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DUBLIN PORT COMPANY

Alexandra Basin Redevelopment Project

Environmental Impact Statement

Volume 2 | Appendices






APPENDICES

APPENDIX 1

INTRODUCTION

Summary of throughput of ports on the Island of Ireland, 2000 – 2012

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	% of Dublin
1	Belfast	12,484	13,402	12,825	13,201	13,559	13,500	13,514	13,416	13,040	12,050	12,827	13,561	15,186	71.2%
2	Larne	4,508	3,520	4,295	4,319	4,984	5,496	5,489	5,464	5,166	4,297	4,614	4,395	2,913	24.5%
3	Warrenpoint	1,676	1,480	1,826	1,880	1,967	2,436	2,307	1,999	2,119	1,841	2,327	2,425	2,429	11.0%
	NI Total	***21,434***	***21,167***	***21,363***	***21,973***	***23,393***	***24,055***	***24,485***	***23,868***	***23,497***	***20,786***	***22,911***	***23,252***	***23,556***	
4	Greenore	444	310	509	713	664	649	869	790	700	390	503	362	373	3.0%
5	Dundalk	285	304	291	352	350	337	436	371	217	222	140	107	67	1.4%
6	Drogheda	1,015	1,252	1,369	1,255	1,268	1,402	1,279	1,035	664	512	499	489	959	5.4%
7	**Dublin**	**15,892**	**15,782**	**15,557**	**16,682**	**17,930**	**19,227**	**20,795**	**21,801**	**21,127**	**18,606**	**19,548**	**19,467**	**19,898**	**100.0%**
8	Dun Laoghaire	225	184	146	197	160	156	82	61	49	14	2	12	1	0.5%
9	Wicklow	151	171	182	212	235	282	297	221	85	73	89	99	74	0.9%
10	Arklow	88	85	86	4										
11	New Ross	1,121	1,013	979	1,129	1,102	966	831	729	694	515	444	357	268	4.2%
12	Waterford	1,943	1,958	1,910	2,332	2,342	2,257	2,376	2,253	2,082	1,631	1,451	1,383	1,174	10.4%
13	Rosslare	1,913	1,990	1,926	1,956	2,174	3,118	2,744	2,926	2,722	2,328	2,502	2,192	1,864	12.5%
14	Cork	9,732	9,446	9,042	9,176	8,923	9,919	9,709	10,098	9,633	7,968	8,466	8,434	8,708	49.2%
15	Shannon Foynes	10,282	10,708	10,418	10,102	10,619	11,355	11,393	11,072	10,819	7,577	9,134	9,899	10,094	55.1%
	RoI totals	***45,273***	***45,795***	***44,919***	***46,165***	***47,720***	***52,146***	***53,318***	***54,139***	***51,081***	***41,836***	***45,071***	***45,078***	***47,649***	
	Ireland total	**66,707**	**66,962**	**66,282**	**68,138**	**71,113**	**76,201**	**77,803**	**78,007**	**74,578**	**62,622**	**67,982**	**68,330**	**71,205**	

Evaluation of three major ports as alternative locations

Belfast

Introduction	Cargo volumes in the Port of Belfast is in the same order of magnitude as in Dublin Port. Additionally, Belfast also handles cargo in all modes, similar to Dublin. The port's ship handling capacity (in terms of depth of water available in the approach channel and at the working berths) is at least on a par with that of Dublin Port. Belfast services a hinterland of 1.8m (being the population of Northern Ireland which is similar to that of the Greater Dublin Area serviced from Dublin Port). Belfast is 167km from Dublin and this remoteness limits its ability to compete with Dublin Port except in circumstances where capacity in Dublin Port might be constrained (as it was in the 1980's or could be again if Dublin Port does not expand its capacity to handle projected future growth).
Landside	The Port has considerable areas of vacant or derelict land in its general area, much of it being brownfield lands formerly associated with large-scale industry. The greater portion of these lands is privately owned and is scheduled for urban renewal.
Access	Road access to the Northern Ireland network is good. Rail Access is not available. Belfast is located 167km from Dublin and similar additional costs are involved in transporting goods between Belfast and the Dublin Region, as is the case in Larne.
Planning	There are no significant impediments from a planning point of view to expansion of Belfast Port. The Belfast Metropolitan Area Plan 2015 Draft Plan contains a section dealing with the Belfast Harbour Area. It states that the policy will be to *"develop the Port of Belfast as the main Port of the Region and a major distribution centre for international sea freight"*. Such an unambiguous statement is evidence of support for the expansion of Belfast Port.
Environmental Issues	The normal requirements in relation to environmental impact assessment would apply in any extension of the Port. In this regard, it can be noted that although Belfast Lough is a designated SPA area, the designation does not impact directly on the Port. The Belfast Metropolitan Area Draft Plan seeks the conservation of the Coast of Northern Ireland and if necessary, to mitigate the environmental impact of essential Port and other economic developments. Emissions from a typical HGV travelling from Belfast to Dublin City Centre will be 53 times that of a HGV servicing the City from the Port. Consumption of fossil fuels will be of a similar proportion.
Unitised	Virtually all operators of unitised shipping services in Belfast also provide similar services in Dublin Port. Land side distance between origin and destination points determines the respective volumes through each port. There is not, therefore, a development in Belfast which could be considered as an alternative to the proposed development in Dublin.
Bulk	Much of Belfast's bulk trade is local to the port's immediate hinterland (particularly imports of power station coal and exports of aggregates). Beyond this Belfast has a large animal feed and agri import business on behalf of a number of companies who also import through Dublin (as well as Cork and Shannon Foynes). The distance between these ports determines the volumes these companies import through each port. The existing facilities in Belfast or any future additional developments cannot, therefore, be considered as alternatives to the proposed development in Dublin Port.
Cruise	Belfast has a considerable cruise business with 59 calls in 2013 and is planning to build a Stg£7m dedicated cruise facility. Belfast does not compete with Dublin for cruise business. Rather the ports are complementary ports of call on many cruise ship itineraries. Many cruise ships call to both Dublin and Belfast on the one trip. The development of Belfast's cruise facilities are not, therefore, an alternative to what is proposed in Dublin Port.

Cork

Introduction	Cork is one of the world's great natural harbours and has facilities located at different locations throughout the harbour. Cork is similar to Dublin and Belfast in that it is a multi-modal port with a substantial cruise business. Given its distant location from Dublin, however, existing or planned future capacity in Cork are not alternatives to similar capacity in Dublin. Port of Cork is a Tier 1 port under National Ports Policy and a core port within the EU TEN-T network and has its own development priorities which need to be satisfied independently of the needs of Dublin Port. As such, any developments in Cork cannot be considered as alternatives to similar developments in Dublin. Rather, capacity developments in each port to cater for their own requirements are required to meet national port capacity and port policy objectives.
Planning	Cork Harbour Company has drawn up revised plans for submission to the Board following a refusal for an earlier plan by An Bord Pleanála.
Environmental Issues	Cork's Harbour facilities are spread over a wide area but are all circa 250km from Dublin. Emissions from a typical HGV servicing Dublin from Cork would be 83 times that of a vehicle serving Dublin from its Port. Current costs are €400 per single journey for a typical HGV from Cork to Dublin.
Unitised	Cork's Ro-Ro business is very small (0.1% that of Dublin's and 0.2% that of Belfast's). Given its distant location from Dublin, Cork's current or any possible future capacity is not a realistic alternative to that proposed to be developed in Dublin.
Bulk	Cork has a large animal feed and agri import business on behalf of a number of companies who also import through Dublin (as well as Belfast and Shannon Foynes). The distance between these ports determines the volumes these companies import through each port. The existing facilities in Cork or any future additional developments cannot, therefore, be considered as alternatives to the proposed development in Dublin Port.
Cruise	Cork had 57 cruise calls in 2012 and benefits from excellent facilities at its dedicated cruise berths in Cobh where the largest cruise ships can be accommodated. As in the case of Belfast, Dublin and Cork are complementary ports of call on many cruise ship itineraries. Many cruise ships call to both Dublin and Cork on the one trip. The combination of the cruise developments in Belfast and the capability within the proposed development in Dublin Port added to Cork's existing capability create an island-wide capacity to cater for the cruise industry with three major destinations in sufficient proximity to facilitate attractive and economic itineraries for cruise lines. The existence or any future development of cruise facilities in Cork are, therefore, not an alternative to the capacity proposed in Dublin Port.

Larne

Introduction	The Port of Larne is owned by P&O. P&O is also the sole ferry operator from the port offering services for freight and passengers to Cairnryan, and Troon in Scotland. The Port is exclusively (or almost exclusively) a Ro-Ro port. It has six berths with depths ranging from 4.5m CD to 7.5m CD and ship length restrictions on these berths ranging from 80m to 170m.
Landside	Landside Capacity is limited in terms of potential additional storage compounds because of proximity of the built-up area of the Town. However, an area to the South has been rezoned to accommodate Port expansion.
Access	It has good and improving road access. The A8 is currently being expanded to dual carriageway to provide complete dual carriageway standard between Larne and Belfast without traversing residential areas. Larne has no Rail access.
Planning	An area has been zoned adjacent to the existing Port facilities to allow for an expansion of the Port southwards in the Larne Area Plan 2010.
Environmental Issues	The Port is located 203km from Dublin. It is unsuitable in terms of serving the Dublin market because of its distance with consequent economic and environmental costs. Current figures suggest an additional cost of €500 for a one-way trip or €600 for a turn-around trip to service Dublin. The emission from one typical freight vehicle for a single journey of this length would be 67 times that of a vehicle serving Dublin from Dublin Port.
Unitised	Larne has considerable surplus Ro-Ro capacity available having seen its throughput decline from 438,050 in 2007 to 215,357 in 2012. However, given the port's location 203km from Dublin, neither this surplus capacity nor any possible additional development to provide yet more capacity are a realistic alternative to the Ro-Ro capacity proposed in Dublin Port.
Bulk	Larne's deepest berth has depth alongside of between 7.2m (at LAT) and 11.5m (at HAT) and a ship length restriction of 165m. The port's potential to handle bulk currently is, therefore, very limited. In addition, the distance to Dublin suggests that no development at Larne could be considered as an alternative for the bulk handling capacity to be provided by the project proposed in Dublin Port.
Cruise	Given the requirement for cruise ships to berth close to visitor attractions and given Larne's proximity to Belfast, Larne does not offer a realistic potential alternative location for the cruise ship capacity proposed in Dublin Port.

Evaluation of ten small ports as alternative locations

Warrenpoint

Introduction	This is a relatively small Port containing two Lo-Lo berths and one Ro-Ro berth. Its stated objective is to serve a regional catchment area.
Vessel Requirements	The Port is limited in terms of the size of vessels it can accommodate.
Landside	The Port is constrained by its built-up area to the North East and by a relatively narrow Channel to the South West.
Access	Access to the Northern Ireland road network is good. There is no Rail access.
Planning	There are no specific provisions in the Development Plan for the area dealing with the Port, other than it is an objective to strengthen its role as a Regional Port.
Environmental Issues	A large part of Carlingford Lough forms part of a Special Protection Area stretching from Killowen Point to Soldiers Point. Its boundaries also are coincident with the Carlingford Area of Special Scientific Interest. It does not impact directly on Warrenpoint Harbour. Warrenpoint is 116km from Dublin so that a typical HGV servicing the Dublin market would emit some 28 times the emissions compared to that of a similar vehicle servicing the City from Dublin Port.
Unitised	Warrenpoint has capacity for both Ro-Ro and Lo-Lo. Whereas its Lo-Lo business has declined considerably in recent years (42,000 TEU in 2006 to 20,000 TEU in 2012), it has a sizable Ro-Ro business (90,000 units in 2012). Warrenpoint is a significant niche player in the Ro-Ro business and services the hinterland between the two main population centres services by Belfast / Larne on the one hand and Dublin on the other. It has limited capacity to expand and road haulage cost differentials will additionally limited its relative growth in the future. The port's current capacity nor any conceivable expansion there can be considered as a realistic or viable alternative to the Ro-Ro capacity being proposed in Dublin.
Bulk	Warrenpoint's has a sizable animal feed and grain importation business to meet the requirements of the local agri and food sectors. DPC does not believe that the expansion of the port to cater for the size of bulk ships currently handled in Dublin Port or the larger ships envisaged in the future is viable or realistic DPC does not believe that the expansion of the port to cater for the size of bulk ships currently handled in Dublin Port or the larger ships envisaged in the future is viable or realistic.
Cruise	Given its location in Carlingford Lough, Warrenpoint could attract some small ships based on attractions in the local area. Such a possibility would not, however, amount to an alternative to the cruise capacity proposed for Dublin Port.

Greenore

Introduction	By the standards of Ireland's smaller ports, Greenore is a relatively deep water port. It has a 250m long quay wall available with depth alongside of between 6.0m CD and 8.0m CD. Greenore is a privately owned port (in which Dublin Port Company has a 50% financial interest). Greenore is categorised in National Ports Policy as a port of regional significance.
Vessel Requirements	The Port can cater for relatively large ships, though not as large as can be handled in major ports such as Dublin and Belfast. The constraint is the rock bar at the mouth of Carlingford Lough at a depth of 6.3m CD although this is technically capable of improvement by excavation works.
Landside	There are sufficient lands to accommodate increase in storage areas.
Access	Good road access to the National Network is available. There is no rail access.
Planning	The expansion of the Port was the subject of an application to An Bord Pleanála (PL15.PC0011) for designation as a Strategic Infrastructure Development. The project involved the reclamation of approximately five hectares of inter-tidal foreshore, construction of 300m of quay for Lo-Lo ships and construction of a Ro-Ro berth. The County Louth Development Plan 2009 - 2015 is supportive of the Port and states that its policy is to "*ensure that there is sufficient land available for port expansion and related uses and to support the development and expansion of the ports of Drogheda, Dundalk, Greenore and Clogherhead*" (TC 29). At this stage the project is very unlikely to go ahead. Since the SI designation was achieved, the business of the port has declined and, for its part, DPC has substantially written down the value of its investment from €8.8m to €0.8m. The prospects for the development have all but disappeared in the face of the ongoing concentration of unitised volumes from smaller ports (notably Larne, Warrenpoint, Drogheda, Dun Laoghaire and Waterford) into the larger ports of Belfast, Dublin and Cork. DPC believes that this concentration is not reversible except in the event of capacity restrictions emerging in these larger ports. In such circumstances, developments such as that proposed in 2008 for Greenore may become financially viable albeit with considerably increased landside emissions due to greatly increased road haulage.
Environmental Issues	Carlingford Lough is both an SPA (Reference No. 452) and a Special Area of Conservation (SAC) and it is the policy of Louth County Council as Planning Authority, that development shall only be permitted on Carlingford Lough where an assessment carried out to the satisfaction of the Planning Authority indicates that it will have no significant adverse effect (such as disturbance, pollution or deterioration) on the quality of the protected area. Greenore is located 109km from Dublin so that a HGV vehicle servicing Dublin from Greenore would emit 36 times the emission of a similar vehicle servicing the Dublin market from Dublin Port.
Unitised	Greenore has the capability of being expanded to handle unitised trades. However, its remote location rules it out as a viable alternative to these element of capacity which the proposed development in Dublin port will provide.

Greenore (continued)

Bulk	Greenore's principal activity will remain the handling of bulk commodities to meet the requirements of the local economy and industries, notably in agri and food sectors. DPC does not believe that the expansion of the port to cater for the size of bulk ships currently handled in Dublin Port or the larger ships envisaged in the future is viable or realistic.
Cruise	Given the more attractive destinations available elsewhere on the east coast, DPC does not believe that Greenore can develop any significant cruise business. However, even if it did, such development would complement that proposed in Dublin port rather than be an alternative to it.

Dundalk

Overview	Dundalk does not handle containerised traffic and only handles general cargo such as agri bulk commodities, solid fuel, scrap metals and waste. The port is categorised as a port regional significance in National Ports Policy 2013. It is owned by Dublin Port Company. The channel to Dundalk is 13km long and is very shallow. The port is best characterised as a mud creek where ships on the berths ground at low water. The port handles in the order of 80 small ships per year and has negligible capacity for expansion.

Drogheda

Introduction	Drogheda Port is situated on the River Boyne and has reached capacity. It has proposed a new development at Bremore in the functional area of Fingal County Council designed to address the deficit in its Port capacity. The Bremore proposal is addressed separately. Drogheda currently handles bulk cargo. It handled Lo-Lo traffic in the past, peaking at 63,000 TEU in 2002. However, this trade has dwindled to almost zero in recent years. Drogheda Port is categorised in National Port Policy 2013 as a port of regional significance. As shown in Table 3, Drogheda Port is very restricted in terms of the size of ships it can handle and any increase in this capacity would require major works including to the port's training walls, channel and berths.
Access	Road access to both the Town Quays and to Tom Roe's Point is poor, although there are proposals to provide better road access as part of the North Drogheda Environs Development Project. Rail access is not directly available.
Planning	The Louth County Development Plan is supportive of development and expansion of the port.
Environmental	Drogheda is located 50km from Dublin and an average HGV vehicle would have 17 times the emissions of a HGV vehicle servicing Dublin

Issues	from Dublin Port.
Unitised	Drogheda has very limited capacity for unitised trade. Provision of additional capacity, particularly for Ro-Ro traffic, would be extremely problematic given the restrictions in the port's channel, the lack of readily available land for the tranit storage of Ro-Ro units and the poor road access.
Bulk	As with many small ports, Drogheda has a bulk business meeting the requirements of the local economy and industries, notably in recent years for the export of clinker from the nearby Platin cement plant. DPC does not believe that the expansion of the port to cater for the size of bulk ships currently handled in Dublin Port or the larger ships envisaged in the future is viable or realistic.
Cruise	Drogheda has attracted a small number of cruise ships in recent years based on attractions in the local area. Its niche attractiveness for cruise calls will remain. Expansion of the cruise business in Drogheda would require considerable development including the deepening of the port's channel and the building of deeper berths. Such a possibility would not, however, amount to an alternative to the cruise capacity proposed for Dublin Port.

Dun Laoghaire

Introduction	Dun Laoghaire has a limited and declining commercial shipping business. Dun Laoghaire Harbour Company published an ambitious Masterplan in 2011 which focuses on the development of the harbour as a major marine, leisure and tourism destination. Developments within this Masterplan include a dedicated cruise facility, a diaspora centre plus residential and commercial development Dun Laoghaire is categorised as a port of regional significance in National Ports Policy 2013. This policy supports the harbour's move towards marine tourism and leisure. Dun Laoghaire Harbour has limited depth of water and berthage. The longest berth is St. Michael's Pier which is 142 m long on its east side and has depth alongside of 5.0m (MLWS).
Landside	The built-up nature of Dun Laoghaire makes it difficult to expand the port's cargo handling capacity
Access	Road access is constrained by the built-up nature of the surrounding area. There is access to rail for passenger services.
Planning	The Dun Laoghaire Rathdown County Development Plan states that the role of Dun Laoghaire Harbour is changing from a commercial port to a maritime, tourism, recreational and ferry passenger port..
Unitised	Ro-Ro freight volumes have declined from a high level of 42,000 units in 2002 to less than 1,000 currently as Stena Line has gradually reduced its services to the currently daily seasonal HSS service. Given the scale to which Ro-Ro traffic has grown in Dublin Port and the large land areas required to service this trade, it is not conceivable that any future development in Dub Laoghaire could provide an alternative to Dublin Port.
Bulk	Dun Laoghaire Harbour has no capability to handle bulk cargoes and, given its nature and location, it is not conceivable that such a capability could be contemplated.
Cruise	Dun Laoghaire includes the development of dedicated cruise facilities within its Masterplan. Such a development could be considered as an alternative to part of Dublin Port's proposed development and this has been considered in detail by DPC in formulating its own plans (see Section 7)..

Wicklow

Introduction	Wicklow is a small regional port and is categorised in National Ports Policy 2013 as a port of regional significance . The port has three berths the longest of which is 130m and the deepest of which is 5.0m.
Landside	It has reasonable landside areas that could be used or converted for storage
Access	It has good road access to the National Roads system without traversing large areas of residential or other use. It has no immediate direct Rail access.
Planning	The Wicklow Town Plan is supportive of the growth of the Port.
Environmental Issues	Wicklow is located 56km from Dublin and a HGV serving Dublin will have 19 times the emissions of one serving the Dublin area from Dublin Port
Unitised	Wicklow has very no capacity for Ro-Ro trade. Provision of additional capacity would be extremely problematic given the lack of readily available land for the transit storage of Ro-Ro units and the large imposition such trade would put on the local road network at peak times.
Bulk	As with many small ports, Wicklow has a bulk business meeting the requirements of the local economy and industries.
Cruise	The port can handle small cruise ships currently but it would take considerable development to allow

Arklow

Overview	Arklow Port has had no commercial traffic for a decade and responsibility for the harbour has been transferred to Wicklow County Council It is not rated in National Ports Policy 2013 as commercial port. The port has extremely limited ship handling capacity in terms of ship length (limited to 82m) and draught (4.3m). The port's quays are in poor condition and for Arklow to offer an alternative to the proposed development in Dublin Port would require major almost *de novo* infrastructure works including piers and channel dredging.

New Ross

Overview	New Ross is a small river port located 32km from the sea upriver from the confluence of the Barrow and Suir rivers. Its ship handling capacity is very limited with maximum ship length of is 110 m and the beam (restricted by the swing bridge for rail) of 18m. Draft is limited to 6.5m can on spring tides. There are contains six berths totalling 400m in length. The ports cargo business has declined from a peak of 1.1m tonnes to as little as 0.3m tonnes in 2013. The River Barrow is Special Area of Conservation and includes much of the existing Port area. It is located 168km from Dublin and a HGV serving the Dublin Market will have 52 times the emissions of one serving Dublin from the Port. New Ross is a port of regional significance in National Ports Policy. Road access is poor and there is no rail access. The physical limitations and the decline in the business of the port rule New Ross out as a possible alternative for any element of what is proposed in Dublin Port.

Waterford

Introduction	Waterford Port is one of Ireland's two Tier 2 ports and, along with Rosslare, is a comprehensive port on the TEN-T comprehensive network. The business of the port is concentrated at Belview. For many years, Waterford had a large Lo-Lo trade and serviced the entire island via its excellent rail connections. The port's Lo-Lo volumes peaked at 186,000 TEU in 2007 but declined by almost 80% to as little as 39,000 TEU in 2012 in the face of competition from Dublin and Cork. Although Waterford's ship handling capacity is less than that of Dublin, it is considerably better than most other ports in the country and can accommodate ships up to about 240m in length with draughts in the region of 8.0 metres.
Planning	The Kilkenny County Development Plan 2008-2014 contains policies and Objectives that are supportive of the continued development of Belview and the provision of appropriate road and other infrastructure
Environmental Issues	Belview is located 158 km from Dublin so that a typical HGV would emit 52 times the emissions that would be emitted from a vehicle serving Dublin from Dublin Port.
Unitised	Although the port has extensive Lo-Lo capacity available and Ro-Ro facilities could readily be developed there, its distant location from Dublin rules it out as an alternative to the Ro-Ro capacity proposed in for Dublin Port.
Bulk	Lesser ship size capacity and location combine to also rule Waterford out as a viable alternative to the expanded and deepened bulk berths proposed for Dublin Port.
Cruise	Waterford is a popular destination for smaller cruise ships and will retain a niche attraction for such business. The nature of the cruise business suggests that any development in Waterford to grow its cruise business will add to the overall attractiveness of Ireland as a cruise destination and will, therefore, complement and support the proposed cruise capacity in Dublin.

