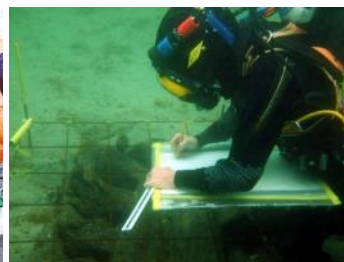
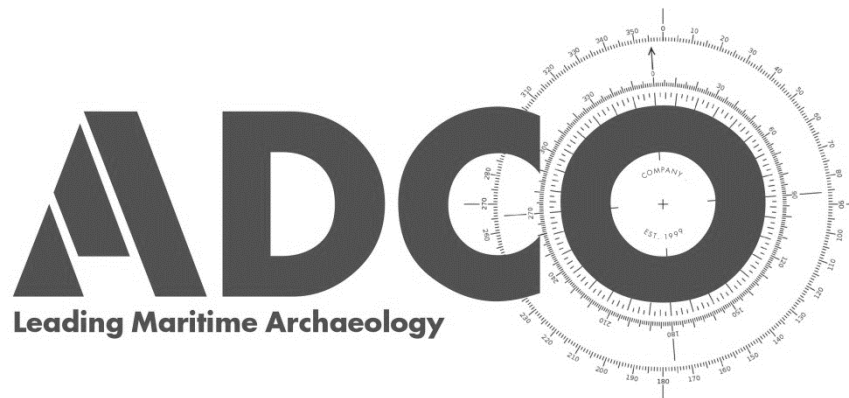


Appendix A16.13 Marine Archaeological Dive Survey Undertaken as Part of the Environmental Impact Assessment



**Greater Dublin Drainage Scheme
Underwater assessment
off Velvet Strand, Burrow, Co. Dublin
16D0051, 16R0076**





**Greater Dublin Drainage Scheme
Underwater assessment
off Velvet Strand, Burrow, Co. Dublin
16D0051, 16R0076**

Report

07 September 2016

Project Director

Niall Brady

Beverley Studios, Church Terrace, Bray, Co. Wicklow

www.adco-ie.com

CONTENTS

Abbreviations

LIST OF FIGURES	1
1.0 SUMMARY	6
2.0 INTRODUCTION	7
3.0 LOCATION	7
4.0 METHODOLOGY	8
5.0 DIVE STRUCTURE	9
6.0 OBSERVATIONS	9
7.0 IMPACT	14
8.0 RECOMMENDATIONS	14
FIGURES	

Abbreviations

ADCO	The Archaeological Diving Company Ltd
DAHG	Department of Arts, Heritage and the Gaeltacht
DAHRRGA	Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
E	Easting
EIS	Environmental Impact Statement
N	Northing
NGR	National Grid Reference
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NPS	Navan Protected Structure
OPW	Office of Public Works
RMP	Record of Monuments and Places
RPS	Record of Protected Structures

LIST OF FIGURES

Figure 1: Location map showing proposed outfall route.

Figure 2: ADCO Dive locations.

1.0 Summary

The Archaeological Diving Company Ltd. (ADCO) was appointed by Jacobs civil engineering through Irish Archaeological Consultancy Ltd on behalf of Irish Water to carry out an underwater assessment of a series of marine geophysical survey anomalies that had been detected in survey commissioned by Irish Water for the marine outfall component of the Greater Dublin Drainage Scheme. Site work took place on 1-2 June 2016. The marine geophysical survey area is 80m wide and extends 4.1km offshore from Velvet Strand, in Burrow townland, Co. Dublin.

A total of 13 anomalies were considered in 6 locations. Dives were carried out in all 6 locations. No material of archaeological significance was observed.

The archaeological underwater assessment has added a new layer of information to the project area.

The impacts arising from the GDD project will require the cutting of a trench to insert the marine outfall pipe.

There is no archaeological reason why the proposed works should not proceed.

It is recommended that a competent, experienced and licence-eligible marine archaeologist is employed to monitor the marine works, to record and recover archaeological materials exposed as a result of the works.

The archaeologist should be assisted by the client, and should be provided with suitable offices and welfare facilities to support their work.

Any objects recovered during the construction phase will need to meet the requirements of the National Museum of Ireland, and resources will need to be provided for all temporary storage and conservation needs.

The recommendations outlined above are subject to the approval of the National Monuments Service, at the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

2.0 INTRODUCTION

The Archaeological Diving Company Ltd. (ADCO) was appointed by Jacobs consultant engineers through Irish Archaeological Consultancy Ltd on behalf of Irish Water to carry out an underwater assessment of a series of marine geophysical survey anomalies that had been detected in survey work commissioned by Irish Water for the marine outfall component of the Greater Dublin Drainage Scheme.

