Mary</i>	27/11/ 1822	Moville	En route from Liverpool when ran ashore
<i>Mary Anne</i>	09/11/1822	Strabreaga Bay	22 year old schooner became stranded in gale and wrecked
<i>Mary jane</i>	19/08/1893	Shrove, Lough Foyle	Wooden fishing smack stranded with no one aboard
<i>Mary Sproat</i>	1889	Moville Bay	Brigantine run down by steamer and sank
<i>Mayflower</i>	unknown	150m from Broomhall Lighthouse	Sank after colliding with the Albatross
<i>Napoleon</i>	08/11/1876	Near mouth of Lough Foyle	10 year old wooden schooner stranded in gale
<i>North Esk</i>	30/09/1847	Inishowen	208 ton sailing vessel was on the shore
<i>Opreisning</i>	29/12/1816	Near Moville	En route from Drondheim when ran ashore
<i>Petrel</i>	21/08/1892	West of Moville Pier	9 year old fishing boat lying at the side of Moville pier
<i>Rob Roy</i>	12/04/1905	Near Greencastle Station	Wooden fishing cutter stranded on rocks in gale and lost
<i>Sardinian</i>	10/05/1878	Moville	Iron steam ship, explosion on board
<i>Sealer</i>	10/03/1875	Moville Bay	Brig, stranded in gale
<i>Stipey</i>	unknown	Outside Moville 55 11N, 07 02W	Wooden vessel caught fire while crew were ashore
<i>Trinidad Valencera</i>	16/09/1588	Glenagivney Bay, Inishowen	Venitian merchant ship, armada ship, carrying guns. Wreck located by Derry sub-aqua club 1971.
<i>Vixen</i>	21/08/1892	Greencastle	Fishing boat went down, no one aboard
<i>Woolton</i>	01/10/1882	Near Moville	En route from Newcastle with cargo of coal.
<i>Unknown</i>	30/06/1907	½ mile east of Moville Light	Sailing Yacht capsized in gale, 1 life lost

POTENTIAL IMPACT

The proposed development has a potential direct impact on all of the above wreck sites at the marine outfall points.

RECOMMENDATIONS

The potential impact should be further qualified by an underwater geophysical survey that should be undertaken as part of the site investigation for the project.