Rosslare

Introduction	Rosslare is the country's second largest ferry port. It is similar to but smaller than the Port of Larne handling 114,000 Ro-Ro units in 2012 compared to Larne's 215,000. Rosslare is operated by Irish Rail and it is categorised in National Ports Policy as a Tier 2 port. In EU terms it is included as one of 236 ports in the TEN-T comprehensive network. It has four berths that can accommodate vessels up to 215m in length. Water depths vary from 7.6m to 10m.
Landside	It has short-term storage that caters for up to 2,000 vehicles and 200 unaccompanied trailer spaces.
Access	The Port has good access to the National Road system albeit that immediate access is single carriageway. There is also direct Rail access.
Planning	The Rosslare Harbour Local Area Plan 2002 zones an extensive area for Port related uses.
Environmental Issues	The Port is 162 km from Dublin and emissions from a HGV vehicle would be 54 times that of a vehicle serving Dublin from Dublin Port.
Unitised / bulk / cruise	Rosslare is an important port providing access to south Wales and to north west France. Its distance from Dublin (162km) effectively rules it out as a suitable location for its development as an alternative for any of the uses planned for the proposed development in Dublin Port.

APPENDIX 2

CONSULTATION PROCESS

APPENDIX 2A

Public Consultation Newsletter

RePORT

Autumn 2013

DUBLIN PORT COMPANY SUPPORTS NEW FUTURE FOR BULL ISLAND

Chance to share your views on new community initiative

- Proposal to transfer Port owned land on Bull Island to the people of Dublin
- Funding for studies on the future of the Island
- Funding for new facilities on the Island

Welcome

It's just over two years since Dublin Port Company launched its Masterplan consultation on the future development of Dublin Port.

During that time, we spoke to a wide range of people and organisations, including community groups, residents and businesses with an interest in Dublin Port and its future. The end result was the publication of a Masterplan, or framework document, designed to guide the future development and operation of Dublin Port.

Many people took the time to meet with us, get in touch and contribute their views on the future of Dublin Port. This in turn helped us to identify a series of projects that could be undertaken in Dublin Port which will allow the Port to continue serving the national economy and the City of Dublin.

Introducing the Alexandra Basin Redevelopment Project

With the framework now in place, Dublin Port Company is preparing its first significant Masterplan project for development. The project will focus on Alexandra Basin to the west of the Port, and involves reconfiguring some of the berthing facilities there for the ships which use the port daily, in addition to some new berthing facilities for the growing number of cruise liners which visit Ireland each year. The project will also provide new berths for ferries on the river towards the east of the Port.

It's a new phase in Dublin Port's development and one we would like to share with you. This newsletter is designed to introduce you to the Alexandra Basin Redevelopment project, and more specifically, ask for your views on a proposal to make a contribution back to the community as part of the project. We will commit to and include this 'community gain' proposal in our planning application.

As Ireland's largest and busiest port, Dublin Port already handles over €35 billion worth of trade annually and supports some 4,000 jobs locally.

Even with modest growth the port's current volumes will double by the year 2040.

To ensure that Dublin Port will be able to facilitate Ireland's future trading needs, the Port needs to be ready to handle larger trade volumes efficiently and competitively when economic recovery comes and also have deeper berths in place to cater for larger more modern ships. This means developing the projects identified under the master

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RePORT

plan now and over time, so that the Port can continue to accommodate the freight ships carrying the goods we import and export daily, whether it's the microwave, breakfast cereals and shoes we buy, or the pharmaceuticals, beef and dairy products we send abroad.

Dublin Port Company made a commitment in the Masterplan to maximise the use of lands within the footprint of the existing port lands. We are living up to that commitment. This project is essentially about how we can best re-design and maximise the use of our existing berthing facilities so that we can better accommodate the modern day vessels using Dublin Port now and in the future without any further encroachment into Dublin Bay.

Looking Ahead

Any development will be subject to a detailed planning application and Environmental Impact Statement. These will be lodged with An Bord Pleanála under the Strategic Infrastructure Act later this year. An Bord Pleanála has already designated this as a 'strategic infrastructure' project, meaning it is recognised as being vital to the development of Ireland's national infrastructure.

Over the coming months, Dublin Port Company will be engaging in an extensive consultation programme as the application is lodged. This will include public information days in the local community, giving everyone the opportunity to meet us in person, learn more about the project and how to participate fully in the planning process, so that your views are taken into account. This means that we can prepare the project for planning and development in the best way possible for the Port, its surroundings, the local community and the City.

Bull Island – a precious natural resource for Dublin

In the event that planning permission is granted for the Alexandra Basin project, Dublin Port Company has given special consideration to a community gain initiative designed to benefit the City and people of Dublin from an environmental, tourism and social inclusion perspective.

As part of this project, Dublin Port Company proposes a community gain initiative which would involve:

- Dublin Port Company transferring its ownership of a portion of Bull Island to Dublin City Council to hold in perpetuity for the people of Dublin and future generations;
- Dublin Port Company partnering with Dublin City Council and Fáilte Ireland in a feasibility study for a new interpretative centre and international visitor experience at the UNESCO designated Bull Island biosphere, as well as a master plan for Bull Island following the conclusion of the study;
- Dublin Port Company allocating up to €1.2m towards the cost of the study, master plan and new services or facilities identified for Bull Island;
- Dublin Port Company continuing its ongoing, wide-ranging programme of community initiatives and special projects including education bursaries and sports sponsorships, drugs education and rehabilitation programmes, sail training and events to animate the River Liffey.

What will the feasibility study examine?

- How any new proposals for Bull Island can take place in a way that protects and supports the UNESCO Biosphere designation and the precious natural resource that Bull Island represents;
- Current and possible future recreational uses on Bull Island;
- An assessment of the potential for an international visitor interpretative centre;
- Examples of similar locations internationally.

Dublin Port Company and Bull Island?

Bull Island has a long association with Dublin Port and was originally created as a result of port engineering works in the 1800s; the construction of the Great South Wall and North Bull Wall resulted in the creation of Bull Island as we know it today.

COMHLACHT CHALAFORT ÁTHA CLIATH DUBLIN PORT COMPANY

Autumn 2013

Dublin Port Company owns a portion of Bull Island closest to the port and adjacent to the Royal Dublin Golf Club. The area owned by Dublin Port Company is approximately 10.5 hectares and is located at the western side of the island beside the North Bull Wall. At present, the lands owned by Dublin Port Company are used for recreation with some swimming shelters, informational signage and seating in place, as well as the Marion Shrine. The lands are also used to gain access to Dollymount strand, providing an important link to the rest of Bull Island and major amenity within easy distance of the city centre for both people living locally and the wider Dublin community.

A lasting legacy for local communities and the City

Corporate Social Responsibility (CSR) has a central place at the heart of Dublin Port Company's Strategic Plan, where we define CSR as the commitment of the Port to contribute to sustainable economic development and improved quality of life – working with our employees, the local community and society at large in ways that complement the Port's business while benefitting the City of Dublin, its citizens and visitors.

Our role in the local community is built on strong connections fostered over generations, during which time we have worked to develop CSR projects designed to provide valuable support for a range of groups and individuals across the following areas:

» Education - as a means of helping to improve the economic well-being and prospects of people living in the locality, including the generation of employment opportunities in the local economy;

» Community events;

» Sports in local communities and in Dublin Bay.

We continue to form new partnerships, create new events and support projects which we believe will open the port to the City and benefit its citizens. The launch of Riverfest in June this year, a new three day festival, brought the River Liffey and quayside to life with an array of boat displays, attractions and entertainment which brought over 40,000 Dubliners and visitors to the port area.

Dublin Port Company wants to leave a lasting and meaningful legacy that will enrich the lives of future generations in our immediate locality and the wider Dublin community. The proposal to transfer our land holding in Bull Island to Dublin City Council and to provide funding to determine what is best for Bull Island as a precious natural resource as well as the provision of new facilities is a sign of our commitment to be a good neighbour to the City, communities and environment which surrounds us, and underpins this latest community gain initiative at Bull Island.

www.dublinportabr.ie

TELL US WHAT YOU THINK.

Before the community gain initiative is finalised and submitted in the context of a planning application to An Bord Pleanála, Dublin Port Company is keen to hear the views of the local and wider Dublin community on the community initiative generally and with regard to some specific questions.

a. What do you think of the Dublin Port Company proposal to redevelop Alexandra Basin to facilitate new berths in Dublin?

b. Do you agree with the Dublin Port Company commitment to maximise the current land available in the Port and not to encroach into Dublin Bay through any further reclamation?

c. Do you think that it's prudent for Dublin Port Company to plan now for deeper / modern berthing facilities designed to accommodate larger freight ships as a means of preparing Dublin Port to service Ireland's future trading needs?

d. Do you agree that cruise ships are better suited to berthing away from the industrial port environment and closer to the City's shops, eateries and attractions?

e. What other measures do you think could be taken to help enhance Dublin as a destination for cruise tourism so that the City benefits as a whole?

f. Are there any specific environmental considerations that you would like to highlight at this stage?

g. Are there any architectural, historical or heritage considerations that you believe are important to this project?

h. Do you believe that Bull Island is an important amenity for the people of Dublin?

i. Do you visit Bull Island and what do you use it for (walking/running, golf, bird watching, etc)?

j. Do you think Bull Island is underused by the people of Dublin, especially given its UNESCO Biosphere designation?

k. What measures do you feel can be taken to make Bull Island a resource for all of the people of Dublin?

l. Do you think that placing Bull Island under the single ownership of Dublin City Council will lead to the island being better managed as a resource?

m. Do you support the idea of a study and master plan being developed to guide the management of the island and any subsequent sustainable development of an international visitor attraction?

n. What services or additional facilities do you feel need to be provided at Bull Island to enhance its recreational, amenity and environmental status, as well as reinforce its UNESCO Biosphere designation?

How to get in touch

To share your views on the community gain initiative generally, or address any of the questions outlined in this newsletter, please send your responses by Friday, 18th October 2013 to:

Charlie Murphy
Dublin Port Company
Alexandra Road
Dublin 1

Email: abr@dublinport.ie
Tel: +353 (0)1 887 6000

Further details: **www.dublinportabr.ie**

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APPENDIX 2B

Public Consultation on Proposed Community Gain Initiative

Public Consultation on proposed community gain initiative

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Dublin Port Company's Masterplan provides a framework for the future development of Dublin Port to 2040. Dublin Port Company is now preparing its first significant Masterplan project for development.

The Alexandra Basin Redevelopment project will focus on the Alexandra Basin to the west of Dublin Port, and involves reconfiguring existing berthing facilities to provide new and deeper multi-purpose berths to service cargo ships using the Port daily. The project will also provide new berths for ferries on the river towards the east of the Port. In addition, there will be new berthing facilities for the growing number of cruise liners choosing to visit Dublin Port each year.

Dublin Port Company made a commitment in the Masterplan to maximise the use of lands within the footprint of the existing port lands and the project delivers on this commitment. Any development will be subject to a planning application and Environmental Impact Statement lodged with An Bord Pleanála under the Strategic Infrastructure Act.

As part of the project, Dublin Port Company will commit to and include in its planning application a community gain initiative designed to benefit the City and people of Dublin from an environmental, tourism and social inclusion perspective. This would involve:

- Dublin Port Company transferring its ownership of 10.5 hectares of Bull Island to Dublin City Council to hold in perpetuity for the people of Dublin and future generations;
- Dublin Port Company partnering with Dublin City Council and Fáilte Ireland in a feasibility study for a new interpretative centre and international visitor experience at the UNESCO designated Bull Island biosphere, as well as a master plan for Bull Island following the conclusion of the study;
- Dublin Port Company allocating up to €1.2m towards the cost of the study, master plan and new services or facilities identified for Bull Island;

Through the community gain initiative, Dublin Port Company wants to assist in providing a legacy that enriches Bull Island as a precious natural resource for Dubliners and visitors to the City. Before the community gain initiative is finalised, Dublin Port Company wants to hear the views of the local and wider Dublin community on the proposal.

To guide respondents' submissions, Dublin Port Company has prepared a number of specific questions on the proposal: see **www.dublinportabr.ie.**

Interested parties are invited to make their submissions to **abr@dublinport.ie** or Charlie Murphy, Dublin Port Company, Alexandra Road, Dublin 1 **no later than Friday, 18th October 2013.**

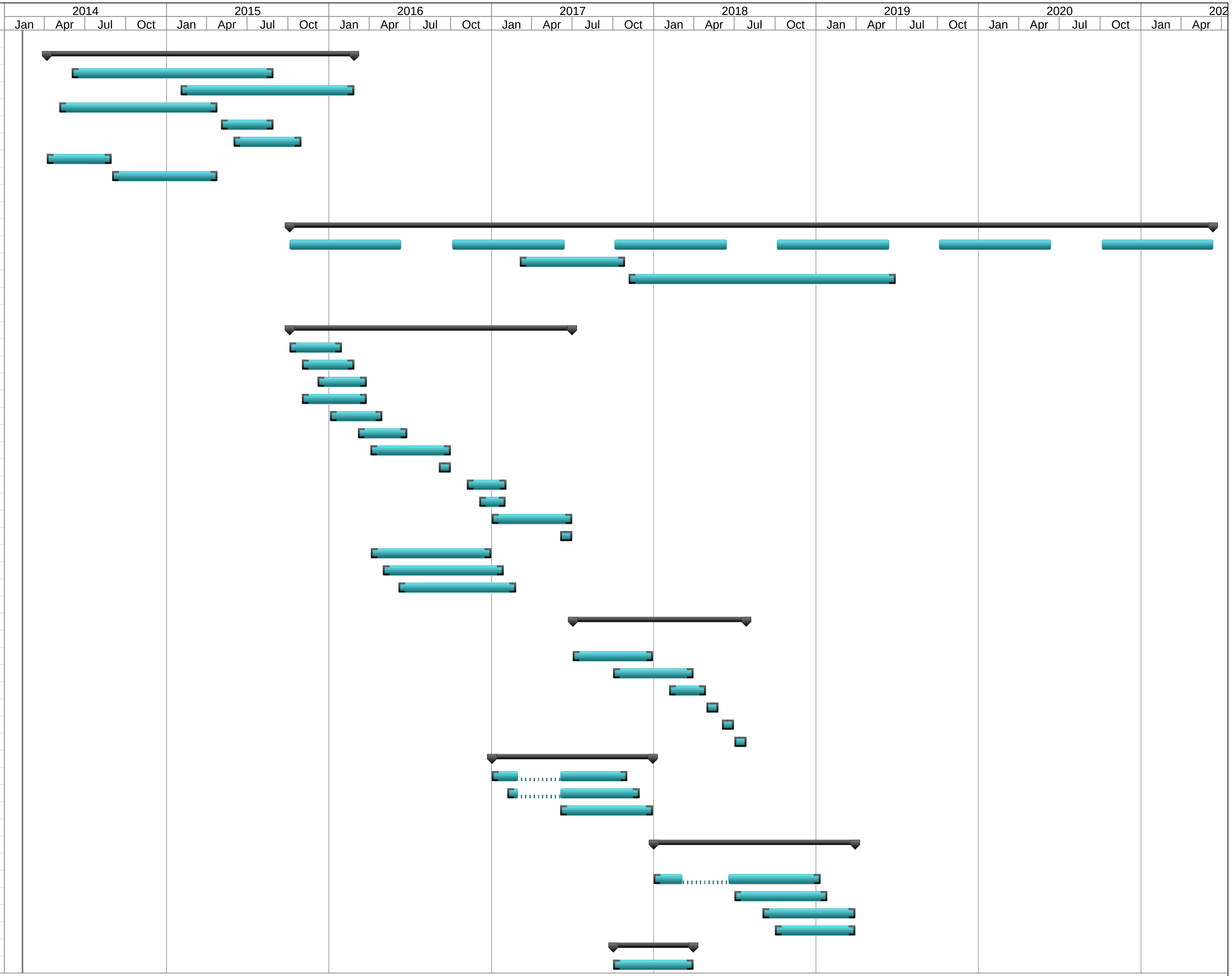
APPENDIX 3

There is no appendix for this Chapter of the EIS

APPENDIX 4

Project Description

ID	Task Name
1	**Advance Works**
2	
3	Design/procurement mobilisation of dredging package
4	Procurement and fabrication of conveyor system
5	Detailed design and tendering of first phase elements
6	Contractor appointment and mobilisation
7	Ordering/delivery of first phase steel elements
8	Marine SI works (Bull Wall / Marina / Quay Walls)
9	Develop Design Solution for Bull Wall (if required)
10	
11	**Dredging**
12	
13	**Main Channel Dredging**
20	Stabilisation Works at Bull Wall Heads (if required)
21	Alexandra Basin Dredging / Treatment and Placement
22	
23	**Phase 1**
24	
25	Preparation of Area west of Berth 29
26	Piling from existing Conveyor to West (Rig 1)
27	Piling North to extended Berth 29 (Rig 2)
28	Piling of anchor wall (Rig 3)
29	Construction of new Quay behind berth 29
30	Install conveyors on berth 29
31	Demolish lead jetty and complete dredge in area
32	Transfer Tara Mines
33	Demolish Loading jetty
34	Install New linkspans / ramps
35	Consruct new Mooring Dolphins Marine Plant
36	Move Seatruck
37	Piling Berths 32-34 and Ocean Pier (Rig 1)
38	Piling Berths 32-34 and Ocean Pier (Rig 2)
39	Complete construction and fit out of quay wall
40	
41	**Phase 2**
42	
43	Construction of Cellular wall
44	Construction of New river berth
45	Move Ramp 4 to new river berth
46	Move Stena to new river berth
47	Move Seatruck to Berth 51
48	Move P&O to Alex Basin West
49	**Phase 2a**
50	Piling Berths 29-31 (Rig 1)
51	Piling Berths 29-31 (Rig 2)
52	Complete construction and fit out of quay wall
53	
54	**Phase 3**
55	
56	North Quay Wall Piling (2 Rigs)
57	Deconstruction of North Quay Wall
58	Completion of Quay Wall Construction
59	Feature Stone elements / lighthouse
60	**Phase 3a**
61	Construction of Marina Wall (Marine Plant - Piling rig)



Project: Programme
Date: Tue 11/02/14

Task		Project Summary		Inactive Task		Duration-only		Finish-only	
Split		External Tasks		Inactive Milestone		Manual Summary Rollup		Progress	
Milestone		External Milestone		Inactive Summary		Manual Summary		Deadline	
Summary		Inactive Task		Manual Task		Start-only			

Management Asbestos Survey

Of

P & O Buildings and Various Structures in Alexandra Basin, Dublin Port

UKAS
TESTING
2083

Report Classification:		Management Asbestos Survey
Report Status:		FINAL
Report Reference:		NI1499/A/M01/01
	Name	***Date***
Report by:	Stephen McAfee **Senior Environmental Consultant**	11th February 2014
Reviewed by:	Stephen Cleary **Associate Director**	12th February 2014
Analysed by:	Helen McGuckin **Analyst G&L Consultancy**	10th February 2014

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5.2 MEDIUM TO LOW PRIORITY ACMS 14

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Appendix B - Certificates of Analysis

Appendix C - Location Plans

Appendix D - Risk Management Codes

Appendix E - Full Asbestos Register

Executive Summary

A Management Asbestos Survey (MAS) was undertaken at a range of buildings and structures within Alexandra Basin, Dublin Port on 4th February 2014. The survey was completed in accordance with the Irish Health and Safety Authority (HSA) guidance document *Asbestos-containing Materials (ACMs) in Workplaces - Practical Guidelines on ACM Management and Abatement (2013)* and the UK guidance document *HSG264 Asbestos: The Survey Guide* (Health & Safety Executive, 2010)

A MAS is the standard survey type used for buildings that are still occupied. Its purpose is to locate, as far as reasonably practicable, the presence and extent of any suspect ACMs in the building which could be damaged or disturbed during normal occupancy, including foreseeable maintenance and installation, and to assess their condition.

MASs can involve a combination of sampling to confirm asbestos is present or presumption that asbestos is present where access cannot be achieved. The survey of buildings and structures at Alexandra Basin involved the sampling of all potential ACMs where these materials could be reasonably accessed.

During the MAS, the following buildings and structures were surveyed by RPS:

- P&O Head Offices;
- P&O Terminal Building
- The Vehicle Maintenance Unit (VMU) Building;
- Bulk Jetty
- Lead-In Jetty
- Ramp No. 4
- Ramp No. 6
- Ramp No. 7
- Ramp No. 8
- Jetty next to Ramp No. 7
- Jetty next to Ramp No. 8

Structures including the bulk jetty, the lead-in jetty, ramp number 4 and ramp number 6 were surveyed and accessed as far as reasonably practicable. No suspected ACMs were identified on these structures and hence no samples were taken of materials on these structures.

During the course of the Management Asbestos Survey, ACMs were detected in the form of:

- Gaskets

The asbestos gaskets should be removed during the normal maintenance programme of the building. The works do not require a licensed contractor, however the material should be disposed of as asbestos waste.

According to guidance documents listed above, all areas should be accessed and inspected as far as reasonably practicable during a MAS. The surveyors were unable to gain access to the following areas due to conditions outside of their control:

- P&O Head Offices - Boiler Room: Limited access throughout Boiler Room;
- P&O Head Offices - Boiler Room: No access inside plant;
- P&O Head Offices - Shipping/Traffic: No access inside safe;
- P&O Head Offices - No access inside air conditioning units throughout;
- P&O Head Offices - Lift: No access inside lift shaft;
- P&O Head Offices - Traveller Driver Restroom: No access into room;
- P&O Head Offices - Accounts Manager: No access inside Matthews safe;
- P&O Head Offices - Exterior: No access inside plant on roof;
- P&O Head Offices - No access inside electrical units throughout;
- VMU Building - Open Area 1: No access inside safe/storage unit;
- VMU Building - Open Area 1: No access inside entrance door;
- VMU Building - No access inside electrical units throughout;
- P&O Terminal Building - Staff: No access into room;
- P&O Terminal Building - Office: No access into room;
- P&O Terminal Building - Exterior Boiler Shed: No access into room;
- Bulk Jetty: Limited access throughout structure;
- Lead-In Jetty: Limited access throughout structure;
- Ramp No 4: Limited access throughout structure;
- Ramp No 6: Limited access throughout structure;
- Ramp No. 7 Limited access throughout structure
- Ramp No. 8 Limited access throughout structure
- Jetty next to Ramp No. 7 Limited access throughout structure
- Jetty next to Ramp No. 8 Limited access throughout structure

These areas must be accessed prior to disturbance, refurbishment or demolition activities. Areas not accessed are presumed to contain asbestos.

For Health & Safety reasons, the surveyors did not take apart electrical units or storage heaters.

If any planned works are likely to damage or disturb ACMs noted in section 4, then the asbestos must be removed prior to these works taking place.

This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

The client is advised not to solely read the asbestos register as a definitive description of all ACMs within the building.

THIS REPORT SHOULD BE READ IN ITS ENTIRETY.

1 Introduction

RPS Group were requested to complete a Management Asbestos Survey (MAS) at a number of buildings and structures within Alexandra Basin in Dublin Port. The purpose of the survey was to identify the presence of any asbestos-containing materials (ACMs) as part of the ongoing use and maintenance of the buildings/structures and with a view to the future demolition of these buildings/structures.

A MAS is the standard survey type used for buildings that are still occupied. Its purpose is to locate, as far as reasonably practicable, the presence and extent of any suspect ACMs in the building which could be damaged or disturbed during normal occupancy, including foreseeable maintenance and installation, and to assess their condition.