Site work took place on 1-2 June 2016 under licence from the National Monuments Service at the then Department of Arts, Heritage and the Gaeltacht, 16D00151, 16R0076.

The marine geophysical survey area is 80m wide and extends 4.1km offshore from Velvet Strand, in Burrow townland, Co. Dublin. A total of 13 anomalies were considered in 6 locations. Dives were carried out in all 6 locations. No material of archaeological significance was observed.

3.0 LOCATION

The survey area extends approximately 4.1km long by 80m wide, from a point on the shoreline of Velvet Strand, off Burrow townland, Portmarnock. Co. Dublin (Figure 1).

A series of anomalies were observed in data sets acquired through marine geophysical survey commissioned for the project.¹ None of the anomalies were indicative of shipwreck or other archaeological indicators, and many of the anomalies were associated with the presence of a working platform (spud barge) immediately prior to the marine geophysical survey being carried out.

A small number of anomalies remained that could not be explained in this manner, and the dive inspections were commissioned to examine those anomalies, to assess further their archaeological risk (Table 1, Figure 2).

¹ Niall Brady, 'Great Dublin Drainage Scheme. Marine geophysical survey off Velvet Strand, Burrow, Co. Dublin. 15R0092', unpublished report of the Archaeological Diving Company Ltd, 2016.

Dive Location	ITM E	ITM N	Anomalies	Aims
1	727443	742380	ss4, b1/mg7	To assess nature of linear anomaly in sand and potential for outlying metallic debris by extending to include ss4.
2	728310	742333	ss11, ss12, ss24	Assess nature of sonar anomaly complex.
3	729262	742333	ss15, ss22	Assess nature of sonar anomaly complex.
4	728801	742337	ss16	Assess nature of sonar anomaly, which appears to be expanse of cobbles. Work should focus on looking for debris trapped amongst cobbling.
5	728567	742297	ss17, ss23, ss25	Assess nature of sonar anomaly complex.
6	727687	742314	ss18	Assess nature of sonar anomaly.

Table 1: List of locations for archaeological dive inspection to assess further the archaeological risk.

4.0 METHODOLOGY

ADCO presented an archaeological dive team on site to carry out the inspection work. The following procedure was followed:

- 1) Dive support was provided by a RIB, operating from Dun Laoghaire Harbour and skippered by a third party, Oceandivers.
- 2) Project work was planned to take place over a two (2) day period.
- 3) The dive support vessel took position over the 6 dive locations using on-board GPS/DGPS.
- 4) Individual targets/anomalies were buoyed by dropping a weight line over the position coordinates.
- 5) Dive work proceeded to inspect each location.
- 6) The dive team operated Surface Supplied Diving Equipment in accordance with SI422 of 1981. A four-person team conducted the work, comprising Dive Supervisor, Dive Tender, Diver and Standby Diver.
- 7) The Diver descended the buoyed line and inspected the seabed. A circular search pattern was established at each location, reaching up to 50m out from the buoyed line.
- 8) Record was taken of all observations. Written record was recorded topside based on the diver's observations made during the dive. Visual record was made and, where suitable, recorded using a hand-held underwater camera. A hand-held metal detector was employed simultaneously.
- 9) Once ADCO was satisfied that all areas of the inspection area were fully inspected and recorded, site work concluded.

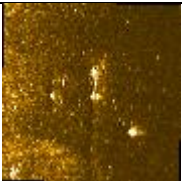
5.0 DIVE STRUCTURE

The four-person dive team comprised: Niall Brady (NB) diver, Rex Bangerter (RB) diver, Kyle McCoy (KMcC) diver, and Brian MacAllister as Dive Supervisor. Dan Lenehan served as diver tender. All personnel are competent and experienced in the survey work required and in interpreting marine deposits.

The work was completed on 01 and 02 June 2016. Weather conditions were very favourable on the first day, deteriorating slightly on the second day but full and uninterrupted access was possible in all six dive locations.