MASs will often involve minor intrusive work and some disturbance, the extent of which will depend on what is reasonably practicable for individual properties. A management survey should include an assessment of the condition of the various ACMs and their ability to release fibres into the air if they are disturbed.

The survey will usually involve sampling and analysis to confirm the presence or absence of ACMs, however a management survey can also involve presuming the presence of asbestos where access is not feasible. Surveyors will always endeavour to positively identify ACMs, as the presumption of asbestos can make managing the asbestos in a building more difficult for the dutyholder.

During a MAS, all areas should be accessed as far as reasonably practicable. Areas accessed should include under floor coverings, false ceilings, inside risers, service ducts, lift shafts etc. Surveys may involve some minor intrusive work (e.g. accessing behind panels etc.) depending on what is feasible based on the building and its use and consultation with the dutyholder.

A MAS should cover routine and simple maintenance work. Where more extensive maintenance work is involved, there may not be sufficient information in the management survey and a localised refurbishment survey will be needed. A refurbishment survey will be required for all work which disturbs the fabric of the building in areas where the management survey has not been intrusive. Where buildings or structures are to be demolished a Demolition Survey must be undertaken prior to demolition works commencing.

The survey of the buildings and structures at Alexandra Basin was conducted by Stephen McAfee & Stephen Cleary of RPS Group Plc.

Certificates of Analysis for Bulk Samples obtained during the survey are included within Appendix B of this report.

Throughout the report the following terms and abbreviations may be used:

ACM	Asbestos containing material.
NAD	Asbestos not detected.
MMMF	This describes any machine made mineral fibre, fibreglass, Rockwool, ceramic fibres and other such material.

AIB	Asbestos Insulating Board.
Chrysotile	Commonly known as white asbestos.
Amosite	Commonly known as brown asbestos.
Crocidolite	Commonly known as blue asbestos.
Amphibole	Generic name for all asbestos types, excluding Chrysotile.

Site layout plans have been annotated and accompany the report, see Appendix C.

If any planned works are likely to disturb or damage ACMs noted in section 4, then the ACM must be removed prior to these works taking place.

This report may not be reproduced other than in full, except with the prior written approval of the issuing office.

The client is advised not to solely read the asbestos register as a definitive description of all ACMs within the building.

THIS REPORT SHOULD BE READ IN ITS ENTIRETY.

Questions arising from the survey report should be directed, in the first instance, to the author of this report, who will be pleased to clarify any technical issues raised.

2 Survey Objectives

The objective of a MAS is to locate, as far as reasonably practicable, the presence and extent of any suspect ACMs in the buildings/ and structures which could be damaged or disturbed during normal occupancy, including foreseeable maintenance and installation, and to assess their condition.

3 Limitations

During a MAS, all areas should be accessed as far as reasonably practicable. Areas accessed should include under floor coverings, false ceilings, inside risers, service ducts, lift shafts etc. Surveys may involve some minor intrusive work (e.g. accessing behind panels etc.) depending on what is feasible based on the building and its use and consultation with the dutyholder.

During the survey of Alexandra Basin, the surveyors attempted to access all areas as far as reasonably practicable. The surveyors were unable to gain access to the following areas due to conditions outside of their control:

- P&O Head Offices - Boiler Room: Limited access throughout Boiler Room;
- P&O Head Offices - Boiler Room: No access inside plant;
- P&O Head Offices - Shipping/Traffic: No access inside safe;
- P&O Head Offices - No access inside air conditioning units throughout;
- P&O Head Offices - Lift: No access inside lift shaft;
- P&O Head Offices - Traveller Driver Restroom: No access into room;
- P&O Head Offices - Accounts Manager: No access inside Matthews safe;
- P&O Head Offices - Exterior: No access inside plant on roof;
- P&O Head Offices - No access inside electrical units throughout;
- VMU Building - Open Area 1: No access inside safe/storage unit;
- VMU Building - Open Area 1: No access inside entrance door;
- VMU Building - No access inside electrical units throughout;
- P&O Terminal Building - Staff: No access into room;
- P&O Terminal Building - Office: No access into room;
- P&O Terminal Building - Exterior Boiler Shed: No access into room;
- Bulk Jetty: Limited access throughout structure;
- Lead-In Jetty: Limited access throughout structure;
- Ramp No 4: Limited access throughout structure;
- Ramp No 6: Limited access throughout structure;
- Ramp No. 7 Limited access throughout structure;
- Ramp No. 8 Limited access throughout structure;
- Jetty next to Ramp No. 7 Limited access throughout structure.
- Jetty next to Ramp No. 8 Limited access throughout structure.

These areas must be accessed prior to disturbance, refurbishment or demolition activities. Areas not accessed are presumed to contain asbestos.

For Health & Safety reasons, the surveyors did not take apart electrical units or storage heaters.

See also Appendix A.

4 Asbestos Survey Register

This section contains a record of all materials sampled (whether positive or negative for asbestos) and all materials presumed to contain asbestos during the survey of the various buildings and structures in Alexandra Basin.

The full asbestos register of all rooms inspected is located in Appendix E.

SAMPLED MATERIALS

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Pump Room **Form:** Composite

Location & Description: Grey Floor Tiles

Extent: 8m^2

Sample Number: (1) - BEL1001

Lab Reference Number: BS071815

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Security Locker **Form:** Composites

Location & Description: Grey/Blue Floor Tiles

Extent: 20m^2

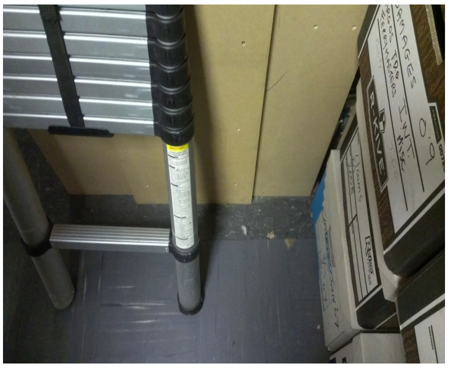
Sample Number: (2) - BEL1002

Lab Reference Number: BS071816

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A



Site: Alexandra Basin, P&O Head Offices

Floor: Ground

Room Reference: Security Locker

Form: Composites

Location & Description: Grey Floor Tiles

Extent: <1m^2

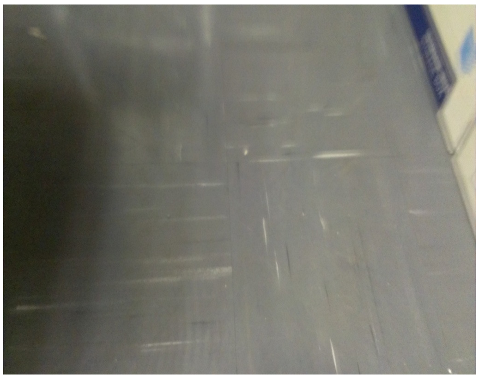
Sample Number: (3) - BEL1003

Lab Reference Number: BS071817

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A



Site: Alexandra Basin, P&O Head Offices

Floor: Ground

Room Reference: Toilet 1

Form: Bitumen

Location & Description: Sink Pad

Extent: <1m^2

Sample Number: (4) - BEL1004

Lab Reference Number: BS071818

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices

Floor: Ground

Room Reference: Toilet 1

Form: Composite

Location & Description: Grey Floor Tiles

Extent: 10m^2

Sample Number: (5) - BEL1005

Lab Reference Number: BS071819

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Hall 3 **Form:** Composites

Location & Description: Grey floor covering

Extent: 4m^2

Sample Number: (6) - BEL1006

Lab Reference Number: BS071820

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Security **Form:** Composites

Location & Description: Floor Tiles (Under Floor Covering)

Extent: 10m^2

Sample Number: (7) - BEL1007

Lab Reference Number: BS071821

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Stevedores **Form:** Composites

Location & Description: Sink Pad

Extent: <1m^2

Sample Number: (8) - BEL1008

Lab Reference Number: BS071822

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground
Room Reference: Stevedores **Form:** Composites
Location & Description: Floor Tiles under Floor Covering
Extent: 20m^2
Sample Number: (9) - BEL1009
Lab Reference Number: BS071823
Lab Result: No Asbestos Detected (NAD)
Recommended Action: N/A
Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground
Room Reference: Shipping Traffic **Form:** Composites
Location & Description: Grey Floor Tiles under Carpet
Extent: 100m^2
Sample Number: (10) - BEL1010
Lab Reference Number: BS071824
Lab Result: No Asbestos Detected (NAD)
Recommended Action: N/A
Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground
Room Reference: Stairs **Form:** Composites
Location & Description: Stair Nosing
Extent: 10 linear metres
Sample Number: (11) - BEL1011
Lab Reference Number: BS071825
Lab Result: No Asbestos Detected (NAD)
Recommended Action: N/A
Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Canteen **Form:** Composites

Location & Description: Light Grey Floor Tiles

Extent: 15m^2

Sample Number: (12) - BEL1012

Lab Reference Number: BS071826

Lab Result: No Asbestos Detected (NAD)

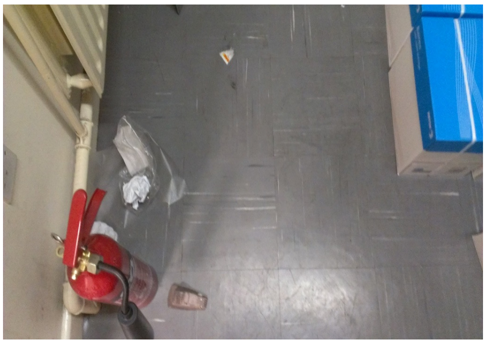
Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** First

Room Reference: First Floor Hall **Form:** Composites

Location & Description: Grey floor tiles



Extent: 20m^2

Sample Number: (13) - BEL1013

Lab Reference Number: BS071827

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Boiler Room **Form:** Bitumen

Location & Description: Damp Proof Course

Extent: 10m^2

Sample Number: (14) - BEL1021

Lab Reference Number: BS071835

Lab Result: No Asbestos Detected (NAD)

Recommended Action: N/A

Comments: N/A

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Boiler Room **Form:** Gasket - Card

Location & Description: Gasket

Extent: <1m^2

Sample Number: (15) - BEL1022

Lab Reference Number: BS071836

Lab Result: Chrysotile

Recommended Action: See Comments

Comments: The asbestos should be removed during the normal maintenance programme of the building.
The works do not require a licensed contractor, however the material should be disposed of as asbestos waste.

Site: Alexandra Basin, P&O Head Offices **Floor:** Ground

Room Reference: Boiler Room **Form:** Gasket - Card

Location & Description: Gasket

Extent: <1m^2

Sample Number: (16) - BEL1023

Lab Reference Number: BS071837

Lab Result: Chrysotile

Recommended Action: See Comments

Comments: The asbestos should be removed during the normal maintenance programme of the building.
The works do not require a licensed contractor, however the material should be disposed of as asbestos waste.

Site: Alexandra Basin, VMU Building **Floor:** Ground

Room Reference: Portable Unit **Form:** Composites

Location & Description: Grey floor covering

Extent: 12m^2

Sample Number: (1) - BEL1014

Lab Reference Number: NBS071828

Lab Result: No Asbestos Detected (NAD)

Recommended Action: NAD

Comments: N/A

Site: Alexandra Basin, VMU Building
Floor: Ground
Room Reference: Office
Form: Composites
Location & Description: Grey Floor Tiles
Extent: 10m^2
Sample Number: (2) - BEL1015
Lab Reference Number: BS071829
Lab Result: No Asbestos Detected (NAD)
Recommended Action: NAD
Comments: N/A

Site: Alexandra Basin, P&O Terminal Building
Floor: Ground
Room Reference: Entrance Lobby
Form: Composites
Location & Description: Grey Floor Tiles
Extent: 1m^2
Sample Number: (1) - BEL1016
Lab Reference Number: BS071830
Lab Result: No Asbestos Detected (NAD)
Recommended Action: NAD
Comments: N/A

Site: Alexandra Basin, P&O Terminal Building
Floor: Ground
Room Reference: Male WC 1
Form: Composites
Location & Description: Grey Floor Covering
Extent: 4m^2
Sample Number: (2) - BEL1017
Lab Reference Number: NBS071831
Lab Result: No Asbestos Detected (NAD)
Recommended Action: NAD
Comments: N/A

Site: Alexandra Basin, P&O Terminal Building **Floor:** Ground

Room Reference: Male WC 1 **Form:** Composites

Location & Description: Grey Floor Covering (Different to BEL1017)

Extent: 6m^2

Sample Number: (3) - BEL1018

Lab Reference Number: BS071832

Lab Result: No Asbestos Detected (NAD)

Recommended Action: NAD

Comments: N/A

Site: Alexandra Basin, P&O Terminal Building **Floor:** Ground

Room Reference: Lobby **Form:** Composites

Location & Description: Blue Floor Covering

Extent: 8m^2

Sample Number: (4) - BEL1019

Lab Reference Number: BS071833

Lab Result: No Asbestos Detected (NAD)

Recommended Action: NAD

Comments: N/A

Site: Alexandra Basin, P&O Terminal Building **Floor:** Ground

Room Reference: Exterior **Form:** Bitumen

Location & Description: Bitumen to Roof

Extent: 200m^2

Sample Number: (5) - BEL1020

Lab Reference Number: BS071834

Lab Result: No Asbestos Detected (NAD)

Recommended Action: NAD

Comments: N/A

5 Recommendations

5.1 ACMs Requiring Priority Attention

There were no ACMs requiring priority attention discovered during the survey.

5.2 Medium to Low Priority ACMs

During the course of the Management Asbestos Survey, ACMs were detected in the form of:

- Gaskets

The asbestos gaskets should be removed during the normal maintenance programme of the building. The works do not require a licensed contractor, however the material should be disposed of as asbestos waste.

5.3 Limited/Non accessed areas

The surveyors were unable to gain access to the following areas due to conditions outside of their control:

- P&O Head Offices - Boiler Room: Limited access throughout Boiler Room;
- P&O Head Offices - Boiler Room: No access inside plant;
- P&O Head Offices - Shipping/Traffic: No access inside safe;
- P&O Head Offices - No access inside air conditioning units throughout;
- P&O Head Offices - Lift: No access inside lift shaft;
- P&O Head Offices - Traveller Driver Restroom: No access into room;
- P&O Head Offices - Accounts Manager: No access inside Matthews safe;
- P&O Head Offices - Exterior: No access inside plant on roof;
- P&O Head Offices - No access inside electrical units throughout;
- VMU Building - Open Area 1: No access inside safe/storage unit;
- VMU Building - Open Area 1: No access inside entrance door;
- VMU Building - No access inside electrical units throughout;
- P&O Terminal Building - Staff: No access into room;
- P&O Terminal Building - Office: No access into room;
- P&O Terminal Building - Exterior Boiler Shed: No access into room;
- Bulk Jetty: Limited access throughout structure;
- Lead-In Jetty: Limited access throughout structure;
- Ramp No 4: Limited access throughout structure;
- Ramp No 6: Limited access throughout structure;
- Ramp No. 7 Limited access throughout structure
- Ramp No. 8 Limited access throughout structure
- Jetty next to Ramp No. 7 Limited access throughout structure
- Jetty next to Ramp No. 8 Limited access throughout structure

Appendix A - General Notes for Information

The following is a summary of building features and materials commonly found to contain asbestos.

All areas, which could not be accessed during the survey, must be presumed to contain amphibole asbestos until assessed by a competent person

This summary is not a complete list but is intended to emphasise the importance of a full asbestos survey and building register, and to reinforce the requirement for care and attention to be taken before and during refurbishment or demolition works.

BUILDING FEATURES

- **Wall Cavities**

  May be completely blocked or bricked in, or concealed by decorative features. Detected only if shown on building construction plans or during demolition.

- **Risers**

  Often completely blocked or bricked in. May only be detected if shown on building construction plans or during demolition. In certain circumstances, entering riser shafts can carry a high risk of fibre release from the disturbance of any ACM within them, which could contaminate adjacent areas.

- **Floor Voids**

  May be completely enclosed. Detected only if shown on building construction plans or during demolition.

- **Trunking/Ductwork**

  May contain asbestos internally as linings or gaskets that are not visible until the trunking is disassembled. Often found within **ceiling voids** and **risers** (see above).

- **Fire doors**

  May contain an inner sandwich layer or strips of asbestos, which is not often visible without partial disassembly of the door.

- **Electrical Installations**

  Live electrical installations including fuse boxes, equipment control cabinets, distribution panels, trunking, transformer enclosures etc. are not routinely checked for safety reasons. Electrical equipment will only be examined if it is locked off and an isolation certificate has been issued. Under exceptional circumstances, when arranged by the client, examination of non-isolated equipment may take place under the supervision of an electrician.

- **Boilers**

  May contain asbestos internally which is not visible until dismantled.

- **Refrigerators, Cold Rooms, Safes and Kilns**

  May contain asbestos internally which is not visible until dismantled.

- **Heater Units**

  Sealed heater units are often lined with asbestos, or have insulation blocks containing asbestos within them, but cannot be examined until dismantled.

POTENTIAL ACMs

- **Thermal Insulation**

  Often found within **ceiling voids, wall cavities, risers, floor voids** (see above). Thermal insulation to pipes etc. which contains asbestos is often not uniform in its application or composition. Although a representative number of locations relative to the extent of the material may be examined and found to be non-asbestos, it is possible that asbestos has been incorporated in a number of isolated locations. An inner skim of asbestos pipe insulation or paper lining may also be found beneath a non-asbestos outer layer. Lagging construction of this type is often difficult to identify without sampling and analysis. Some residual asbestos insulation may only be identified when the outer layers of non-asbestos material have been completely removed.

- **Sprayed Coatings**

  Often found within **ceiling voids** (see above). Sprayed coating material which contains asbestos is often not uniform in its application or composition. Although a representative number of locations relative to the extent of the material may be examined and found to be non-asbestos, it is possible that asbestos has been incorporated in a number of isolated locations. In areas where sprayed coating is found on ceilings or structural steelwork, it is often also present in any hollow section building blocks forming adjacent walls or soffits, or as overspray behind plaster applied to walls and beneath the floor screed. This cannot be detected without applying destructive techniques. May be a significant hazard during demolition or major refurbishment works.

- **Plaster and Textured Coatings/Artex**

  Plaster, paints and textured coatings applied to walls, ceilings or structural beams etc. contain asbestos. Positive identification is not possible without sampling and analysis.

Fire Break Boards

Original asbestos boards may be covered with Supalux or plasterboard to increase fire ratings at a later date. Often found within **ceiling voids and floor voids** (see above).

- **Wall Panels**

Often covered with wallpaper, painted, or covered with hardboard/plasterboard.

- **Shuttering**

  Either AIB or asbestos cement flat sheet or tube sections may be set within the structural fabric of the building or maybe hidden by new walls, covered with wallpaper, painted or plastered over. Refurbishment and demolition works should proceed with caution.

- **Expansion Joints and Cement Sleeves**

  These may have been used in the building construction but may be rendered or concreted over as part of the finishing works. These can only usually be detected if they are detailed in the building construction plans or when demolition takes place.

- **Flange Gaskets**

  Not usually visible until the pipework is dismantled. All gaskets are usually presumed to contain asbestos and to be disposed of as Asbestos Waste when replaced during the course of routine maintenance.

- **Floor Tiles**

  Thermoplastic floor tiles often contain asbestos within the bonded material, or it may be contained within the adhesive used to affix the tiles. The risk of fibre release under normal occupation is minimal. All floor tiles are usually assumed to contain asbestos until sampled. When removed, they must be disposed of as Asbestos Waste.

- **Roof Slates**

  Very similar in appearance to natural slates.

- **Roofing Felt/Damp Courses**

  Bituminous products may contain asbestos in low concentrations. Without sampling and analysis, it is very difficult to determine the presence of asbestos in these products, but the risk of fibre release is extremely low.

- **Wall Fixings**

  Loose asbestos was often used as a plugging material for wall fixings. Usually covered with wallpaper, painted or plastered over.

- **Debris**

  Often found within **ceiling voids, wall cavities, risers, floor voids** (see above). Small amounts of asbestos debris are very difficult to locate and may be present at any location. Asbestos contained in general debris is difficult to identify visually, and often cannot be identified at all without sampling and analysis.

- **Encapsulated Debris**

Small amounts of ACM debris may have been painted over after historical removal works, during subsequent refurbishment. This is a common occurrence in plant rooms.

- **ACMs Hidden Behind Known ACMs**

  Asbestos ceilings and panels etc. may conceal further ACMs, for example an asbestos insulated duct or lagged pipe. This would not be known until the ceiling or panels were removed.

- **Non-asbestos Insulated Services**

  Services re-insulated with MMMF, Vegetable fibre, Cork, Polystyrene, etc. may have residual asbestos insulation adhering to their surface. It is not possible to check all surfaces unless all of the new insulation is removed. However, exposed sections, valves, etc. will be examined where possible.

Appendix B - Certificates of Analysis

G&L Consultancy Ltd

Specialists in Asbestos Management

BULK MATERIAL SAMPLE REPORT

Reference No:	J535847	Client Order No:	NI1499/01
Date Received:	6 Feb 2014		
Client Name and Address:	RPS Planning & Environment, Elmwood House, 74 Boucher Road, Belfast, Co. Antrim, Northern Ireland BT12 6RZ		
Site Address:	P&O Head Offices		
Sampling Officer:	RPS Planning & Environment		
Date of Analysis:	10 Feb 2014		
Analyst:	Colin Webb		
Approving Officer:	Linda Hussey	Signed:	Linda Hussey
Issue Date:	10 Feb 2014		

ANALYSIS RESULTS

Sampling carried out by our own officers follows the procedures documented in our internal method M3: The Sampling of Bulk Materials, for Analysis to Determine the Presence of Asbestos. These samples have been analysed in accordance with internal method M2: The Identification of Asbestos, within Bulk Materials, by the Use of Optical Microscopy. Both these internal methods are based on the standard method as outlined in the HSE Document 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures. Any deviations from these standard methods will be recorded in this report. No responsibility is taken for sampling that is not carried out by own officers. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation. Any comments regarding percentage content or density determination is outside the scope of our UKAS accreditation. The material classification is the opinion of the analyst, based on the samples' appearance, as received, and may not accurately reflect the source material on site. All samples are analysed at one of our UKAS accredited laboratories in Somerset or Northern Ireland. This report must not be reproduced, except in full, without the written permission of the laboratory. These samples will be retained within this laboratory for a period of six months prior to disposal at a licensed asbestos disposal site, unless the client makes alternative arrangements.

For advice concerning these materials, risk assessments, removal procedures or information regarding the current legislation for work with asbestos containing materials, please contact G & L Consultancy Ltd.