6.0 OBSERVATIONS


6.1 Dive Location 1, anomalies b1, mg7, ss4

Date	Diver	Weather	Sea State	Time in	Time Out
01/06	RB	Sunny, very good	Light chop	11:43	12:30
Geophysical survey interpretation and side-scan sonar image					
Localised occurrence of 4 anomalies less than 1m each in size, over 10m-long area. Possibly rocks but located 28m North of b1. Magnetometer (ping 1598) registered a slight fluctuation in the magnetic field, suggesting the presence perhaps of some debris or a small-scale localised natural variation.					
Dive Log and interpretation					
Yellow buoy observed on site, suggesting the terminus of an existing outfall pipe is positioned in this location. There was no anomaly observed at the bottom of the down-line. Water depth was 8.2m, underwater visibility was 2m. A circular search commenced, extending to 40m from the down-line, and using a pendulum search pattern to ensure full coverage of the search area. The seabed surface comprises silt and sand, with a light rippled surface. The sediment is a medium density, permitting manual penetration to a depth of 3cm. The seabed is flat and featureless. There are no rises or hollows in contrast to the topographic anomaly b3 detected in the geophysical survey, which had suggested a slight linear variation. The natural slope seawards (to the East) was observed. The metal-detector did not detect any anomalies here. There is no feature in this location exposed on or above the seabed.					
Recommendation					
No further work is required in this location prior to the construction phase. Archaeological monitoring of all seabed impacts is required during the construction phase.					

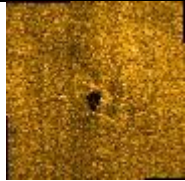


Underwater view of the seabed at Dive Location 1.

6.2 Dive Location 2, anomalies ss11, ss12, ss24

Date	Diver	Weather	Sea State	Time in	Time Out
01/06	NB	Sunny, very good	Light chop	12:43	13:10
Geophysical survey interpretation and side-scan sonar image					
Cluster of four anomalies c. 1m in diameter forming parallelogram plan 13 x 18m in size. Close to ss12 and ss24. Appears to be footprint of spud barge, but 115m E of VC8. Magnetometer (ping 435-6) did not register any anomaly.					
Dive Log and interpretation					
There was no anomaly observed at the bottom of the down-line. Water depth was 13m, underwater visibility was 2m. A circular search commenced, extending to 30m from the down-line, and using a pendulum search pattern to ensure full coverage of the search area. The seabed surface comprises silt and sand, with gentle sand ripples on the surface. The sediment is a medium density, permitting manual penetration to a depth of 5cm. The seabed is flat and featureless and some sea life was observed, including starfish, a whelk and razor shells. There are no rises or hollows, and no features observed. The metal-detector did not detect any anomalies here. There is no feature in this location exposed on or above the seabed.					
Recommendation					
No further work is required in this location prior to the construction phase. Archaeological monitoring of all seabed impacts is required during the construction phase.					

6.3 Dive Location 3, anomalies ss15, ss22

Date	Diver	Weather	Sea State	Time in	Time Out
01/06	KMcC	Sunny, very good	Light chop	13:30	14:05
Geophysical survey interpretation and side-scan sonar image					
Isolated defined anomaly with scour area around, 1.4m long, 0.9m high off seabed. Probable rock or debris. 5m from ss22, a c. 6m long anomaly rising 60cm off the seabed.					
Dive Log and interpretation					
There was no anomaly observed at the bottom of the down-line. Water depth was 20m, underwater visibility was 1-2m. A plastic fishing pot for whelk-fishing was observed within 3m of the downline. A circular search commenced, extending to 30m from the down-line, and using a pendulum search-pattern to ensure full coverage of the search area. The seabed surface comprises silt and sand, and was quite flat and featureless. The sediment is a soft- to medium density, permitting manual penetration to a depth of 10cm. The metal-detector did not detect any anomalies here.					

There is no feature in this location exposed on or above the seabed, other than the fishing pot.
Recommendation
No further work is required in this location prior to the construction phase. Archaeological monitoring of all seabed impacts is required during the construction phase.

6.4 Dive Location 4, anomalies ss16

Date	Diver	Weather	Sea State	Time in	Time Out
01/06	KMcC	Good	Wind against tide (lumpy)	11:15	11:31

Geophysical survey interpretation and side-scan sonar image

Extensive area of shoaling/boulder spread, measuring at least 60m E/W by 15m wide. Natural feature. Coordinate taken at centre of feature on its E side.



Dive Log and interpretation

There was no anomaly observed at the bottom of the down-line. Water depth was 20m, underwater visibility was 1m.
Seabed composed of compact silty-sand with frequent crushed shell inclusions. The topography is flat and featureless. Hand penetration depth of 4cm. One full length of the swim-line completed, extending out to 20m from the base; no change in the seabed was observed. Strong current present. Underwater visibility 1m (max.).
The metal-detector did not detect any anomalies here.
There is no feature in this location exposed on or above the seabed.