Site Ref	Lab Ref	Description	Analysis Result	Classification
BEL1001	BS071815	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1002	BS071816	Grey/Blue Floor Tiles	No Asbestos Detected	Not Applicable
BEL1003	BS071817	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1004	BS071818	Sink Pad	No Asbestos Detected	Not Applicable

BULK MATERIAL SAMPLE REPORT (CONTINUATION)

Site Ref	Lab Ref	Description	Analysis Result	Classification
BEL1005	BS071819	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1006	BS071820	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1007	BS071821	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1008	BS071822	Sink Pad	No Asbestos Detected	Not Applicable
BEL1009	BS071823	Floor Tiles	No Asbestos Detected	Not Applicable
BEL1010	BS071824	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1011	BS071825	Stair Nosing	No Asbestos Detected	Not Applicable
BEL1012	BS071826	Light Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1013	BS071827	Grey Floor Tiles	No Asbestos Detected	Not Applicable

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BULK MATERIAL SAMPLE REPORT

Reference No:	J535850	Client Order No:	NI1499/01
Date Received:	6 Feb 2014		
Client Name and Address:	RPS Planning & Environment, Elmwood House, 74 Boucher Road, Belfast, Co. Antrim, Northern Ireland BT12 6RZ		
Site Address:	P&O Head Offices		
Sampling Officer:	RPS Planning & Environment		
Date of Analysis:	10 Feb 2014		
Analyst:	Colin Webb		
Approving Officer:	Linda Hussey	Signed:	Linda Hussey
Issue Date:	10 Feb 2014		

ANALYSIS RESULTS

Sampling carried out by our own officers follows the procedures documented in our internal method M3: The Sampling of Bulk Materials, for Analysis to Determine the Presence of Asbestos. These samples have been analysed in accordance with internal method M2: The Identification of Asbestos, within Bulk Materials, by the Use of Optical Microscopy. Both these internal methods are based on the standard method as outlined in the HSE Document 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures. Any deviations from these standard methods will be recorded in this report. No responsibility is taken for sampling that is not carried out by own officers. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation. Any comments regarding percentage content or density determination is outside the scope of our UKAS accreditation. The material classification is the opinion of the analyst, based on the samples' appearance, as received, and may not accurately reflect the source material on site. All samples are analysed at one of our UKAS accredited laboratories in Somerset or Northern Ireland. This report must not be reproduced, except in full, without the written permission of the laboratory. These samples will be retained within this laboratory for a period of six months prior to disposal at a licensed asbestos disposal site, unless the client makes alternative arrangements.

For advice concerning these materials, risk assessments, removal procedures or information regarding the current legislation for work with asbestos containing materials, please contact G & L Consultancy Ltd.

Site Ref	Lab Ref	Description	Analysis Result	Classification
BEL1021	BS071835	Damp Proof Course	No Asbestos Detected	Not Applicable
BEL1022	BS071836	Gasket - Card	Chrysotile	Asbestos Textiles/Paper
BEL1023	BS071837	Gasket - Card	Chrysotile	Asbestos Textiles/Paper

G&L Consultancy Ltd
Specialists in Asbestos Management

BULK MATERIAL SAMPLE REPORT

Reference No:	J535848	Client Order No:	NI1499/01
Date Received:	6 Feb 2014		
Client Name and Address:	RPS Planning & Environment, Elmwood House, 74 Boucher Road, Belfast, Co. Antrim, Northern Ireland BT12 6RZ		
Site Address:	Vehicle Maintenance Units Building		
Sampling Officer:	RPS Planning & Environment		
Date of Analysis:	10 Feb 2014		
Analyst:	Colin Webb		
Approving Officer:	Linda Hussey	Signed:	Linda Hussey
Issue Date:	10 Feb 2014		

ANALYSIS RESULTS

Sampling carried out by our own officers follows the procedures documented in our internal method M3: The Sampling of Bulk Materials, for Analysis to Determine the Presence of Asbestos. These samples have been analysed in accordance with internal method M2: The Identification of Asbestos, within Bulk Materials, by the Use of Optical Microscopy. Both these internal methods are based on the standard method as outlined in the HSE Document 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures. Any deviations from these standard methods will be recorded in this report. No responsibility is taken for sampling that is not carried out by own officers. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation. Any comments regarding percentage content or density determination is outside the scope of our UKAS accreditation. The material classification is the opinion of the analyst, based on the samples' appearance, as received, and may not accurately reflect the source material on site. All samples are analysed at one of our UKAS accredited laboratories in Somerset or Northern Ireland. This report must not be reproduced, except in full, without the written permission of the laboratory. These samples will be retained within this laboratory for a period of six months prior to disposal at a licensed asbestos disposal site, unless the client makes alternative arrangements.

For advice concerning these materials, risk assessments, removal procedures or information regarding the current legislation for work with asbestos containing materials, please contact G & L Consultancy Ltd.

Site Ref	Lab Ref	Description	Analysis Result	Classification
BEL1014	BS071828	Grey Floor Covering	No Asbestos Detected	Not Applicable
BEL1015	BS071829	Grey Floor Tiles	No Asbestos Detected	Not Applicable

G&L Consultancy Ltd

Specialists in Asbestos Management

BULK MATERIAL SAMPLE REPORT

Reference No:	J535849	Client Order No:	NI1499/01
Date Received:	6 Feb 2014		
Client Name and Address:	RPS Planning & Environment, Elmwood House, 74 Boucher Road, Belfast, Co. Antrim, Northern Ireland BT12 6RZ		
Site Address:	P&O Terminal Building		
Sampling Officer:	RPS Planning & Environment		
Date of Analysis:	10 Feb 2014		
Analyst:	Colin Webb		
Approving Officer:	Linda Hussey	Signed:	Linda Hussey
Issue Date:	10 Feb 2014		

ANALYSIS RESULTS

Sampling carried out by our own officers follows the procedures documented in our internal method M3: The Sampling of Bulk Materials, for Analysis to Determine the Presence of Asbestos. These samples have been analysed in accordance with internal method M2: The Identification of Asbestos, within Bulk Materials, by the Use of Optical Microscopy. Both these internal methods are based on the standard method as outlined in the HSE Document 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures. Any deviations from these standard methods will be recorded in this report. No responsibility is taken for sampling that is not carried out by own officers. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation. Any comments regarding percentage content or density determination is outside the scope of our UKAS accreditation. The material classification is the opinion of the analyst, based on the samples' appearance, as received, and may not accurately reflect the source material on site. All samples are analysed at one of our UKAS accredited laboratories in Somerset or Northern Ireland. This report must not be reproduced, except in full, without the written permission of the laboratory. These samples will be retained within this laboratory for a period of six months prior to disposal at a licensed asbestos disposal site, unless the client makes alternative arrangements.

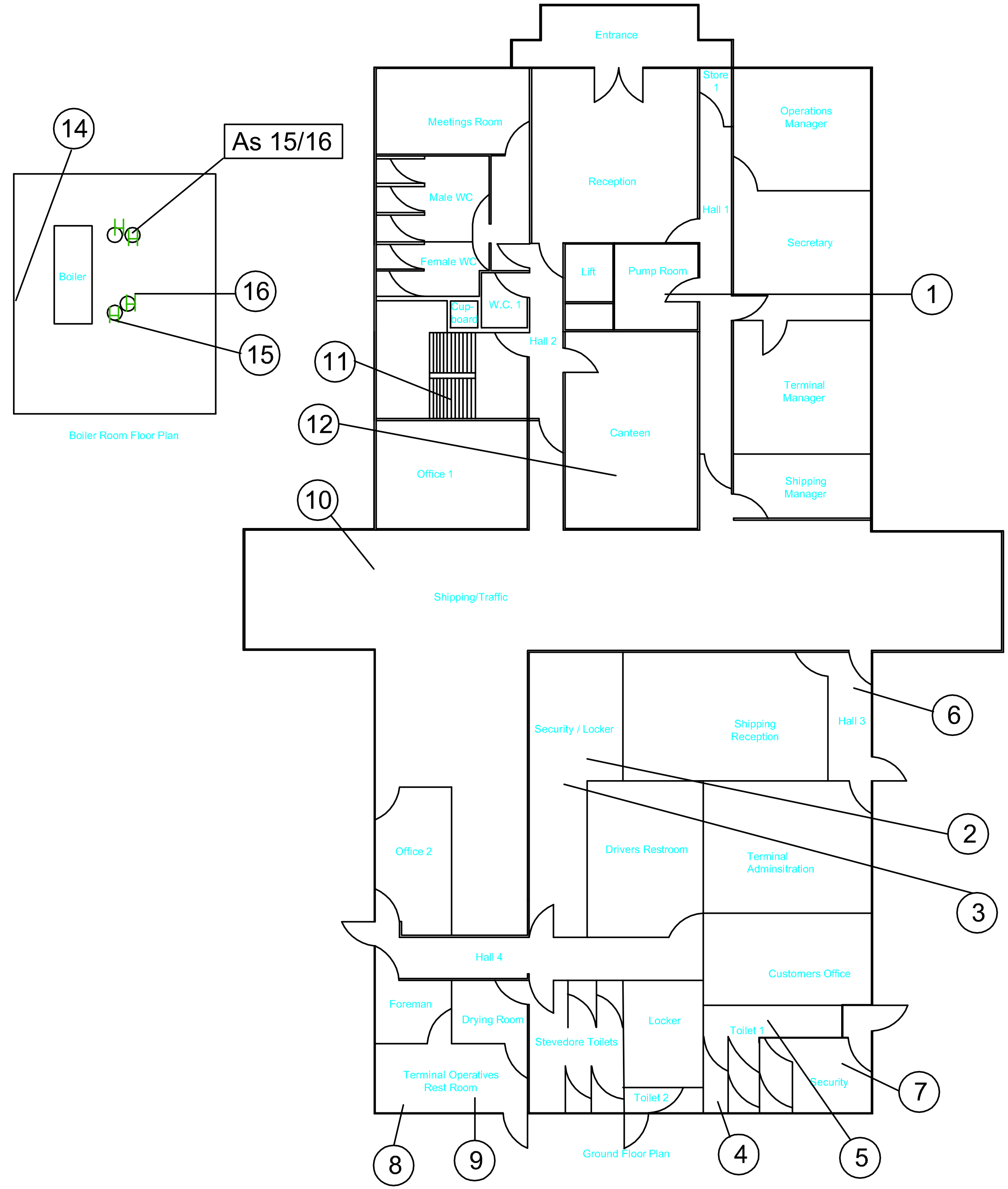
For advice concerning these materials, risk assessments, removal procedures or information regarding the current legislation for work with asbestos containing materials, please contact G & L Consultancy Ltd.

Site Ref	Lab Ref	Description	Analysis Result	Classification
BEL1016	BS071830	Grey Floor Tiles	No Asbestos Detected	Not Applicable
BEL1017	BS071831	Grey Floor Covering	No Asbestos Detected	Not Applicable
BEL1018	BS071832	Grey Floor Covering	No Asbestos Detected	Not Applicable
BEL1019	BS071833	Blue Floor Covering	No Asbestos Detected	Not Applicable

BULK MATERIAL SAMPLE REPORT (CONTINUATION)

Site Ref	Lab Ref	Description	Analysis Result	Classification
BEL1020	BS071834	Bitumen to Roof	No Asbestos Detected	Not Applicable

Appendix C - Sample Location Plans



INFORMATION RELATING TO DETECTED ASBESTOS CONTAINING MATERIALS IN THE BUILDING

(NB. This drawing provides a simple indication of ACMs locations; for more detailed and comprehensive information, reference must also be made to the Asbestos Register)

RPS Planning & Environment
Elmwood House
74 Boucher Road
Belfast, Co. Antrim
BT12 6RZ
T. 028 90667914
F. 028 90668286
www.rpsgroup.com

CLIENT: Dublin Port
SITE: Alexandra Basin, Dublin Port
LOCATION: P&O Head Offices - Ground Floor
SURVEY DATE: 4/02/14
RPS PROJECT NUMBER: NI1499
DRAWING NO & REVISION: 1499/ASB/R/01/01
RPS SURVEYORS: SC & SM

Date Issued: 12/02/14

ASBESTOS REPORT

Drawing Key

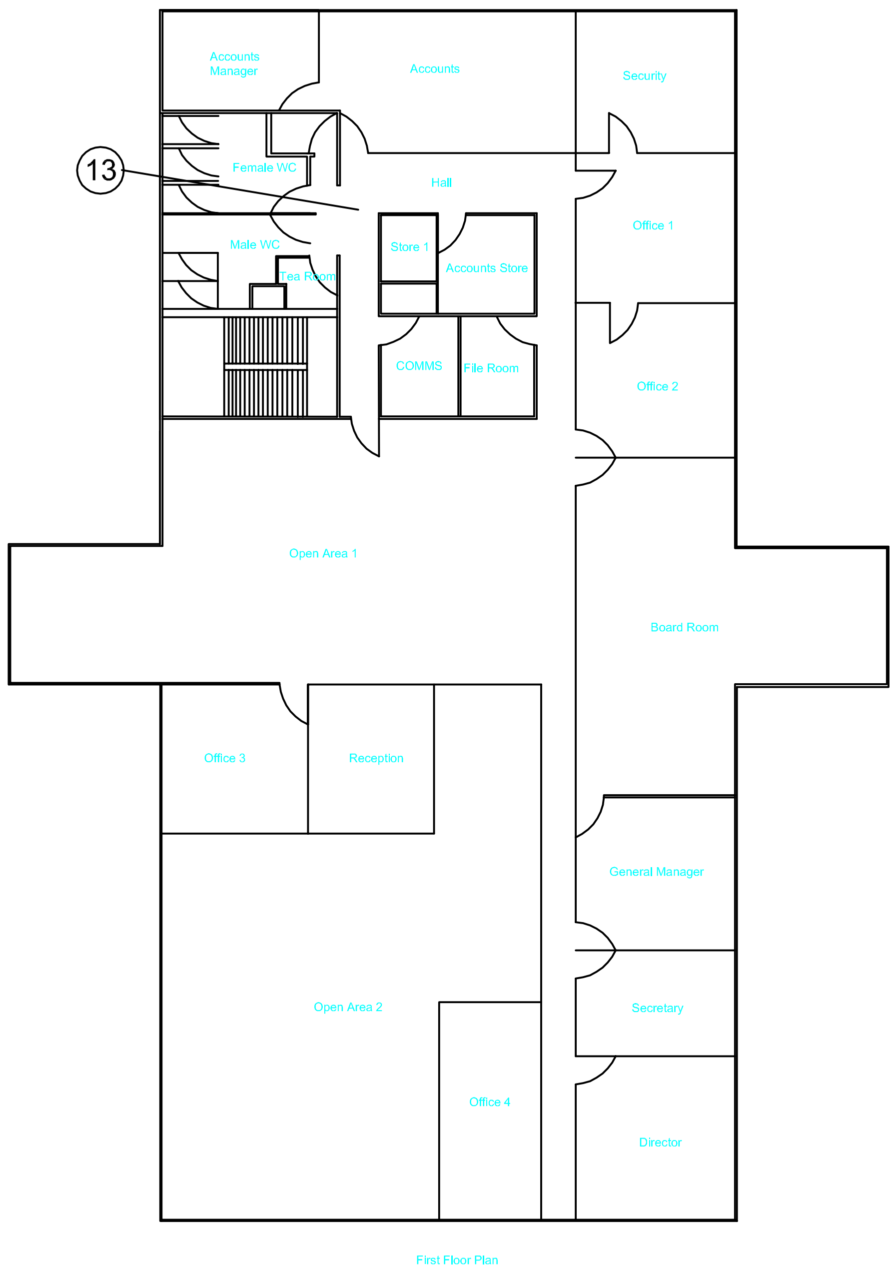
ⓧ→	Sample Taken for Analysis		
	Asbestos Cement Sheet (Horizontal)		AIB / Insulation Debris
	Asbestos Cement Sheet (Vertical)		Asbestos Insulation
O	Asbestos Cement Flue		Asbestos Floor Tiles / Lino
H	Asbestos Gaskets / Rope Products		Textured Coating (Artex)
	Asbestos Cement Debris		Eternite Window Sills / Toilet Cisterns
⚠	No Access / Further Information [See Register]		Asbestos Roof Tiles
	Asbestos Insulating Board (AIB) Vertical		Asbestos Roof Felt / Sink Pads
	Asbestos Insulating Board (AIB) Horizontal		Asbestos Spray Coating

NOT TO SCALE

LIMITATION OF INFORMATION

The information indicated on this drawing relating to Asbestos Containing Materials (ACMs) detected within the building should not be considered as exhaustive and it must always be assumed there may be other ACMs present, hidden and/or undetected within the structure. In view of this it may be necessary to undertake further investigations prior to carrying out any works likely to disturb the building fabric.

THIS IS A COLOUR DRAWING AND SHOULD NOT BE RELIED ON IF IN BLACK AND WHITE ONLY



INFORMATION RELATING TO DETECTED ASBESTOS CONTAINING MATERIALS IN THE BUILDING

(NB. This drawing provides a simple indication of ACMs locations; for more detailed and comprehensive information, reference must also be made to the Asbestos Register)

RPS Planning & Environment
Elmwood House
74 Boucher Road
Belfast, Co. Antrim
BT12 6RZ
T. 028 90667914
F. 028 90668286
www.rpsgroup.com

CLIENT: Dublin Port
SITE: Alexandra Basin, Dublin Port
LOCATION: P&O Head Offices - First Floor
SURVEY DATE: 4/02/14
RPS PROJECT NUMBER: NI1499
DRAWING NO & REVISION: 1499/ASB/R/02/01
RPS SURVEYORS: SC & SM

Date Issued: 12/02/14

ASBESTOS REPORT

Drawing Key

	Sample Taken for Analysis		
	Asbestos Cement Sheet (Horizontal)		AIB / Insulation Debris
	Asbestos Cement Sheet (Vertical)		Asbestos Insulation
	Asbestos Cement Flue		Asbestos Floor Tiles / Lino
	Asbestos Gaskets / Rope Products		Textured Coating (Artex)
	Asbestos Cement Debris		Eternite Window Sills / Toilet Cisterns
	No Access / Further Information [See Register]		Asbestos Roof Tiles
	Asbestos Insulating Board (AIB) Vertical		Asbestos Roof Felt / Sink Pads
	Asbestos Insulating Board (AIB) Horizontal		Asbestos Spray Coating

NOT TO SCALE

LIMITATION OF INFORMATION

The information indicated on this drawing relating to Asbestos Containing Materials (ACMs) detected within the building should not be considered as exhaustive and it must always be assumed there may be other ACMs present, hidden and/or undetected within the structure. In view of this it may be necessary to undertake further investigations prior to carrying out any works likely to disturb the building fabric.

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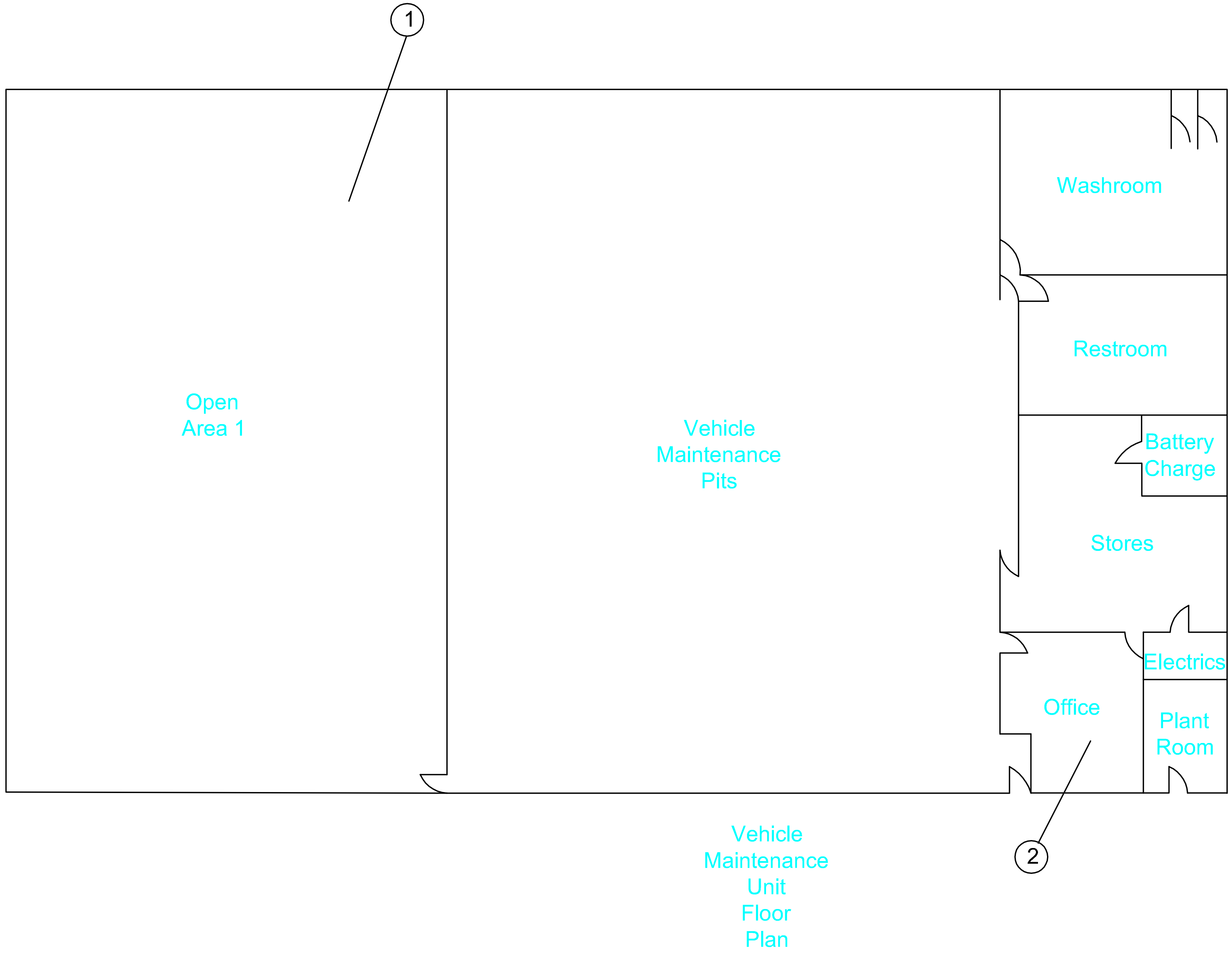

INFORMATION RELATING TO DETECTED ASBESTOS CONTAINING MATERIALS IN THE BUILDING

(NB. This drawing provides a simple indication of ACMs locations; for more detailed and comprehensive information, reference must also be made to the Asbestos Register)

RPS Planning & Environment
Elmwood House
74 Boucher Road
Belfast, Co. Antrim
BT12 6RZ
T. 028 90667914
F. 028 90668286
www.rpsgroup.com

CLIENT: Dublin Port
SITE: Alexandra Basin, Dublin Port
LOCATION: Vehicle Maintenance Unit Building
SURVEY DATE: 04/02/14
RPS PROJECT NUMBER: NI1499
DRAWING REVISION: 1499/A/R/03/01
RPS SURVEYORS: SC & SM

Date Issued: 12/02/14

ASBESTOS REPORT

Drawing Key

	Sample Taken for Analysis		
	Asbestos Cement Sheet (Horizontal)		AIB / Insulation Debris
	Asbestos Cement Sheet (Vertical)		Asbestos Insulation
	Asbestos Cement Flue		Asbestos Floor Tiles / Lino
	Asbestos Gaskets / Rope Products		Textured Coating (Artex)
	Asbestos Cement Debris		Eternite Window Sills / Toilet Cisterns
	No Access / Further Information [See Register]		Asbestos Roof Tiles
	Asbestos Insulating Board (AIB) Vertical		Asbestos Roof Felt / Sink Pads
	Asbestos Insulating Board (AIB) Horizontal		Asbestos Spray Coating

NOT TO SCALE

LIMITATION OF INFORMATION

The information indicated on this drawing relating to Asbestos Containing Materials (ACMs) detected within the building should not be considered as exhaustive and it must always be assumed there may be other ACMs present, hidden and/or undetected within the structure. In view of this it may be necessary to undertake further investigations prior to carrying out any works likely to disturb the building fabric.