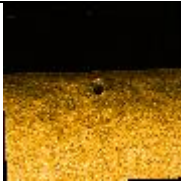
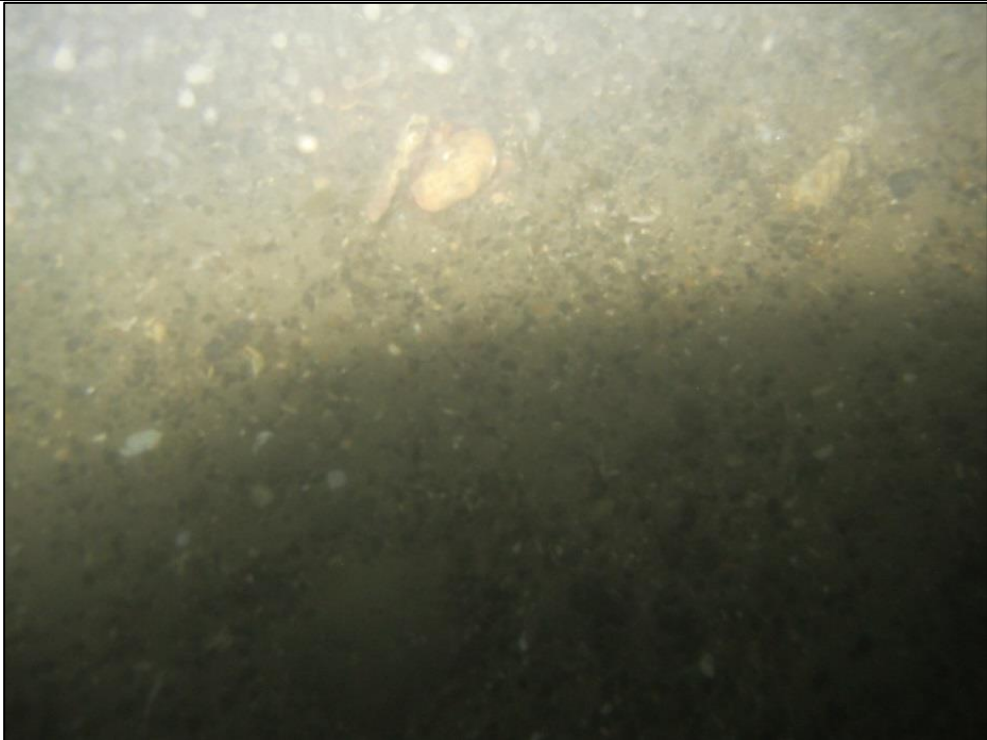
Recommendation

No further work is required in this location prior to the construction phase.
Archaeological monitoring of all seabed impacts is required during the construction phase.

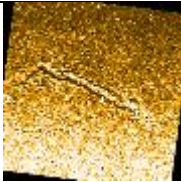
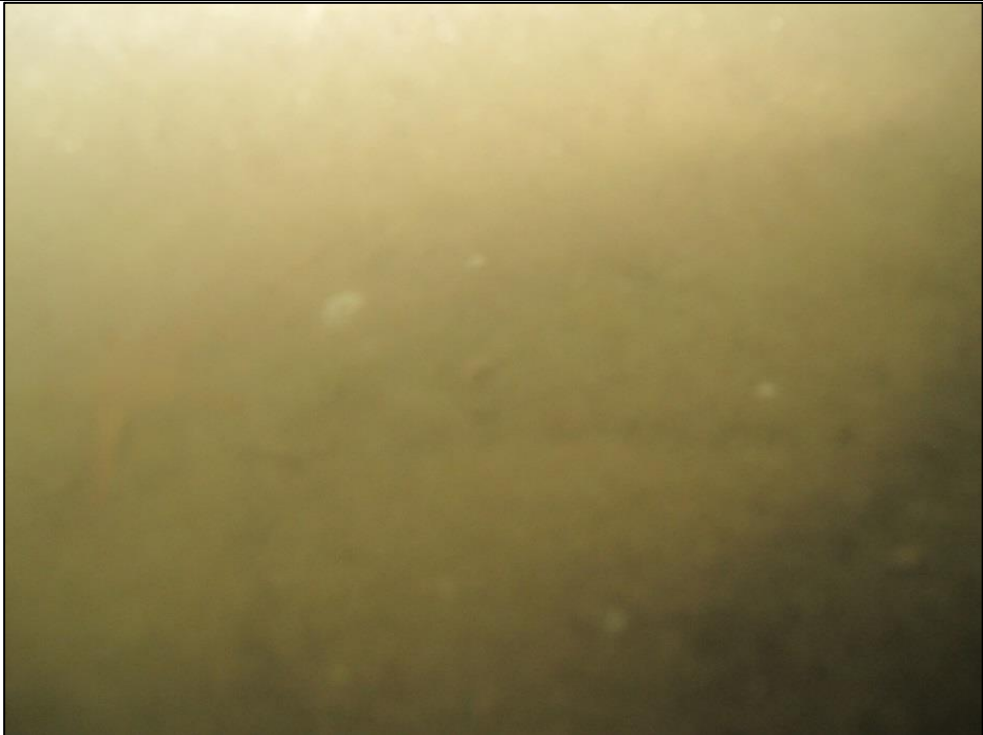


Underwater view of the seabed at Dive Location 4.

6.5 Dive Location 5, anomalies ss17, ss23, ss25

Date	Diver	Weather	Sea State	Time in	Time Out
01/06	KMcC	Good	Wind against tide (lumpy)	11:50	12:20
Geophysical survey interpretation and side-scan sonar image					
Small isolated anomaly on sandy bed, c. 1m in diameter. Rock or debris.					
Dive Log and interpretation					
<p>There was no anomaly observed at the bottom of the down-line. Water depth was 18m, underwater visibility was 1m.</p> <p>Seabed composed of compact silty-sand with frequent crushed shell inclusions. The topography is flat and featureless. A localised area of cobble spread is present to the south of downline. A string of whelk pots was located a short distance south of this cobbling. Hand penetration depth was 4cm-6cm. The full length of the swim-line was reached and extended out to 40m from the downline. No change in seabed was observed. A strong current was present.</p> <p>The metal-detector did not detect any anomalies here.</p> <p>There is no feature in this location exposed on or above the seabed.</p>					
Recommendation					
<p>No further work is required in this location prior to the construction phase.</p> <p>Archaeological monitoring of all seabed impacts is required during the construction phase.</p>					
					
Underwater view of the seabed at Dive Location 5.					

6.6 Dive Location 6, anomalies ss18

Date	Diver	Weather	Sea State	Time in	Time Out
01/06	KMcC	Good	Wind against tide (lumpy)	12:28	12:38
Geophysical survey interpretation and side-scan sonar image					
c. 18m long dragmark scar on sandy seabed. Magnetometer (ping 1774) did not register any anomaly					
Dive Log and interpretation					
<p>There was no anomaly observed at the bottom of the down-line. Water depth was 8m, underwater visibility was 1m.</p> <p>Seabed composed of a thin layer of compact silty-sand overlying a compact clay. The topography is flat and featureless. Hand penetration was possible to a depth of 1-2cm. The seabed appears to be stripped of overlying silty-sand deposits, perhaps due to the strong currents present in this location. Dredge scarring from boat anchors would be common in this area. The full length of the swim-line was reached out to 20m from the downline. A strong current was present.</p> <p>The metal-detector did not detect any anomalies here.</p> <p>There is no feature in this location exposed on or above the seabed.</p>					
Recommendation					
<p>No further work is required in this location prior to the construction phase.</p> <p>Archaeological monitoring of all seabed impacts is required during the construction phase.</p>					
					
Underwater view of the seabed at Dive Location 6.					

6.7 Discussion

All six dive locations were inspected and examined comprehensively. There were no archaeological features observed. The dive inspections clarified the nature of the geophysical survey anomalies in Dive Locations 3, 5 and 6, and indicate the presence of modern fishing practice as the most likely explanation. The absence of clarification at Locations 1, 2 and 4 might reflect the dynamic nature of this gently sloping sandy

seabed, where one can expect shifting topography as a result of a season's weather patterns.

7.0 IMPACTS

The outfall pipe trench will be tunnelled across the foreshore to a point that lies between Borehole 1 and Borehole 2. One option is to continue tunnelling the pipe seawards to its offshore terminus. A second option is to dredge the pipe trench seawards from where the tunnelled limit ends between Boreholes 1 and 2.

Tunnelling is unlikely to create extensive impact on the surface levels of the foreshore and may therefore have a reduced impact from an archaeological perspective, but the risings could reveal material of interest and these should be inspected.

Dredging of the pipe trench will create high impact along the pipe trench route, extending out to the sides of the way leave. All such ground disturbance activities have the potential to reveal new archaeological material and will require archaeological monitoring.

8.0 RECOMMENDATIONS

The recommendations in this report refer only to the marine dredging works offshore and nearshore, and do not refer to the intertidal foreshore.

There is no archaeological reason why the proposed works should not proceed.

8.1 Pre-construction phase measures

No further archaeological mitigation is recommended prior to the construction phase commencing.

8.2 Construction phase measures

MONITORING. Seabed disturbance activities will be archaeologically monitored under licence from the DAHRRGA, with the proviso to resolve fully any archaeological material that occurs during such works. The archaeological monitoring will be conducted by a competent, experienced and licence-eligible marine archaeologist.

The archaeologist should be assisted by the client, and should be provided with suitable offices and welfare facilities to support their work.