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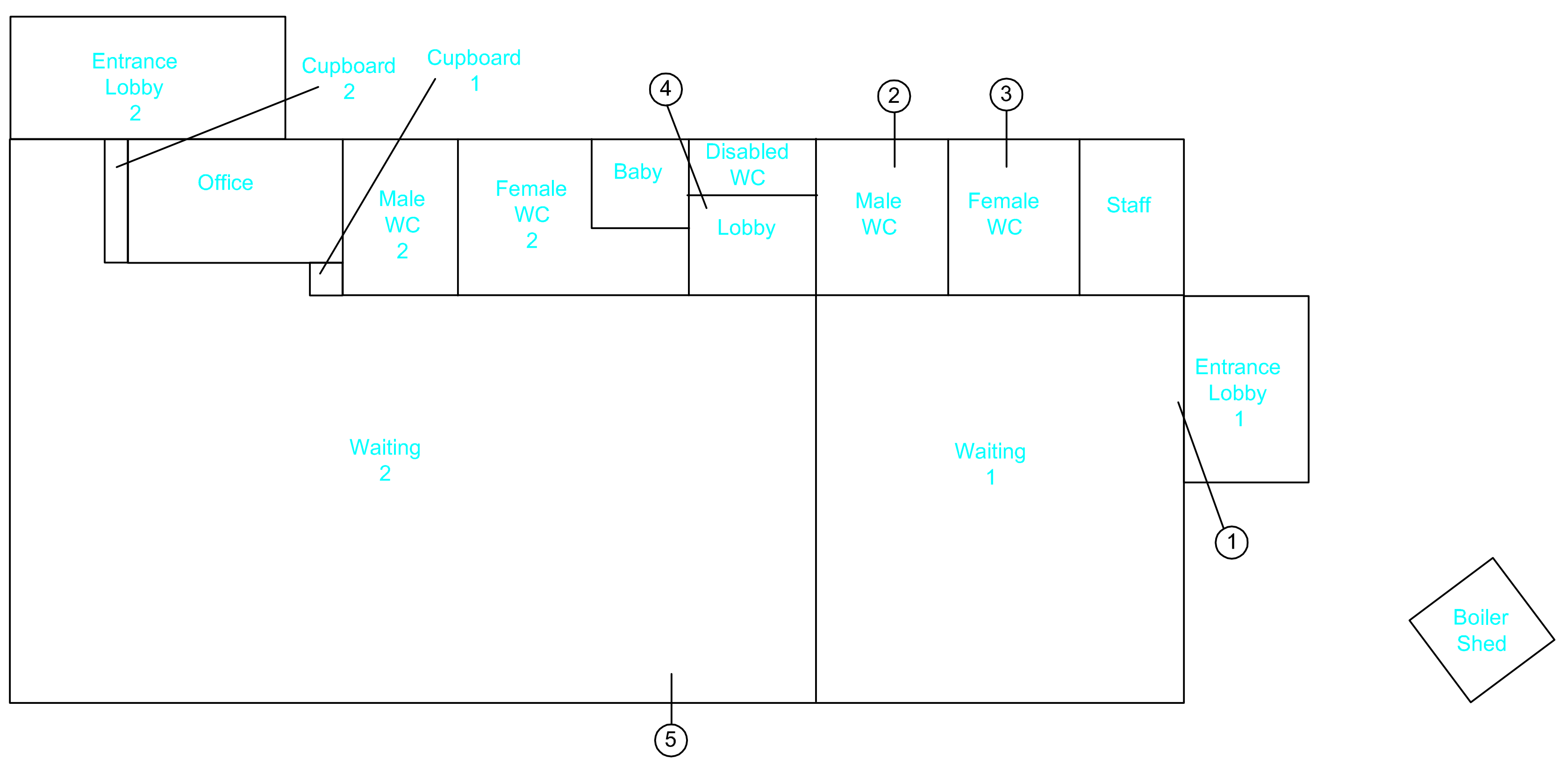


INFORMATION RELATING TO DETECTED ASBESTOS CONTAINING MATERIALS IN THE BUILDING

(NB. This drawing provides a simple indication of ACMs locations; for more detailed and comprehensive information, reference must also be made to the Asbestos Register)

RPS Planning & Environment
Elmwood House
74 Boucher Road
Belfast, Co. Antrim
BT12 6RZ
T. 028 90667914
F. 028 90668286
www.rpsgroup.com

CLIENT: Dublin Port
SITE: Alexandra Basin, Dublin Port
LOCATION: P&O Terminal Building
SURVEY DATE: 04/02/14
RPS PROJECT NUMBER: NI1499
DRAWING REVISION: 1499/A/R/04/01
RPS SURVEYORS: SC & SM

Date Issued: 12/02/14

ASBESTOS REPORT

Drawing Key

	Sample Taken for Analysis		
	Asbestos Cement Sheet (Horizontal)		AIB / Insulation Debris
	Asbestos Cement Sheet (Vertical)		Asbestos Insulation
	Asbestos Cement Flue		Asbestos Floor Tiles / Lino
	Asbestos Gaskets / Rope Products		Textured Coating (Artex)
	Asbestos Cement Debris		Eternite Window Sills / Toilet Cisterns
	No Access / Further Information [See Register]		Asbestos Roof Tiles
	Asbestos Insulating Board (AIB) Vertical		Asbestos Roof Felt / Sink Pads
	Asbestos Insulating Board (AIB) Horizontal		Asbestos Spray Coating

NOT TO SCALE

LIMITATION OF INFORMATION

The information indicated on this drawing relating to Asbestos Containing Materials (ACMs) detected within the building should not be considered as exhaustive and it must always be assumed there may be other ACMs present, hidden and/or undetected within the structure. In view of this it may be necessary to undertake further investigations prior to carrying out any works likely to disturb the building fabric.

THIS IS A COLOUR DRAWING AND SHOULD NOT BE RELIED ON IF IN BLACK AND WHITE ONLY

Appendix D - Risk Management Codes

The system that has been adopted, concentrates solely on the likelihood of fibre release from ACMs into the breathing zone of persons at risk. This is the single most important factor in assessing the likelihood of that person being exposed to fibre concentrations injurious to their health.

The assessment is based on the following factors, each given a numerical score:

Position:	Whether external, internal or in a hot environment
Condition:	Whether the material is damaged and the level of damage
Accessibility:	How easily the material can be disturbed accidentally
Friability:	How likely the material is to give off significant levels of asbestos fibres if disturbed
Treatment:	How well the material is sealed or encapsulated
Content:	The amount of asbestos present in the material

The scores for each factor are added to give a risk value. Each risk category contains a range of values.

In some situations, it may be useful to undertake measurement of atmospheric fibre concentrations; however, these levels are open to large variations dependent upon conditions and may well be below the concentration measurable using optical microscopy methods but still be above local background environmental issues.

Although recommendations which are issued will vary according to the situation, it is desirable that some standardisation of action is achieved. It is therefore proposed that the following guidelines be adopted.

PRIORITY RATING RECOMMENDATIONS AND COMMENTS

Category A: +16 Points

Materials within this category warrant urgent consideration. Materials with such a high rating indicate that persons may currently be exposed to significant levels of respirable asbestos fibres.

This potential exposure will vary according to local conditions, for example, the intensity of use of a heating system or the nature of airflow and movement around a damaged ceiling. Due to the potential for exposure, materials which fall into this category should be remediated as soon as practicable.

In most circumstances, immediate plans for removal of the asbestos concerned should be implemented, or at least the rapid sealing of the affected materials.

Category B: 13-16 Points Inclusive

Situations within this category warrant urgent consideration, since any change in one of a number of contributory factors may result in an unacceptable risk to health. It is therefore necessary for the asbestos to be treated as recommended within a specified timescale (See Section 4).

It is recommended that the maximum period for any recommended action should be as stipulated in the report and that, in the meantime, emergency repair and sealing operations should be undertaken where any deterioration or damage occurs.

Category C: 8-12 Points Inclusive

Situations within this category do not pose an imminent risk and the likelihood of exposure was perceived to be low at the time of the survey. It would be appropriate for materials within this category to be monitored, as deterioration may occur over time.

It is recommended that the maximum period for any recommended action should be as stipulated in the report, the material subsequently inspected periodically if appropriate.

Category D: Less then 8 Points

Situations within this category are low priority. The situation should be monitored as recommended in the report to ascertain any change in risk.

Category E: 0 Points

No asbestos was identified in materials within this category. No further action is considered necessary.

Appendix E – Full Asbestos Register

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **Ground Floor**
Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Entrance	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Reception	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Hall 3	No	6/BEL1006	-	Floor covering	Grey floor covering	$4m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Store 1	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Operations Manager	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Secretary	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Transport Manager	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Shipping Manager	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Shipping/ Traffic	No	10/BEL1010		Floor Tiles	Grey floor tiles under carpet	$100m^2$									-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **Ground Floor**
Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Shipping/ Traffic	Presumed	-	-	-	No access inside safe	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Shipping/ Traffic	No	As 11/BEL1011		Stair Nosing	Black Stair Nosing	1 lin. m									-/E
	Comments: None				Urgency/Next Review:		-								
Pump Room	Presumed	-	-	-	No access inside air conditioning units	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Pump Room	No	1/BEL1001	-	Floor tiles	Grey floor tiles	$8m^2$	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		-								
Lift	Presumed	-	-	-	No access inside lift shaft	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Hall 2	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Office 1	No	-		-	No asbestos detected	-									-/E
	Comments: None				Urgency/Next Review:		-								
Stairs	No	11/BEL1011	-	Stair Nosing	Black stair nosing	10 lin. m	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
WC 1	No	As 10/ BEL1010	-	Floor Tiles	Grey floor tiles	$2m^2$	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **Ground Floor**
Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Male WC	No	As 10/ BEL1010	-	Floor Tiles	Grey Floor Tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Female WC	No	As 10/ BEL1010	-	Floor Tiles	Grey floor tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Meetings Room	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Shipping Reception	No	As 3/ BEL1003		Floor Tiles	Grey floor tiles	$20m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Security/ Locker	No	2/BEL1002		Floor tiles	Grey/ Blue Floor Tiles	$20m^2$	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Security/ Locker	No	3/BEL1003		Floor tiles	Grey Floor Tiles	$<1m^2$	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Cupboard 1	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Customs Office	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Toilet 1	No	4/BEL1004		Bitumen	Sink Pad	$<1m^2$	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Toilet 1	No	5/BEL1005		Floor tiles	Grey Floor Tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **Ground Floor**

Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Terminal Admin	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Traveller Driver Restroom	Presumed	-			No access into room	-							-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Security	No	7/ BEL1008	-	Floor Tiles	Floor tiles under lino	10m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Toilet 2	No	As 7/ BEL1007		Floor Tiles	Grey floor tiles	3m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Foreman's Office	No	As 6/ BEL1006		Floor Tiles	Grey floor tiles	8m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Foreman's Office	No	As 9/ BEL1009		Floor Tiles	Grey floor tiles under lino	8m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Stevedores	No	8/BEL1008		Bitumen	Sink Pad	<1m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Stevedores	No	As 6/ BEL1006		Floor Tiles	Grey floor tiles	20m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Stevedores	No	9/BEL1009		Floor Tiles	Grey floor tiles under floor covering	20m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **Ground Floor**

Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Drivers Reception	No	As 3/ BEL1003	-	Floor Tiles	Grey floor tiles	$20m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Hall 4	No	As 3/ BEL1003	-	Floor Tiles	Grey floor tiles	$8m^2$	-	-	-	-	-		-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Drying Room	No	As 3/ BEL1003	-	Floor Tiles	Grey floor tiles	$10m^2$	-	-	-	-	-		-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Stevedore Toilets	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Locker	No	As 6/ BEL1006		Floor Covering	Grey floor covering	$15m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Office 2	No	As 6/ BEL1006		Floor Covering	Grey floor covering	$12m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
WC Foyer	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Canteen	No	12/ BEL1012	-	Floor Tiles	Light grey floor tiles	$15m^2$	-	-	-	-	-		-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Boiler Room	No	14/ BEL1021	-	Bitumen	Damp Proof Course	$10m^2$	-	-	-	-	-		-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Boiler Room	No	15/ BEL1022	-	Gasket	Gasket x 2	$<1m^2$	2	0	1	0	2	3	0	0	8/C
	Comments: None				Urgency/Next Review: Date: 04/01/15		Recommendations: The asbestos should be removed during the normal maintenance programme of the building. The works do not require a licensed contractor, however the material should be disposed of as asbestos waste.								
Boiler Room	No	16/ BEL1023	-	Gasket	Gasket x 2	$<1m^2$	2	0	1	0	2	3	0	0	8/C
	Comments: None				Urgency/Next Review: Date: 04/01/15		Recommendations: The asbestos should be removed during the normal maintenance programme of the building. The works do not require a licensed contractor, however the material should be disposed of as asbestos waste.								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **First Floor**
Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Hall	No	13/ BEL1013	-	Floor Tiles	Grey floor tiles	$20m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Tea Room	No	As 10/ BEL1010		Floor Tiles	Grey floor tiles	$1m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Male WC	No	As 10/ BEL1010		Floor Tiles	Grey floor tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Female WC	No	As 10/ BEL1010		Floor Tiles	Grey floor tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Accounts Manager	Presumed	-	-	-	No access inside Matthews safe	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Accounts	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
COMMS	No	As 10/ BEL1010		Floor Tiles	Grey floor tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Store 1	Presumed	-	-	-	No access inside electrics	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Store 1	No	As 6/ BEL1006		Floor Tiles	Grey floor tiles	$20m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Office 1	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Security	No	As 10/ BEL1010		Floor Tiles	Grey floor tiles under carpet	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **First Floor**

Survey conducted by Stephen Cleary and Stephen McAfee   Samples analysed by G&L Consulting Laboratory

Room Reference	**Asbestos Present**	**Sample No./ Lab Ref No.**	**Photo**	**Form**	**Location and Description**	**Extent**	**Position Ext 0 Int 1 Heat/ Airflow 2**	**Condition Good 0 Fair/Minor Damage 2 Poor 4**	**Access Low 0 Med 1 High 2**	**Friability Low 0 Med 1 High 4**	**Treatment Sealed 0 Partial 2 Unsealed 4**	**Content Trace 1 Sig 2 Sub 3**	**Analysis Result Serpentine + 0 pts Amphibole + 2pts**		**Total Points & Priority Rating**
Office 2	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Board Room	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
General Manager	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Secretary	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Director	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Open Area 1	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Open Area 2	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Reception	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Office 3	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Office 4	No	As 6/ BEL1006		Floor Tiles	Grey floor tiles	20m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Main Offices**
Floor: **First Floor**
Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
File Room	No	As 10/ BEL1010		Floor Tiles	Grey floor tiles under carpet	$6m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Exterior	Presumed	-	-	-	No access inside plant on roof.		-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **Vehicles Maintenance Units**
Floor: **Ground Floor**

Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	**Asbestos Present**	**Sample No./ Lab Ref No.**	**Photo**	**Form**	**Location and Description**	**Extent**	**Position Ext 0 Int 1 Heat/ Airflow 2**	**Condition Good 0 Fair/Minor Damage 2 Poor 4**	**Access Low 0 Med 1 High 2**	**Friability Low 0 Med 1 High 4**	**Treatment Sealed 0 Partial 2 Unsealed 4**	**Content Trace 1 Sig 2 Sub 3**	**Analysis Result Serpentine + 0 pts Amphibole + 2pts**		**Total Points & Priority Rating**
Portable Units	No	1/ BEL1014	-	Floor Covering	Grey floor covering	$12m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Open Area 1	Presumed	-	-	-	No access inside safe/ storage unit		-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Open Area 1	Presumed	-	-	-	No access inside door		-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Office	No	2/ BEL1015	-	Floor Tiles	Grey floor tiles	$10m^2$	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Plant Room	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Stores	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Battery	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Electric Cupboard	Presumed	-		-	No Access inside electrical units		-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Exterior	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **Vehicles Maintenance Units**
Floor: **Ground Floor**

Survey conducted by Stephen Cleary and Stephen McAfee

Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Restroom	No	As 2/ BEL1015	-	Floor Tiles	Grey floor tiles	15m^2	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Washroom	No	As 2/ BEL1015	-	Floor Tiles	Grey floor tiles	15m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: **Dublin Port, Alexandra Basin** **Last Date of Survey: 04/02/14**
Building: **P&O Terminal Building**
Floor: **Ground Floor**
Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Entrance Lobby	No	1/ BEL1016	-	Floor Tiles	Grey floor tiles	1m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Staff	Presumed	-	-	-	No Access	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Male WC 1	No	2/ BEL1017	-	Floor Covering	Grey floor covering	4m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Male WC 1	No	3/ BEL1018	-	Floor Covering	Grey floor covering	6m^2	-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Lobby	No	4/ BEL1019	-	Floor Covering	Blue floor covering	8m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Disabled	No	As 4/ BEL1019	-	Floor Covering	Blue floor covering	6m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Baby	No	As 4/ BEL1019	-	Floor Covering	Blue floor covering	6m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Female WC 2	No	As 4/ BEL1019	-	Floor Covering	Blue floor covering	6m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Male WC 2	No	As 4/ BEL1019	-	Floor Covering	Blue floor covering	6m^2	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Cupboard 1	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Cupboard 2	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

Asbestos Survey Register

Site: Dublin Port, Alexandra Basin **Last Date of Survey: 04/02/14**
Building: P&O Terminal Building
Floor: Ground Floor

Survey conducted by Stephen Cleary and Stephen McAfee Samples analysed by G&L Consulting Laboratory

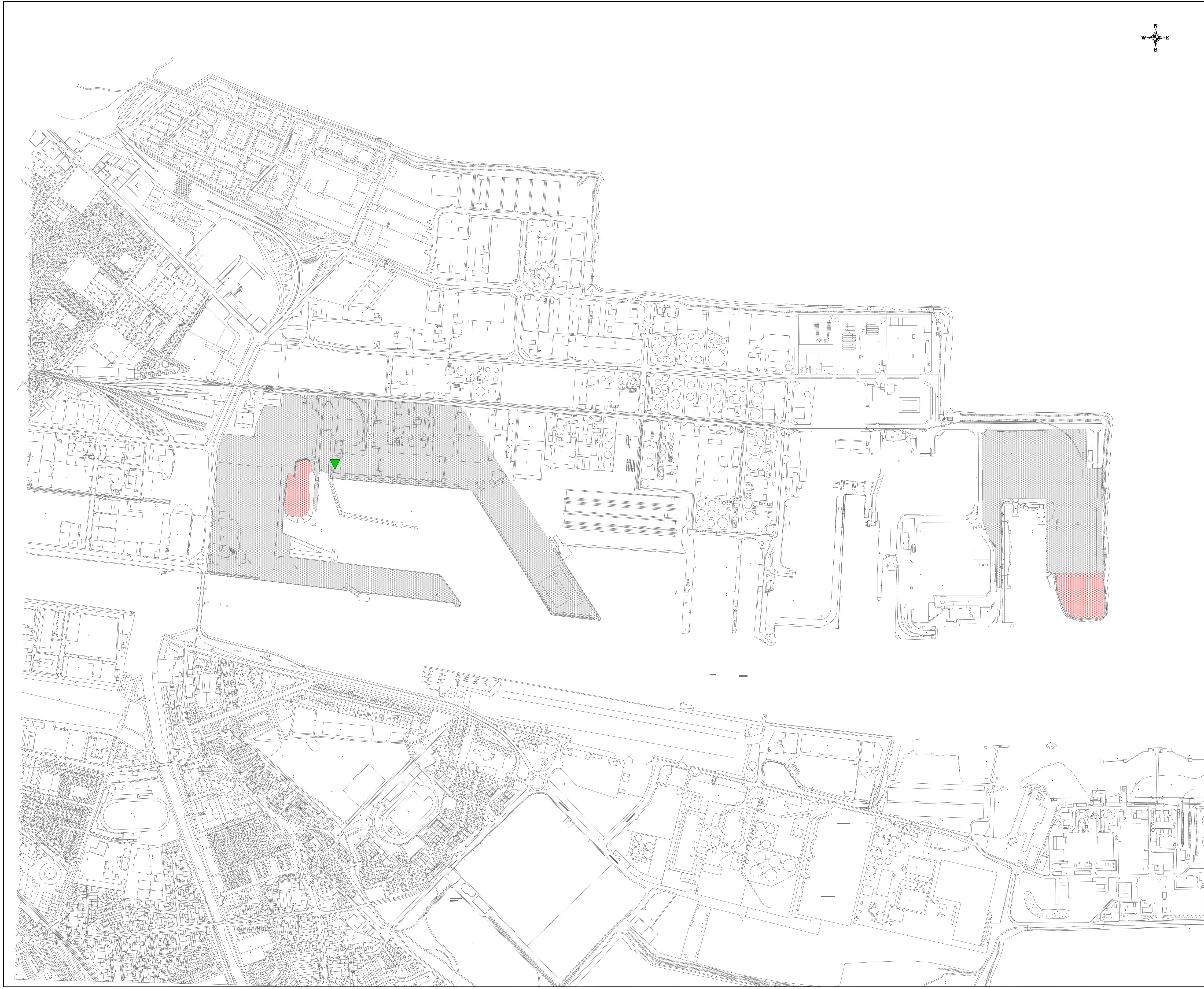
Room Reference	Asbestos Present	Sample No./ Lab Ref No.	Photo	Form	Location and Description	Extent	Position Ext 0 Int 1 Heat/ Airflow 2	Condition Good 0 Fair/Minor Damage 2 Poor 4	Access Low 0 Med 1 High 2	Friability Low 0 Med 1 High 4	Treatment Sealed 0 Partial 2 Unsealed 4	Content Trace 1 Sig 2 Sub 3	Analysis Result Serpentine + 0 pts Amphibole + 2pts		Total Points & Priority Rating
Office	Presumed	-	-	-	No Access	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Entrance Lobby 2	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Waiting 2	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								
Waiting 1	No	-	-	-	No asbestos detected		-	-	-	-	-	-	-	-	-/E
	Comments:				Urgency/Next Review:		-								
Exterior Boiler Shed	Presumed	-	-	-	No Access	-	-	-	-	-	-	-	-	-	-/-
	Comments: None				Urgency/Next Review:		Recommendations: Non accessed area. This area should be surveyed prior to refurbishment or demolition								
Exterior	No	5/ BEL1020	-	Bitumen	Bitumen to roof	$200m^2$	-	-	-	-	-	-	-	-	-/E
	Comments: None				Urgency/Next Review:		-								

Priority Rating: A – May cause sign. Risk to health, B – Any deterioration may cause sign. Risk to health, C – Unlikely to pose imminent risk, D – Low priority, E – None Detected.

APPENDIX 5

Flora and Fauna

Terrestrial Habitats Map



LEGEND

Habitats
- Spoil and bare ground
- Buildings and artificial surfaces

Mammal survey
- Bat detector location

ISSUE DETAILS

Drawn:	DMC	Project	NI 1439
Chkd:	JMC		
Appd:	RH		
Date:	15-11-2013	Rev.	01
Scale:	1:10,000 (A3)		

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PROJECT & FIGURE DETAILS

Project Title: Alexandra Basin Redevelopment

Figure Title: Terrestrial Ecology Survey Results

Figure Number: 1

Bat Survey Report of Dublin Port

BAT ECO SERVICES

P&O Buildings:

Dublin Port,

County Dublin.

Bat Survey – REPORT

Dr Tina Aughney

2014

ULEX HOUSE, DRUMHEEL, LISDUFF, VIRGINIA, COUNTYCAVAN
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SUMMARY

Site:	P&O Buildings, Dublin Port, Co. Dublin.
Bat Survey:	Winter check –23rd January 2014
Survey by:	Dr Tina Aughney
Bat species present:	Building/structure check only – no bat evidence recorded.
Roost location:	None
Bat access:	Not applicable.
Proposed works:	Buildings/structures to be demolished.

1. Introduction

Buildings and structures, proposed to be demolished, and located at P&O Buildings, Dublin Port were on checked on 23rd January 2014.

Such surveying was completed due to the fact that bats are protected species under the Wildlife Act (1976) and Wildlife [Amendment] Act (2000). Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions. Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All bat species are protected under Annex IV of the EU Habitats Directive, while the lesser horseshoe bat is listed under Annex II. Member states are required to designate Special Areas of Conservation for all species listed under Annex II in order to protect them.

The general format of this report is in accordance with guidelines recommended by the EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*. Recommendations and evaluation techniques utilised are in general accordance with *Guidelines for Baseline Ecological Assessment* (Institute of Environmental Assessment, UK, 1995), *Wildlife Impact: the treatment of nature conservation in environmental assessment* (RSPB, 1995) and *Guidelines for ecological evaluation and impact assessment* (Regini, M. 2000).

1.1 Site description

The P&O Buildings include a series of large warehouse buildings, currently used for storage, office prefabs, prefab structures, piers, conveyor belt structures and pier walls. The entire survey site is located in an open industrial site. The structures surveyed are proposed to be demolished (Figure 1, Demolition Plan). There are some small pockets of scrub within the survey area, principally located adjacent to open sea water.

Two structures scheduled for demolition were cited by RPS ecologists as having some bat roost potential: the lighthouse on North Quay and the building on Alexandra Quay associated with the Tara Mines conveyor.

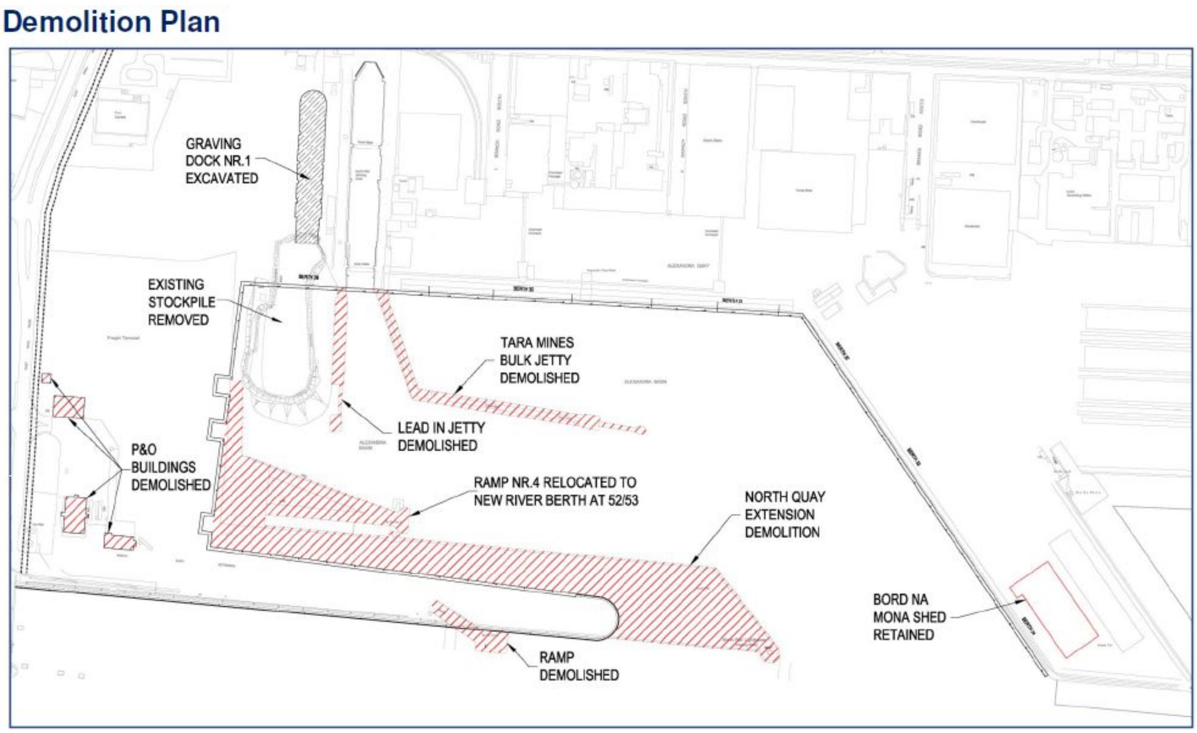


Figure 1: Proposed demolition plan of P&O Buildings, Dublin Port.

2. Survey Methodology

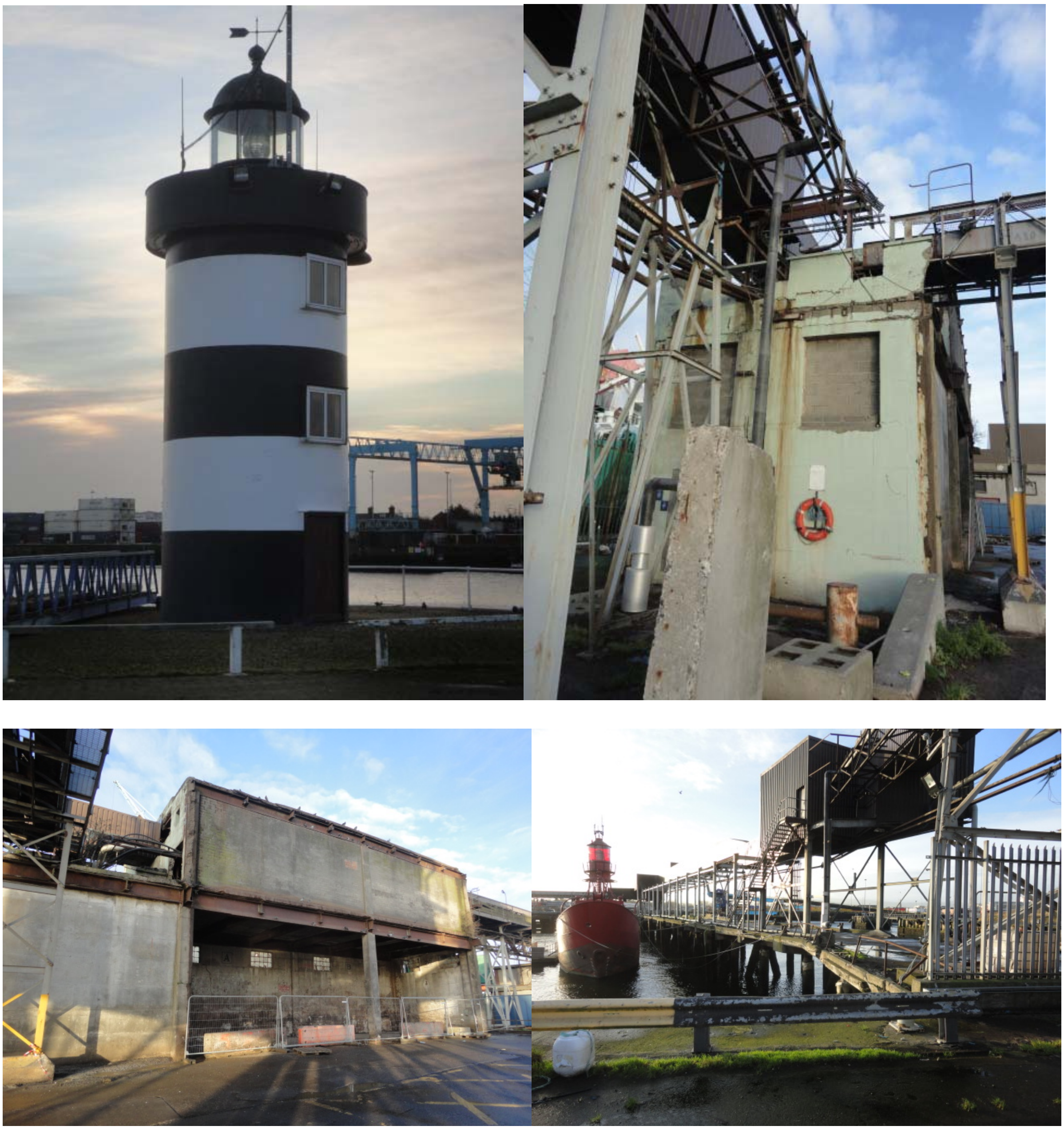
Survey of bat fauna was carried out by means of search of buildingsand structures on-site and the general environs of the survey areas. Presence of bats is indicated principally by their signs, such as staining, lack of spider webs, feeding signs or droppings - though direct observations are also occasionally made. The nature and type of habitats present are also indicative of the species likely to be present.

Figure 1-2 (clockwise): Examples ofbat droppings on a floor and insect wings discarded by a feeding bats.

The array of buildings and structures inspected consisted of the following:

Plates 1-6: Series of photographs of structures and buildings within the survey area.

This brief bat survey was undertaken out of the bat activity season and only consisted of a daytime inspection of buildings and structures within the survey area. No bat activity survey was undertaken due to seasonal constraints. The bat survey was carried on 23rd January 2014.



Plates 8-9: Series of photographs of structures and buildings within the survey area. Condt.

2.1 Survey Constraints

This survey was undertaken outside the preferred summer months of May to mid-September. Therefore, there were survey constraints. However, considering the type of buildings and structures and their location, it is considered that the potential for roosting bats is low and more likely to be incidental.

3. Bat Assessment

The results of

a) Daytime inspection

On the 23rd January 2014, an inspection of buildings was undertaken. This involved examining surfaces of the buildings (e.g. window panes) for evidence of bats (e.g. bat droppings). Where necessary, the interior of buildings was also inspected e.g. Light House and building on Alexandra Quay.

A single building at Alexandra Quay is derelict and was identified to have bat roost potential. This building is in a poor state of repairsbut due to the fact that there are some crevices and a partial roof in place, it is likely to provide shelter for bats during inclement weather conditions. The Light House is in a good condition and while it is considered to have no access points for bats, during the inspection, a window pain on the upper level was missing and therefore would allow bats to access the interior. However, there was no evidence of bat usage during the inspection for either building.

There was also no evidence of bat usage of other buildings and structures within the survey area recorded during this brief inspection. The majority of the buildings and structures were deemed not suitable for roosting bats. The author was also in agreement with RPS ecologists in that only two buildings were potentially suitable for roosting bats: the lighthouse on North Quay and the building on Alexandra Quay associated with the Tara Mines conveyor.

As bats are transient mammals, roosting sites can vary greatly from more traditional winter (hibernation) and summer (maternity roosts) to temporary night and satellite roosts. The buildings and structures within the survey area are not suitable for the more important winter and summer roosts. However, bats will seek temporary shelter during inclement weather conditions and will often use buildings otherwise considered to be unsuitable. Such roosting is considered to be incidental.

In addition, RPS ecologists undertook some surveillance recordings using an AnaBat SD2 Frequency Division Bat Detector in May-June 2013 over a 15 night period. The unit was located adjacent the building on Alexandra Quay associated with the Tara Mines conveyor. This surveillance period recorded two species of bats: Leisler’s bat and common pipistrelle. There were a high number of Leisler’s bat calls recorded on 4th June 2013, with a peak of activity recorded between 23:00 hrs and 01:00 hrs on the 5th June 2013. Sunset at this time of the year 21:15 hrs and Leisler's bat emerge from roosting sites from about 20 minutes after sunset. Therefore, the bat activity recorded on this night is likely to be commuting and foraging bats and therefore is not indicative of bats roosting within the P&O sites. If bats were roosting within the survey area, bat activity would have been recorded within 21:00-22:00 hrs on each night of the surveillance. This is true also for common pipistrelle bat activity recorded during the surveillance period.

These two species of bat have been frequently recorded foraging along coastal areas of Dublin while roosting further inland. Leisler's bats, in particular, will feed high over open water seeking plumes of insects. Common pipistrelles, on the other hand, will feed over open water close to either vegetation or structures, which are being used as shelter points by insects. However, without information from a night-time bat detector dusk survey on the commuting and foraging activity of the bat calls recorded during the surveillance (i.e. direction of commuting bats or was the calls from a single bat circling the building where the AnaBat was located), it is not possible to deduce any further from the information collated.

4. Potential Impacts of proposed works on Bat Fauna

In relation to bats, there are no concerns in view of the proposed works. As a precaution, mitigation measures are provided below in relation to the building on Alexandra Quay and the Light House.

.

4.2 Predicted Impacts

Bat species recorded during RPS Surveillance bat survey is an Annex IV species under the EU Habitats Directive and all have a Favourable Status in Ireland.However, as no roosts were recorded in the buildings/structures surveyed during the current inspection or previous inspections undertaken by RPS ecologists, it is deemed that there will be no impacts on local bat populations in relation to the proposed works.

Therefore, no mitigation measures are required. However, as a precaution the following is recommended:

Mitigation by avoidance

1. If building (Alexandra Quay) does not require to be removed, leave in-situ.

Mitigation by Reduction

1 Removal of buildings – Alexandra Quay

a) Remove the roof of the building and leave open for 3-4 nights prior to demolishment of the building. This will change the internal temperature of the building and encourage residing bats to move off.

b) Undertake an internal inspection of the light house, prior to movement to a new location, to ensure that there are not bats within.

Bats are mobile species and can roost in buildings occasionally. It is important that vigilance for individual bats within the buildings is practiced. Ensure that the bat boxes are erected locally so that any bats found can be removed safely to these points. Only undertake these works outside the months of mid-April to mid-September to reduce the likelihood of encountering bats.

If a bat is found, remove bat with gloved hands to a bat box. If in doubt, contact the local NPWS contact ranger or bat specialist.

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Appendices

Bat ecology – general

The bat is the only mammal that is capable of true flight. There are over 1,100 species worldwide, representing almost a quarter of all mammal species. There are 47 species in Europe - in Ireland, ten species of bat are currently known to exist, which are classified into two families, the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats).

Prey

All the European bat species feed exclusively on insects. A Pipistrelle, weighing only 4 to 8 grammes, will eat up to 3000 insects every night, ensuring a build up of fat in the bat's body to allow it to survive the winter deep in hibernation.

Breeding and longevity

Irish bats can produce one young per year but, more usually, only one young is born every two years (Boyd & Stebbings, 1989). This slow rate of reproduction inhibits repopulation in areas of rapid decline. Although bats have been known to live for twenty or more years, this is rare as most die in their first and the average lifespan, in the wild, is four years.

Threats

All bat species are in decline as they face many threats to their highly developed and specialised lifestyles. Many bats succumb to poisons used as woodworm treatments within their roosting sites (Racey & Swift, 1986). Agricultural intensification, with the loss of hedgerows, treelines, woodlands and species-rich grasslands have impacted bat species also. Habitual roosting or hibernation sites in caves, mines, trees and disused buildings are also often lost to development. Summer roosts are prone to disturbance from vandals. Agricultural pesticides accumulate in their prey, reaching lethal doses (Jefferies, 1972). Chemical treatments in cattle production sterilise dung thus ensuring that no insects can breed within it to be fed upon by bats. Likewise, river pollution, from agricultural runoff, reduces the abundance of aquatic insects. Road building, with the resultant loss of foraging and roosting sites is a significant cause in the reduction of bat populations across Europe.

Extinction

As recently as 1992, the greater mouse-eared bat *Myotis myotis* became the first mammal to become extinct in Britain since the wolf in the 18th century.

Description of bat species known or expected on site

Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*, which is detailed below (Barratt *et al*, 1997). The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Leisler's bat *Nyctalus leisleri*

This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and as Ireland holds the largest national population the species is considered as Near Threatened here.

Ireland Red List No. 3: Terrestrial Mammals - Bats

Species: Common Name	Irish Status	European Status	Global Status
Brandt's bat	Data deficient	Least Concern	Least Concern
Daubenton's bat	Least Concern	Least Concern	Least Concern
Whiskered bat	Least Concern	Least Concern	Least Concern
Natterer's bat	Least Concern	Least Concern	Least Concern
Leisler's bat	Near threatened	Least Concern	Least Concern
Nathusius' pipistrelle	Least Concern	Least Concern	Least Concern
Common pipistrelle	Least Concern	Least Concern	Least Concern
Soprano pipistrelle	Least Concern	Least Concern	Least Concern
Brown long-eared bat	Least Concern	Least Concern	Least Concern
Lesser horseshoe bat	Least Concern	Least Concern	Least Concern

Marnell, F., Kingston, N. & Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland

APPENDIX 6

LANDSCAPE AND VISUAL
(This Appendix is presented in Volume 3 – Appendices)

APPENDIX 7

AIR AND CLIMATE

RPS

Alexandra Basin Redevelopment

Identification and Assessment of Seveso Sites

MDE1148Rp0001

Alexandra Basin Redevelopment

Identification and Assessment of Seveso Sites

DOCUMENT CONTROL SHEET

Client:	**Dublin Port Company**					
Project Title:	**Alexandra Basin Redevelopment**					
Document Title:	**Identification and Assessment of Seveso Sites**					
Document No:	**MDE1148Rp0001**					
This Document Comprises:	**DCS**	**TOC**	**Text**	**No. of Appendices**	**List of Figures**	**List of Tables**
	1	**1**	**21**	**0**	**1**	**1**

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A01	Issue for Consultation	P. Chadwick	C. Reilly	R. Barr	West Pier	4th Nov. 2013

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1 INTRODUCTION

This report has been prepared to accompany the planning application for the Alexandra Basin Redevelopment. The document identifies the Seveso sites located in Dublin Port and provides an assessment of the potential impact of the development on these sites. This assessment has been requested by An Bord Pleanála during the scoping exercise undertaken for the project.

This report is presented in the following format:

- Section 2: Legal and Planning Background including detail on the Seveso Regulations, the Health and Safety Authority requirements and the Dublin City Development Plan 2011 to 2017.
- Section 3: An overview of the Alexandra Basin Redevelopment including details of location, infrastructure and operation.
- Section 4: Identification and description of the Seveso sites located in the Dublin Port area.
- Section 5: Risk assessment of the potential impact of the Alexandra Basin Redevelopment project and the Seveso sites.
- Section 6: Conclusions.

The detail is presented to facilitate a concise assessment of the impact of the development on the Seveso sites and this information is employed in the Environmental Impact Statement (EIS) that will accompany the planning application.

2 LEGAL AND PLANNING BACKGROUND

2.1 SEVESO REGULATIONS

The European Communities (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2006 (EU Directive 96/82/EC as amended by Directive 2003/105/EC) is commonly referred to as the "Seveso II" Directive (or the COMAH Directive).

The Seveso II Directive is transposed into Irish Regulations through the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (S.I. 74 of 2006) which have amended EC (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2000 (S.I. No. 476 of 2000).

The Seveso III Directive (2012/18/EU) was adopted on 4th July 2012 and entered into force on 13th August 2012. Member States have to transpose and implement the Directive by 1st June 2015. The Seveso III Directive will aim to strengthen the existing regulations and make them more efficient but the basic principles will remain unchanged.

The purpose of the existing Regulations is to ensure that, at locations where dangerous substances are handled in quantities above the specified thresholds; there will be a high level of protection for people, property and the environment. This is to be achieved by:

(i) preventing or minimising the risk of a major accident; and

(ii) taking all the necessary measures to limit the consequences of such an accident, should it occur.

The Regulations list a series of named substances in Part 1 of Schedule 1 (liquefied flammable gases, petroleum products, etc.) and a list of categories of substances in Part 2 (e.g. toxic, oxidising, flammable, etc.). Alongside each of the names substances/categories are thresholds ("qualifying quantities") provided for each substance to determine the application of the Regulations. If the inventory of a site equals or is greater than the threshold of column 3 it becomes "upper-tier". If it is less than this threshold but greater than the threshold in column 2, it becomes "lower-tier". The requirements under the Regulations are dependent on the classification of an establishment as upper tier or lower tier.

Both lower tier and upper tier establishments are obliged to do the following under the Regulations:

- Notification to the HSA and the local planning authority;
- Discharging certain general duties;
- Preparation and implementation of a major accident prevention policy (MAPP);
- Action in the event of a major accident; and
- Maintaining a register of notifiable incidents.

Upper tier establishments are also required to carry out the following additional tasks under the Regulations:

- Production of a Safety Report;
- Preparation of an internal emergency plan;
- Provision of information to those responsible for off-site emergency plans; and
- Provision of information for the safety of the public.

The Health and Safety Authority (HSA) has been designated as the competent authority for enforcement of the Regulations in Ireland.

2.2 HEALTH AND SAFETY AUTHORITY PLANNING GUIDANCE

The HSA has published guidance on land use planning and Seveso sites entitled "*Policy & Approach of the Health & Safety Authority to COMAH Risk-based Land-use Planning*" (March 2010).

Article 12 of the Seveso II Directive requires that *'the objectives of preventing major accidents and limiting the consequences of such accidents are taken into account in their land use policies and/or other relevant policies*'. This aspect of the Directive is implemented in Ireland through Regulation 27 of SI 74 of 2006 and the Planning and Development Regulations 2001-2006. The Planning and Development Regulations specify when planning authorities should seek technical advice in this area and the information that must be supplied to the HSA when seeking the advice.

It should be noted that the HSA Guidance applies to the planning of Seveso sites as opposed to planning of non-Seveso sites adjacent to Seveso sites as is the case in this application.

2.3 DUBLIN CITY DEVELOPMENT PLAN 2011 TO 2017

The Dublin City Development Plan 2011 to 2017 (May 2013 update) sets out the Council's policy to dealing with the Seveso Regulations in the planning system through Policy SI57 which states:

In conjunction with the Health and Safety Authority (HSA), to implement the provisions of the Seveso II (COMAH) Directive and to have regard to the provisions of the directive and recommendations of the HSA in the assessment of all planning applications located on or impacted by such sites.