8.3 Project Management Measures

All archaeological site work will be licensed by the DAHRRGA. Licence applications (Detection Device, Dive Survey, and Excavation) take a minimum of three working weeks to be processed, and sufficient lead time is required to ensure that such permits are in place before construction works commence.

THE TIME SCALE for the pre-construction and construction phases should be made available to the archaeologist, with information on where and when the various elements and 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 pre-construction and construction works commencing. This will allow for prompt arrival on site to undertake additional surveys and to monitor ground disturbances. As often happens, 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. Excavation work of marine sites must be done by archaeologists specialized in Marine and Underwater Archaeology. The archaeological team for marine works must include an archaeological dive team working within current Health and Safety regulations for Safety at Work, and specifically *Safety in Industry (Diving Operations) Regulations, 1981: SI 422 of 1981*, and *2010 SI (Draft), HSA Diving Standards 2010*.

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

SECURE WET AND DRY STORAGE for artefacts recovered during the course of the monitoring and related work should be provided on or near those sites where excavation is required.

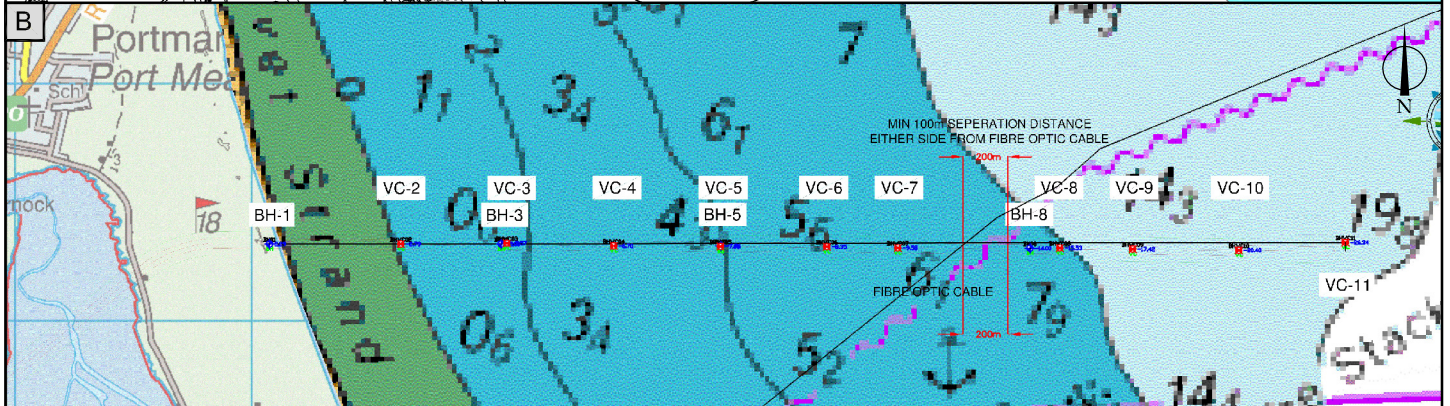
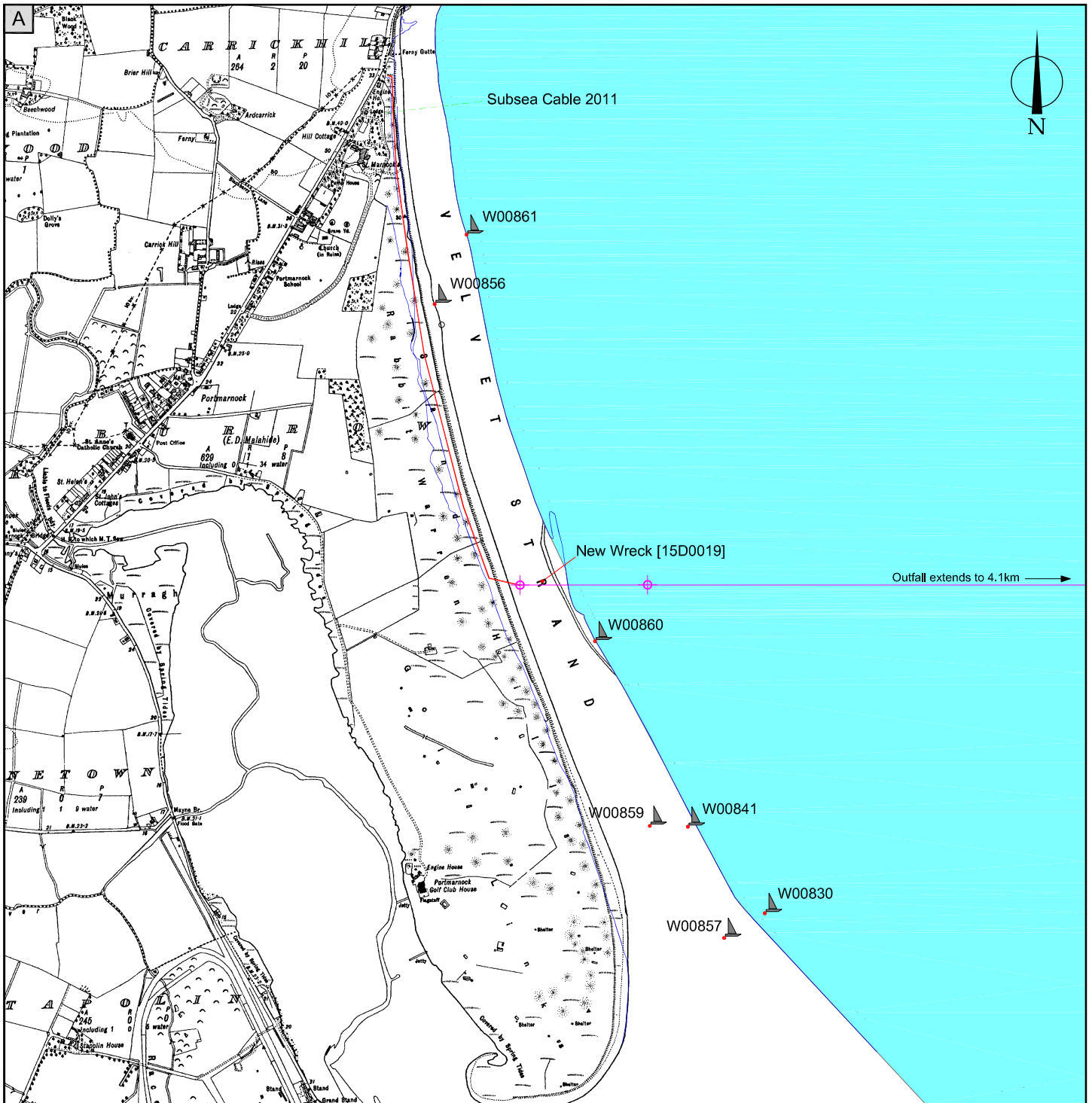
BUOYING of any such areas would be necessary once discovered and during excavation.

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

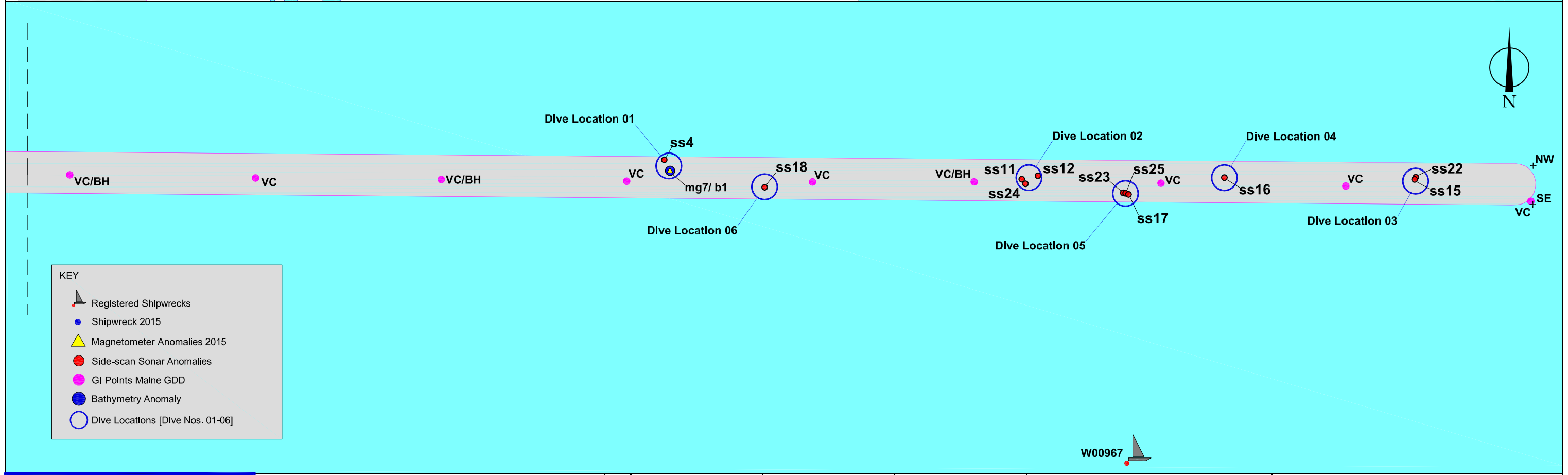
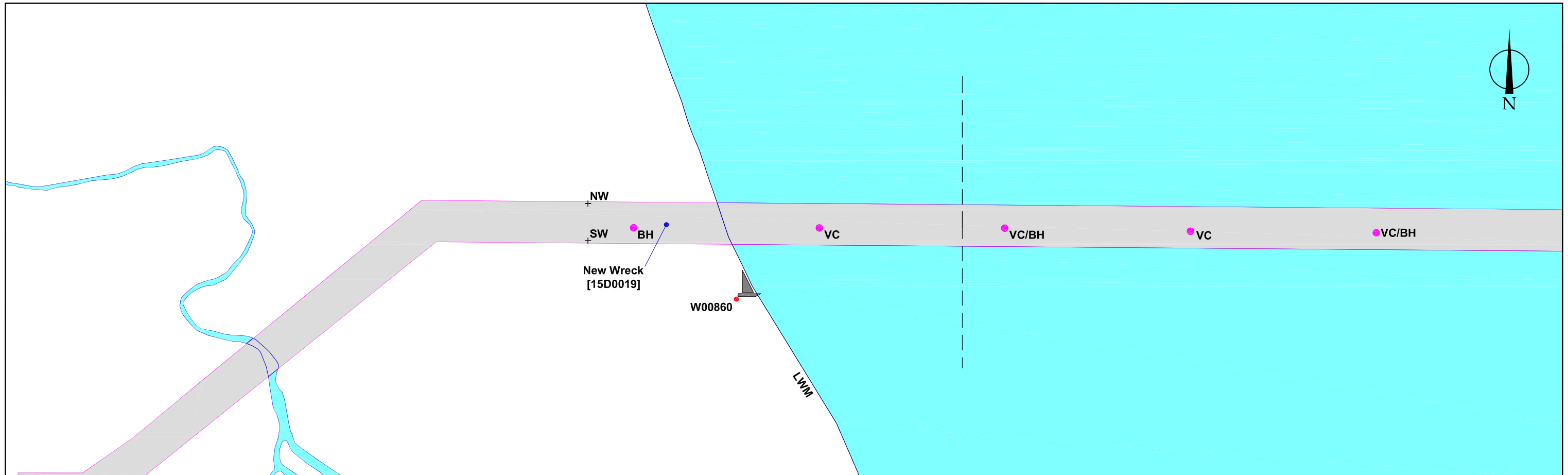
MACHINERY TRAFFIC during construction must be restricted as to avoid any of the selected sites and their environs.

SPOIL should not be dumped on any of the selected sites or their environs.

The recommendations outlined above are subject to the approval of the National Monuments Service, at the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs



Client IAC Ltd./ Irish Water	Notes Source: OSi Historic Map Archive/ Project Dwg. 32102901-1055		Title Figure 1			
Project Underwater Assessment, Greater Dublin Drainage Project	Proposed Haul Road	Subsea Cable Landfall	Geological Testing Sites	Known Shipwreck Site	A- Extract from OS (1912) 25" map with location of development, limit of present day coastline, and known shipwreck sites superimposed. B- Extract from Project Drawing showing extent of outfall and location of Geotechnical Investigation.	
	Job/Exc No. 15D0051	Compiled by R.Bangerter	CAD reference GDD_Velvet	Date 07.09.16	Scale 1:20,000/ 1:30,000	Drawing No. Figure 1



KEY

- Registered Shipwrecks