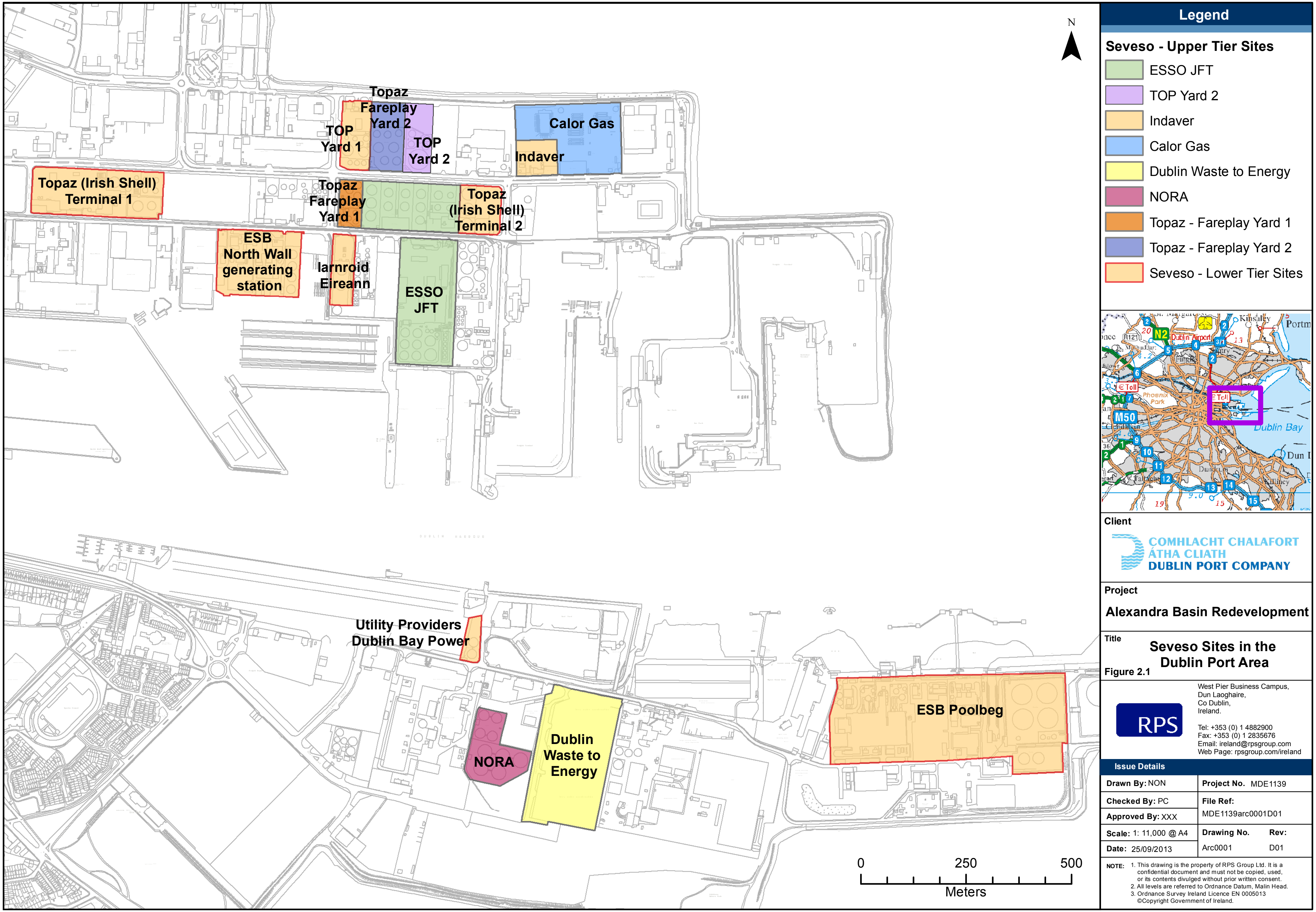
As such, the HSA must be consulted on the nature of any proposed development that may have an impact on Seveso site and this includes both applications for new Seveso sites as well as non-Seveso sites adjacent to Seveso sites as is the case in this application.

In addition, Appendix 19 of the Plan contains the list of Seveso sites where the HSA must be contacted for technical advice prior to proposals for development in the vicinity of these sites. The HSA provides planning advice to Dublin City Council in respect of planning applications within a certain distance of key infrastructure (i.e. perimeter, bund wall, etc.) of these sites. Appendix 19 includes the consultation distances whereby HSA needs to be informed of any planning applications for development within the stated distances. These distances are listed in **Table 2.1** and the locations of these establishments are presented in **Figure 2.1**.

The proximity of these establishments to the proposed Alexandra Basin Redevelopment in comparison to the consultation distances are addressed in **Section 4** of this report.

Table 2.1: Seveso Sites in the Dublin Port area and corresponding HSA consultation distances

Establishment	Seveso Tier	Consultation Distance
Topaz (Irish Shell) Site 1	Lower	400m from perimeter
ESB North Wall Station	Lower	300m from bund wall
Irish Rail	Lower	300m from bund wall
Esso Joint Fuels Terminal	Upper	400m from perimeter
Topaz (Fareplay) Yard 1	Upper	300m from perimeter
Topaz (Irish Shell) Site 3	Lower	300m from bund wall
Tedcastles Oil Products Yard 1	Lower	400m from perimeter
Topaz (Fareplay) Yard 2	Upper	400m from perimeter
Tedcastles Oil Products Yard 2	Upper	400m from perimeter
Indaver	Upper	700m from perimeter
Calor Gas Teo	Upper	600m from perimeter
Dublin Waste to Energy	Upper	300m from perimeter
National Oil Reserves Agency	Upper	300m from perimeter
Utility Operations and Maintenance (Synergen Ltd.)	Lower	300m from bund wall
ESB Poolbeg Station	Lower	300m from bund wall


N
Topaz Fareplay Yard 2
TOP Yard 1
TOP Yard 2
Calor Gas
Indaver
Topaz (Irish Shell) Terminal 1
Topaz Fareplay Yard 1
Topaz (Irish Shell) Terminal 2
ESB North Wall generating station
Iarnroid Eireann
ESSO JFT
Utility Providers Dublin Bay Power
NORA
Dublin Waste to Energy
ESB Poolbeg
0
250
500
Meters
Legend
Seveso - Upper Tier Sites
ESSO JFT
TOP Yard 2
Indaver
Calor Gas
Dublin Waste to Energy
NORA
Topaz - Fareplay Yard 1
Topaz - Fareplay Yard 2
Seveso - Lower Tier Sites
Dublin Bay
Client
COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY
Project
Alexandra Basin Redevelopment
Title
Seveso Sites in the Dublin Port Area
Figure 2.1
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Issue Details
Drawn By: NON
Project No. MDE1139
Checked By: PC
File Ref: MDE1139arc0001D01
Approved By: XXX
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3 PROJECT DESCRIPTION

3.1 OVERVIEW

The Dublin Port estate encompasses 260 hectares and approximately 14km of waterfront close to Dublin city centre. Dublin Port Company is responsible for the management, control, operation and development of the port. Dublin Port Company has published a Masterplan to guide the development of Dublin Port in the period from 2012 to 2040. The Alexandra Basin Redevelopment project is the first element of the Dublin Port Company Masterplan 2012-2040.

The proposed Alexandra Basin Redevelopment project comprises two elements which are presented in **Figure 3.1**:

- Alexandra Basin (Hatched Area A); and

- The basin at Ro-Ro (roll-on/roll-off) Terminal 5, located at the eastern side of the port (Hatched Area B).

Both locations are existing working port areas. The following sections provide a summary of the existing operations, proposed construction stage and proposed operation stage of the project.

3.2 EXISTING OPERATIONS

The existing operations at the Alexandra Basin are summarised as follows and each of the elements listed are shown in **Figure 3.2**. Most of the berths in Alexandra Basis are multi-purpose as described below.

- Berths 29 to 31 along the northern edge of the basin is primarily used for bulk cargo such as grain/feedstuff. One customer of the port has a quayside conveyor system for conveying product into flat stores and silos. In addition to bulk cargoes, the berths are also used for containers, car carriers, occasionally for cruise ships and for visiting naval ships.

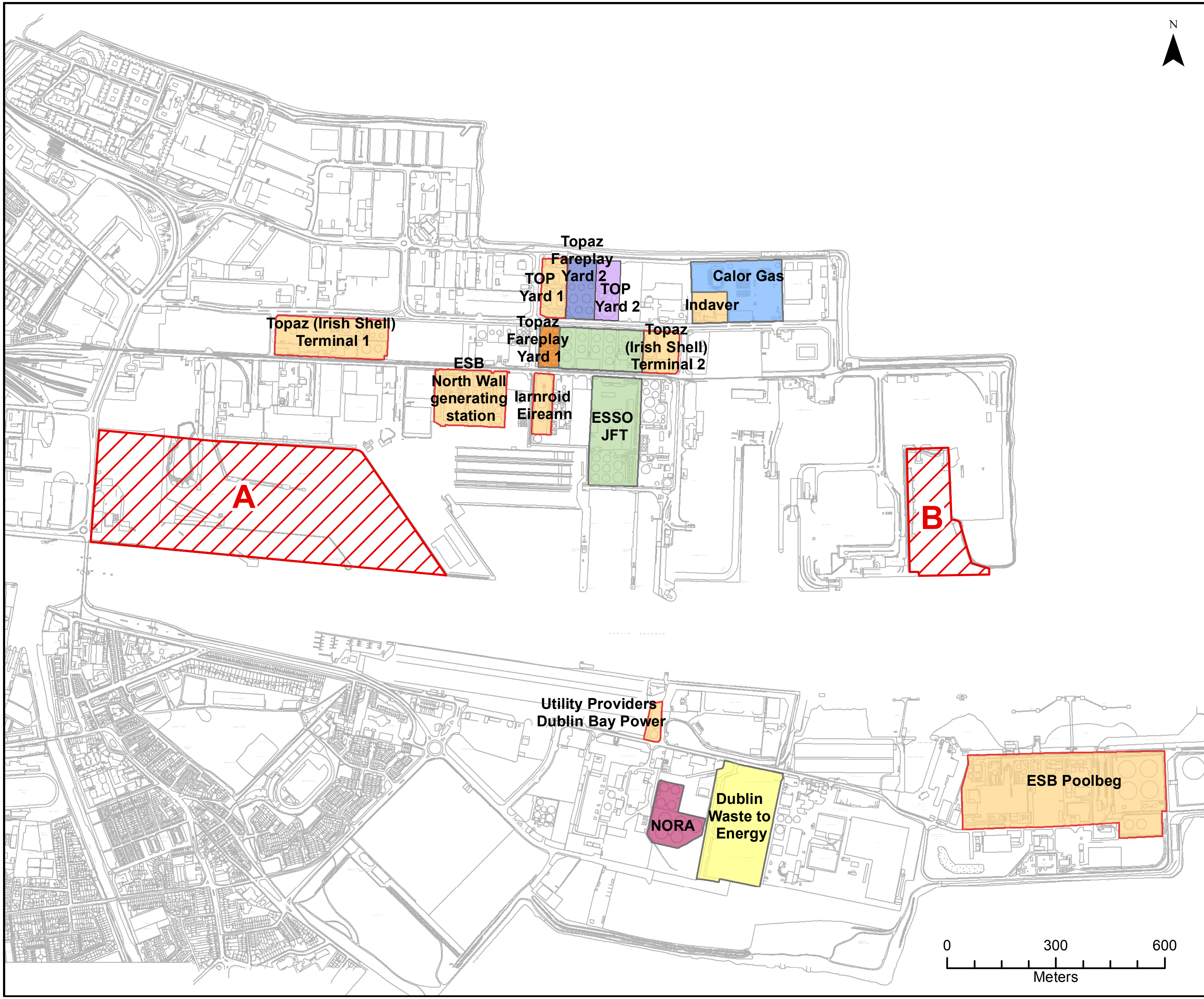
- Berths 32 to 34 along the eastern edge of the basin is has a variety of uses including containers, bulk solid commodities (such as animal feed, peat moss and cement), cruise ships, car carriers, project cargoes (particularly wind turbines) and vising naval ships.

- There is a dedicated bulk jetty for export of lead/zinc ore from Tara Mines which has a sealed conveyor.

- The ramps at the North Quay Extension are currently used for Ro-Ro vessels. North Quay Extension is also used for cruise ships and as a lay over berth.

- In the north west corner of the basin there is a graving dock that is used for ship repair and maintenance.

The existing operations at Terminal 5 include Berths 52 and 53 which are used for Ro-Ro services to the UK. Both berths have floating linkspans. Each of the elements is shown in **Figure 3.3**.

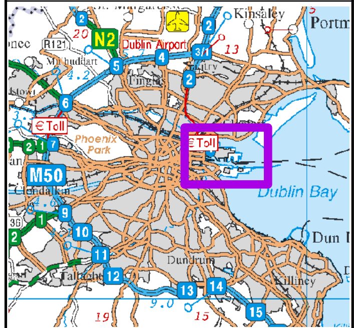


Legend

- Alexandra Basin Works

Seveso - Upper Tier Sites

- ESSO JFT
- TOP Yard 2
- Indaver
- Calor Gas
- Dublin Waste to Energy
- NORA
- Topaz - Fareplay Yard 1
- Topaz - Fareplay Yard 2
- Seveso - Lower Tier Sites



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COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Alexandra Basin Works Locations

Figure 3.1

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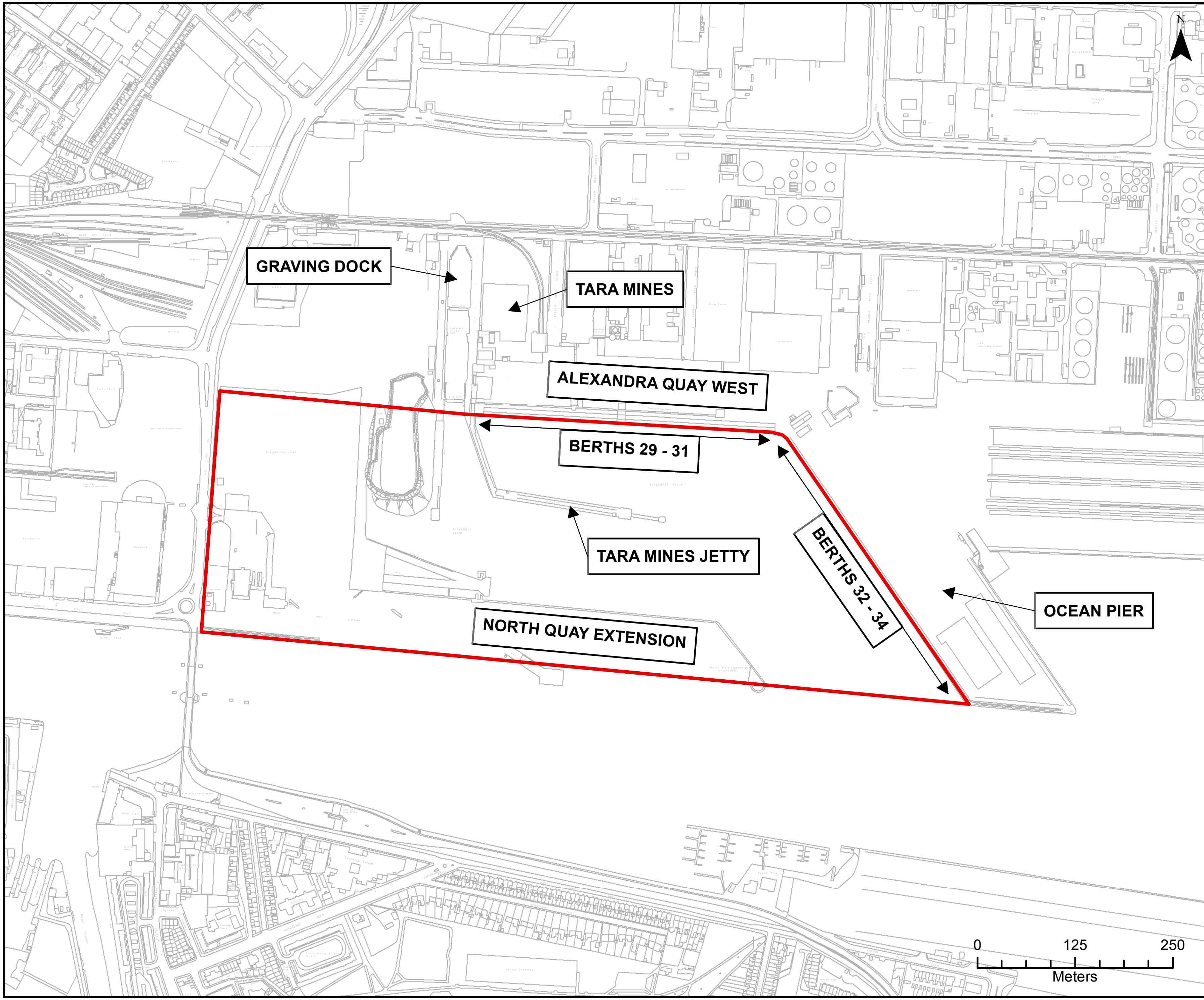
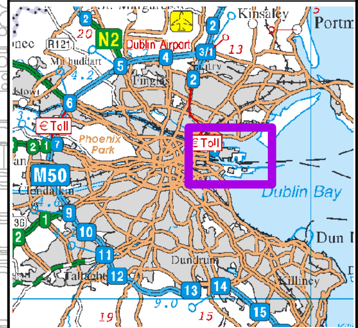


Legend

Alexandra Basin



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DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Development at Alexandra Basin

Figure 3.2

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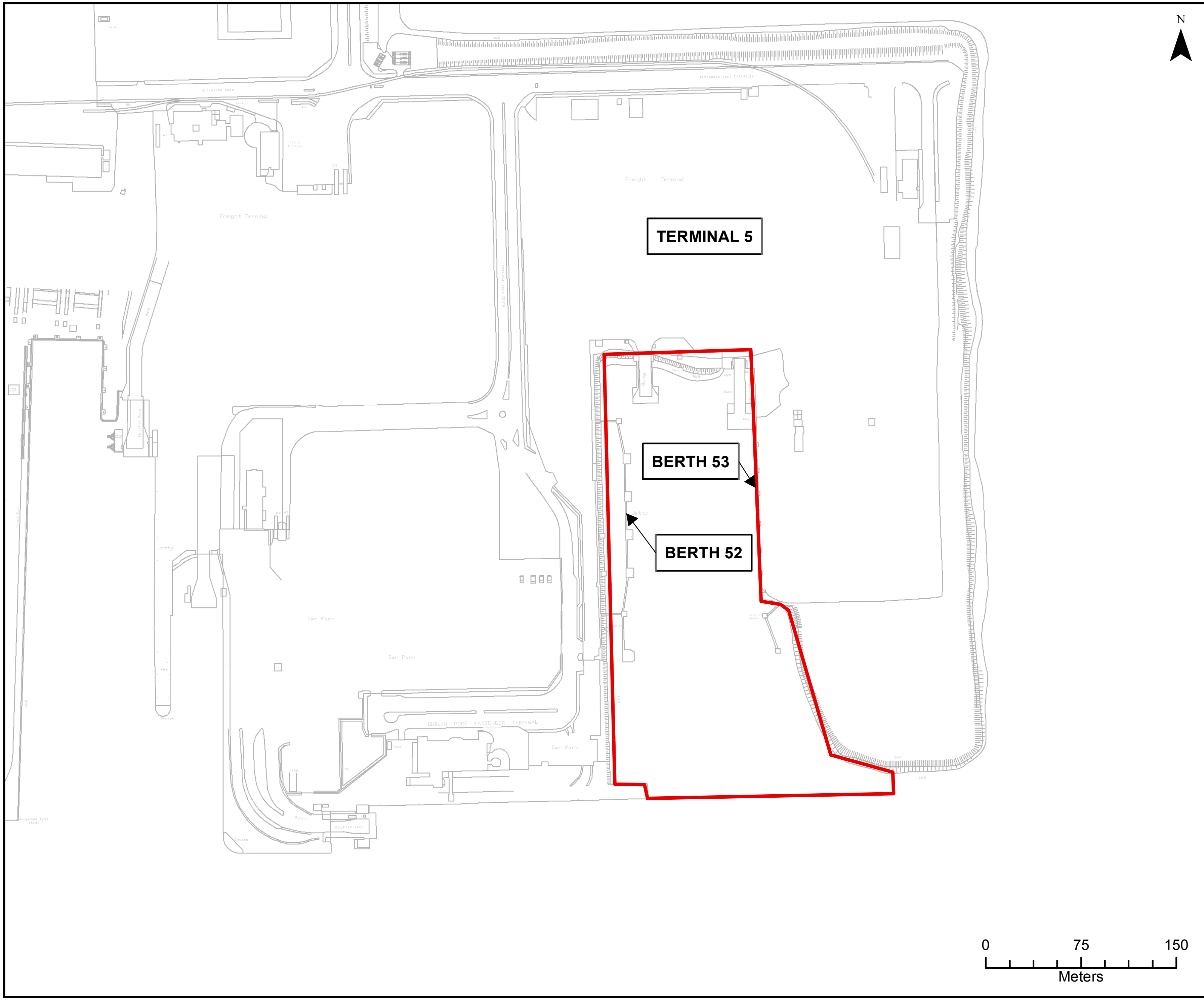
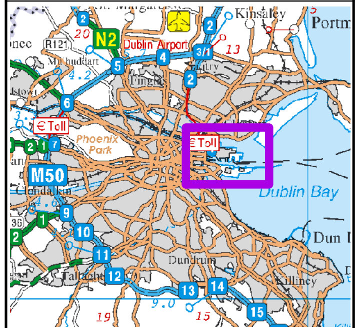


Legend

Terminal 5 Basin



Client

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Development at Terminal 5 Basin

Figure 3.3

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3.3 PROPOSED CONSTRUCTION STAGE

The proposed redevelopment plan is scheduled to occur in the following construction stages which are presented in **Figure 3.4** (Alexandra Basin) and **Figure 3.5** (Terminal 5 Basin):

- Graving Dock No. 2 to be closed;
- Excavation of the adjacent Graving Dock No. 1 which is of significant industrial heritage value;
- Extend Berth 29 westwards to increase length of available quay;
- Relocation of ore concentrate loading system and removal of jetty;
- Remediate Alexandra Basin by dredging of the contaminated soils to depths of -10m to -12m. It is envisaged that this will involve dredging of contaminated material to a depth of 1m over an area of 166,000m^2.
- New Ro-Ro berths at Alexandra Basin, two number ramps;
- Re-engineer North Quay Extension, to create two new deeper berths and inner turning basin;
- Construction of a new quay wall and crane rail installation along Ocean Pier
- Construction of a new quay wall along Alexandra Quay
- Reclamation of Berths 52 and 53 at Terminal 5 and the construction of a new river berth

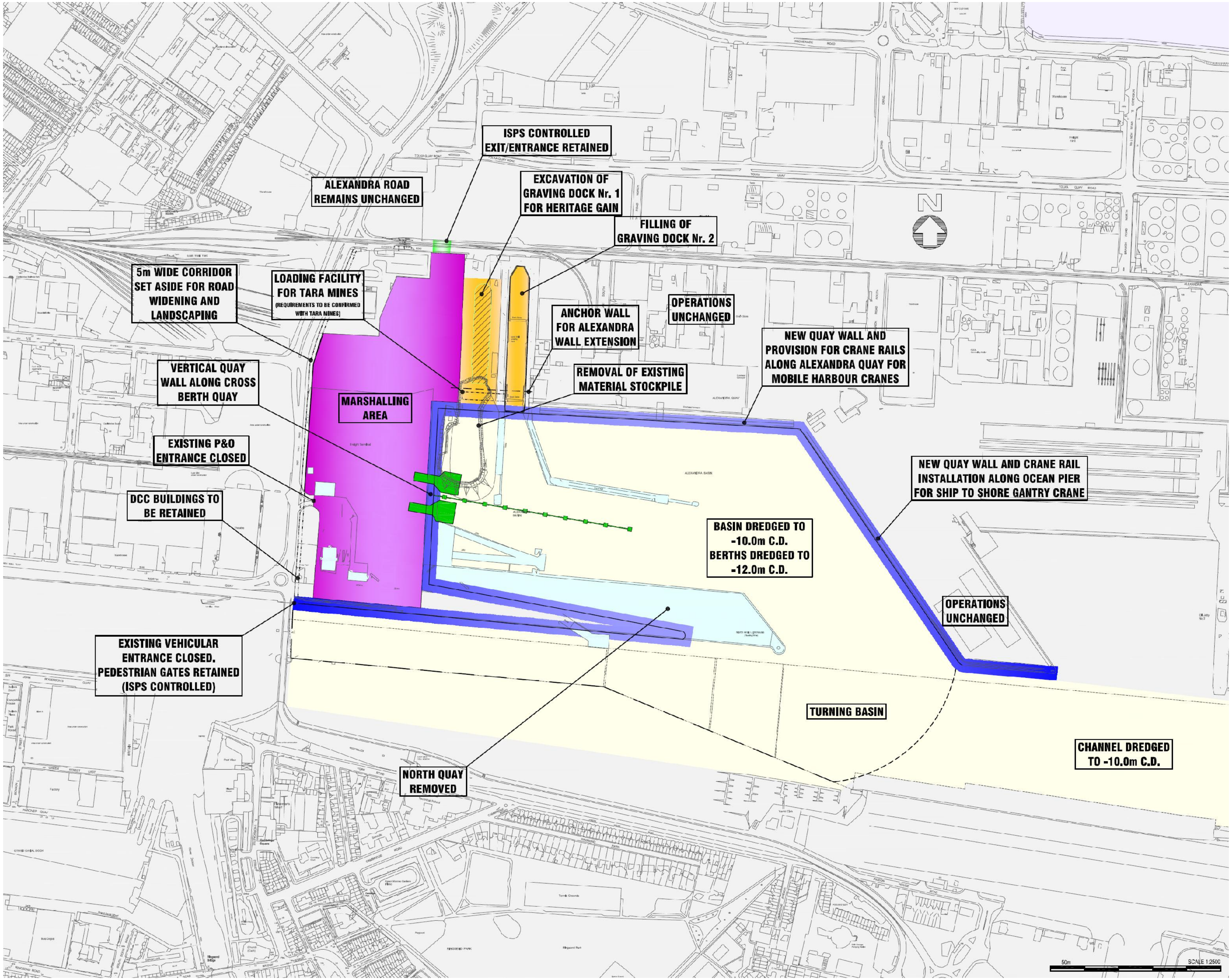
The proposed construction will require planning consent from An Bord Pleanála, a Foreshore Licence from the Department of the Environment, Heritage and Local Government and a Dumping at Sea Permit or a Waste Licence from the EPA. Dublin Port Company envisages that all required consents will be obtained by the end of 2014 and that the first elements of the project will be delivered by the end of 2016.