- Shipwreck 2015
- Magnetometer Anomalies 2015
- Side-scan Sonar Anomalies
- GI Points Maine GDD
- Bathymetry Anomaly
- Dive Locations [Dive Nos. 01-06]

Notes
 Source: ArchGIS
 LWM
 Survey Corridor



A3	Job/Exc No. 15D0052	Compiled by R.Bangerter	CAD reference GDD_Velvet	Client IAC Ltd./ Irish Water	Title Figure 2- ADCO Dive Locations.
	Date 07.09.16	Scale 1:9500	Drawing No. Figure 2	Project Underwater Assessment, Greater Dublin Drainage Project.	

ADCO

- Providing effective underwater and land-based archaeological solutions since 1999.
- Conducting intelligent diving and underwater/marine inspections for the civils and scientific sectors.
- All personnel are fully HSE-certified, capable and experienced.
- ADCO works closely with clients from project inception, through EIS, to full construction stages, delivering the highest quality effectively.

www.adco-ie.com

Recording prehistoric logboat at Gormanston, Co. Meath
GAS 2025 Irish Sea
Interconnector



Underwater elevation of bridge pier collapsed in 1763. River Nore Flood Alleviation Scheme



Iron cannon on site of 17th-century timber wreck discovered during dredging programme Waterford Harbour