3.4 PROPOSED OPERATION STAGE

The main purpose of the development is the reconfiguration of Alexandra Basin to accommodate larger ships including cruise ships.

The project will also provide for a substantial increase in the port's capacity particularly in the handling of longer Ro-Ro ships with the addition of two new Ro-Ro freight berths at the western perimeter of the basin.

It is important to note that there is no fuel storage infrastructure for the vessels using the port proposed as part of the redevelopment. Furthermore, there is no proposed storage of any named substances listed in Part 1 of Schedule 1 (ammonium nitrate, chlorine, etc.) of the Seveso Regulations and no categories of substances listed in Part 2 of the Regulations. As such, the Seveso Regulations will not apply to the proposed development.



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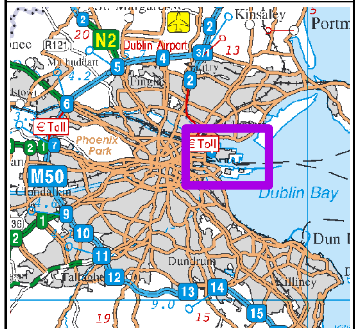

Client

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Project Definition Sheet 1

Figure 3.4

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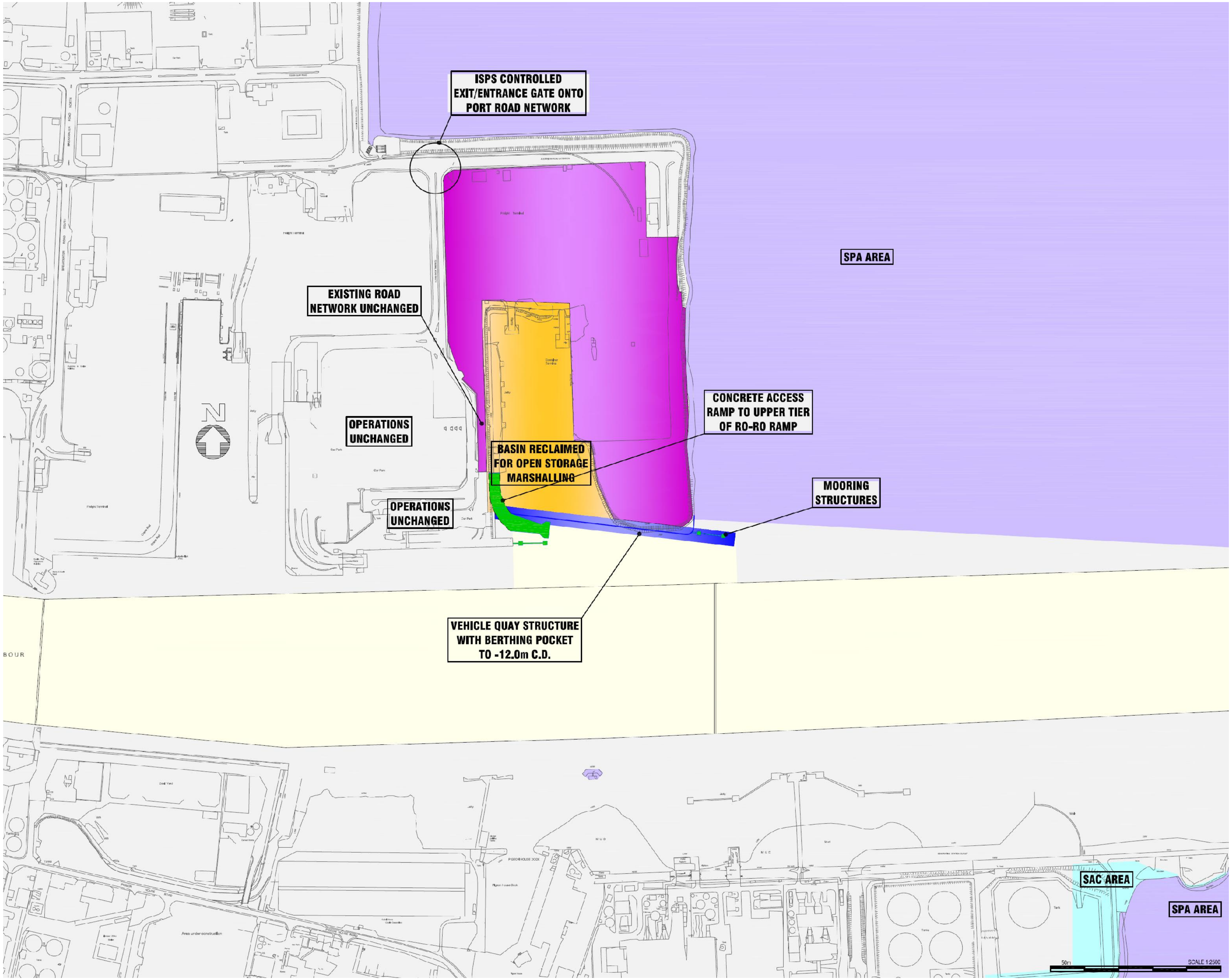

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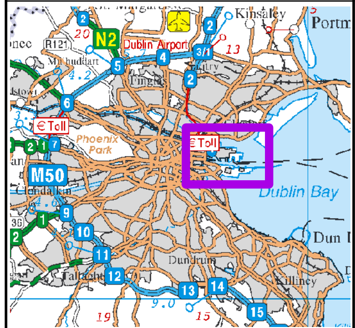

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COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Project Definition Sheet 2

Figure 3.5

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Date: 25/09/2013	

4 IDENTIFICATION OF SEVESO SITES IN DUBLIN PORT

Approximately 94 Seveso establishments have been identified in Ireland by the HSA. 15 of these sites are located in the Dublin Port area. The name, address, nature of the operation and Seveso tier for each of these establishments in Dublin Port is presented in **Table 4.1**. The locations of the Seveso sites in Dublin Port are presented in **Figure 2.1**.

Table 4.1: List of Seveso sites located in the Dublin Port area

Establishment	Address	Seveso Tier	Site Nature
Topaz (Irish Shell) Site 1	Alexandra Road, Dublin 1	Lower	Fuel Storage
ESB North Wall Station	Alexandra Road, Dublin 1	Lower	Fuel Storage, Generating Station
Irish Rail	Alexandra Road, Dublin 1	Lower	Fuel Storage
Esso Joint Fuels Terminal	Alexandra Road, Dublin 1	Upper	Fuel Storage
Topaz (Fareplay) Yard 1	Alexandra Road, Dublin 1	Upper	Fuel Storage
Topaz (Irish Shell) Site 3	Alexandra Road, Dublin 1	Lower	Fuel Storage
Tedcastles Oil Products Yard 1	Promenade Road, Dublin 1	Lower	Fuel Storage
Topaz (Fareplay) Yard 2	Tolka Quay Road, Dublin 1	Upper	Fuel Storage
Tedcastles Oil Products Yard 2	Tolka Quay Road, Dublin 1	Upper	Fuel Storage
Indaver	Tolka Quay Road, Dublin 1	Upper	Solvent Storage
Calor Gas Teo	Tolka Quay Road, Dublin 1	Upper	LPG Storage
Dublin Waste to Energy	Pigeon House Road, Dublin 4	Upper	Use of Ammonium Hydroxide and Fuel Storage
National Oil Reserves Agency	Ringsend, Dublin 4	Upper	Fuel Storage
Utility Operations and Maintenance (Synergen Ltd.)	Pigeon House Road, Dublin 4	Lower	Natural Gas Storage, Generating Station
ESB Poolbeg Station	Ringsend, Dublin 4	Lower	Natural Gas Storage, Generating Station

Each of the 15 establishments listed above are obliged to prepare a Major Accident Prevention Policy (MAPP) under Regulation 10 of the Seveso Regulations. Details for same are presented in Schedule 2 of the Regulations (presenting the details of Annex III of the Directive). This applies to both lower and upper tier establishments.

The eight upper tier establishments are also obliged to prepare a Safety Report under Regulation 12 of the Seveso Regulations and submit a copy of same to the HSA. This report will also include the Major Accident Prevention Policy (MAPP).

In addition to the individual safety management procedures that are statutory requirements for these establishments, the Dublin Port Company has prepared an Emergency Management Plan. This Plan ensures that the structures and arrangements used in response to an emergency will mitigate loss of life, damage to the environment and damage to property. The Plan assigns roles and responsibilities and provides detailed emergency response procedures for a range of hazards both on land and at sea. Hazards addressed include major fire, major oil spill, major chemical spill, chemical incident, traffic hazards and infectious diseases.

Given the above structures and procedures at the facility and estate level, there is significant risk mitigation currently in place at Dublin Port to minimise impacts and the effect of impacts.

5 RISK ASSESSMENT

5.1 PROXIMITY OF THE DEVELOPMENT TO SEVESO SITES

Table 5.1 presents the full list of all Seveso establishments in the Dublin Port area along with the relevant consultation distances as specified in Appendix 19 of the Dublin City Development Plan. Also listed for comparison are the distances of each site boundary to the two areas of the proposed development, i.e. the Alexandra Basin and the Terminal 5 Ro-Ro Basin. Distances presented in bold indicate where the distance to site is within the consultation distance.

Table 5.1: Distances of Seveso establishments to the Alexandra Basin and Terminal 5

Establishment	Consultation Distance	Distance to Site A (Alexandra Basin)	Distance to Site B (Terminal 5 Ro-Ro Basin)
Topaz (Irish Shell) Site 1	400m from perimeter	**250m**	1460m
ESB North Wall Station	300m from bund wall	**212m**	1112m
Irish Rail	300m from bund wall	430m	983m
Esso Joint Fuels Terminal	400m from perimeter	465m	740m
Topaz (Fareplay) Yard 1	300m from perimeter	535m	987m
Topaz (Irish Shell) Site 3	300m from bund wall	762m	670m
Tedcastles Oil Products Yard 1	400m from perimeter	622m	1010m
Topaz (Fareplay) Yard 2	400m from perimeter	673m	935m
Tedcastles Oil Products Yard 2	400m from perimeter	736m	873m
Indaver	700m from perimeter	954m	**605m**
Calor Gas Teo	600m from perimeter	1000m	**492m**
Dublin Waste to Energy	300m from perimeter	919m	660m
National Oil Reserves Agency	300m from perimeter	821m	860m
Utility Operations and Maintenance (Synergen Ltd.)	300m from bund wall	667m	770m
ESB Poolbeg Station	300m from bund wall	1522m	497m

In the absence of details of the specific impact distances of the Seveso sites, the Dublin City Council consultation distances listed in **Table 5.1** are applied as a risk screening tool to determine any potential impact.

Table 5.1 indicates that the Alexandra Basin lies within the consultation distance of two lower tier Seveso establishments, i.e. Topaz (Irish Shell) Site 1 and ESB North Wall Station (distances noted in bold). The remaining Seveso establishments are located at distances greater than the consultation distance and hence the potential risk of impact is low and these establishments are not considered further in this assessment. A more detailed assessment of the potential impact of the Alexandra Basin works on the two Seveso establishments is presented in **Section 5.2** of this report.

Table 5.1 indicates that the Terminal 5 Ro-Ro Basin lies within the consultation distance of two upper tier Seveso establishments, i.e. Indaver and Calor Gas Teo (distances noted in bold). The remaining Seveso establishments are located at distances greater than the consultation distance and hence the potential risk of impact is low and these establishments are not considered further in this assessment. A more detailed assessment of the potential impact of the Terminal 5 Ro-Ro Basin works on the two Seveso establishments is presented in **Section 5.3** of this report.

5.2 POTENTIAL IMPACTS FROM THE ALEXANDRA BASIN

5.2.1 General

Outlined in the following sections are summary descriptions of the two lower tier establishments which the Alexandra Basin aspect of the project lies within the relevant consultation distances specified in Appendix 19 of the City Development Plan. For each establishment, details of the potential infrastructure are provided along with an assessment of the risk posed between the establishment and the Alexandra Basin development (construction and operation). **Figure 5.1** shows the extent of the Alexandra Basin that lies within the consultation distance.

5.2.2 North Wall Generating Station (Lower Tier)

The ESB North Wall Generating Station has been in operation since 1947 but in 2013, CT5 is the only turbine operational on the site and is an open cycle combustion turbine, used for peak system demands or unusual non-availability of other plants. CT5 is fired on natural gas supplied from the national gas network (i.e. no storage on site) and in 2012 a total of 211,228MWh were generated at the site. CT5 operated on natural gas for 1505 hours in total over the year (approximately 17% of the time in 2012). This facility operates under an IPPC licence from the EPA.

Distillate Oil is used as a secondary fuel but this was only employed for 4 hours through 2012 for testing purposes only (equivalent to 664MWh). Distillate is delivered by tankers where it is stored in four 4,000m^3 tanks located along the eastern boundary of the site. However, it is unclear to what extent these tanks are employed as the volume of distillate oil required per annum is vey low. For the purposes of this assessment it is conservatively assumed that all tanks are full.

While the boundary to boundary site distance is 212m (**Table 5.1**), the distance from the bund wall of these tanks to the Alexandra Basin boundary is approximately 340m, which exceeds the consultation distance listed in Appendix 19 of the City Development Plan. As such, the overall risk to/from the Alexandra Basin to these tanks is low.

During the construction stage, the works proposed along the northern and eastern quays (i.e. the areas closes to the North Wall Generating Station, include the infilling of Graving Dock No. 2 (750m to tanks), excavation of the Graving Dock No. 1 (800m to tanks), and extending Berth 29 westwards (750m to tanks). At these distances the risk posed to the tanks is very low.

Other works include the provision of a new quay wall and crane rail for mobile harbour cranes along the eastern and northern boundary (340m to tanks). All other infrastructure on Ocean Quay, the closest point to the tanks, is proposed to remain unchanged during construction.

Given the above review, it is concluded that the risk of hazard for the tanks on North Wall Generating Station during the construction phase is **very low**.

During the operation phase, the current operations at the northern and eastern quays will remain largely unchanged with similar operations but involving larger vessels. The reconfigured North Quay Extension will be able to accommodate new cruise berths which will be located approximately 600m from the tanks and outside the 300m consultation distance. Similarly, the addition of two new Ro-Ro freight berths at the western perimeter of the basin will also be outside of consultation distance (refer **Figure 5.1**).

With the exception of the cruise berths at the North Quay Extension, the proposed development will not significantly alter the numbers of personnel in the Alexandra Basin area and the risk posed by the tanks on personnel in the area will be unchanged. While the cruise berths will increase the number of personnel (employees, tourists, etc.) in the Alexandra Basin area, these personnel will be at significant distances (600m to the berth and approximately 1000m to the marshalling area) from the tanks on the North Wall Generating Station.

Based on this review, the risk of hazard for the tanks on North Wall Generating Station during the operation of the proposed development is **low**.

5.2.3 Topaz (Irish Shell) Site 1 (Lower Tier)

The Topaz (Irish Shell) Site 1 (or Terminal 1) has an operating capacity of approximately 25,000 tonnes which is accommodated in 10 bulk storage tanks used to store kerosene, jet fuel, ethanol and other materials. There is also a vapour recovery unit located on the site. This site boundary is approximately 250m from the northern quays of the Alexandra Basin and within the consultation distance specified in Appendix 19 of the City Development Plan.

However, it should be noted that in September 2012 Topaz lodged a planning application to Dublin City Council (Planning Application Reference 3171/12) for the relocation of Terminal 1 (and Terminal 2, lower tier) to a newly constructed Terminal 3 facility on Promenade Road further north in the Dublin Port footprint. The proposed Terminal 3 would be located on the site between the Tedcastles Oil Products Yard 2 and Indaver where it will lie approximately 800m from the Alexandra Basin and well outside the consultation distance.

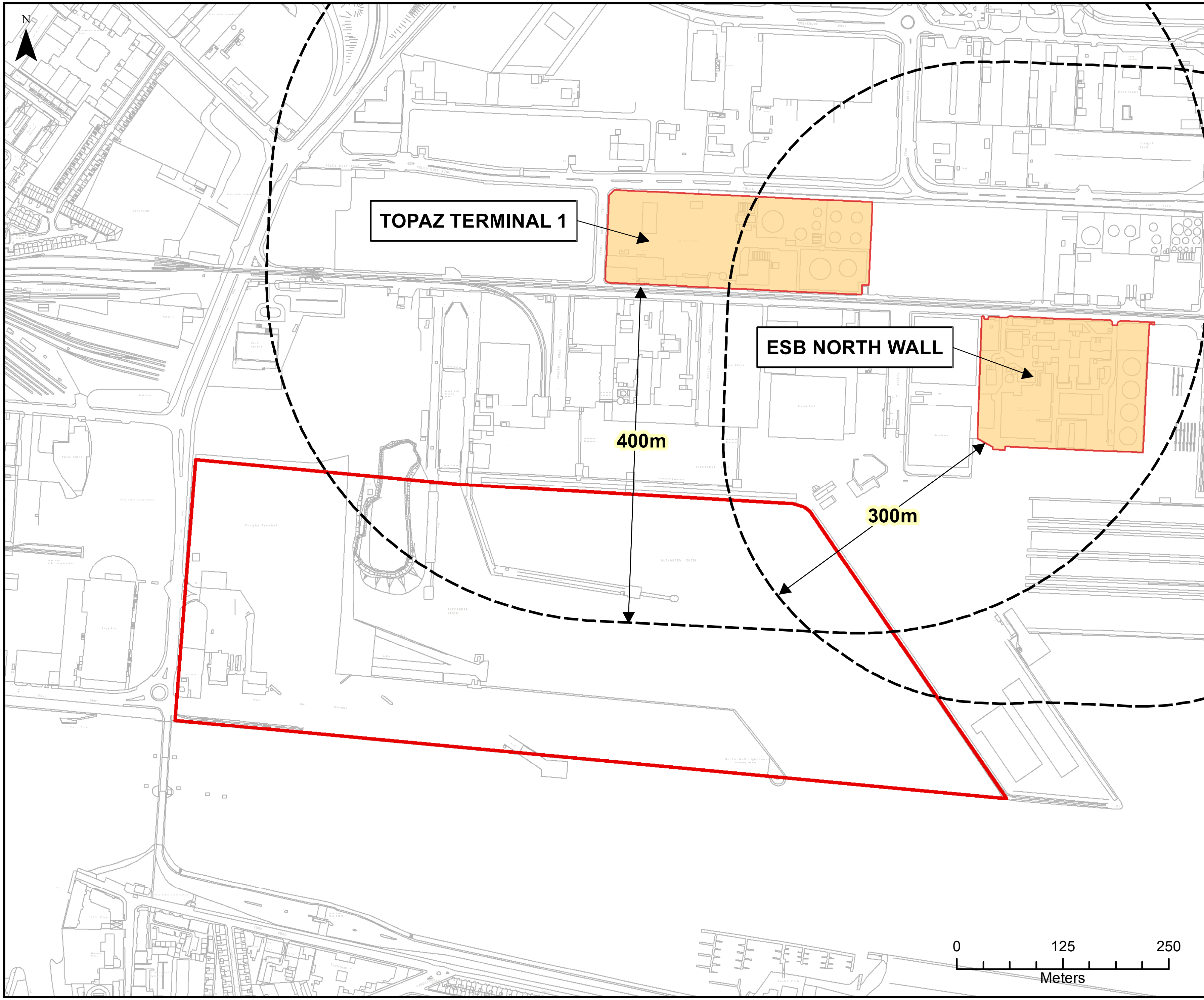
Following completion of the new Terminal 3, the existing Topaz Terminal No. 1 will be demolished removing all tanks, buildings, services and equipment off site from the Terminal except the ESB substation. This demolition will essentially remove the risk from the Terminal 1 site.

Dublin City Council granted permission for this development in July 2013 subject to a series of conditions. Condition 2 relates to provision of all relevant details to the HSA in advance of operations.

Given that the project has acquired planning permission, it is assumed that the demolition of Topaz Terminal No. 1 will proceed as planned. Once the tanks on the site are emptied in advance of any construction on the Alexandra Basin site the anticipated risk of hazard is considered **negligible**.

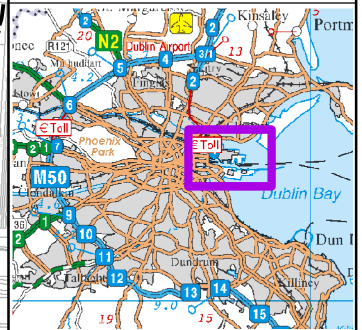
If there is overlap between the decommissioning of the Topaz establishment and the construction of the Alexandra Basin, a residual risk of hazard remains. The proposed construction works along the northern quay (graving docks, quay wall, etc.) are considerably closer (circa 200-300m) than for the North Wall Generating Station outlined above. As such, there is a heightened, albeit low risk of hazard. Given the above, it is concluded that the risk of hazard for the Topaz site during the construction phase is **low**.

As outlined above, once Topaz Terminal 1 is decommissioned in advance of the operation of the Alexandra Basin, the risk is **negligible**.



Legend

- Alexandra Basin Works
- Seveso Site
- Seveso Site Buffer



Client

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Alexandra Basin & Adjacent Sites

Figure 5.1

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5.3 POTENTIAL IMPACTS FROM THE TERMINAL 5 BASIN

5.3.1 General

Outlined in the following sections are summary descriptions of the two upper tier establishments which the Terminal 5 Basin aspect of the project lies within the relevant consultation distances specified in Appendix 19 of the City Development Plan. In addition, the proposed Topaz Terminal 3 (as outlined in **Section 5.2.3**) may also pose a hazard and is included in this assessment. For each establishment details of the potential infrastructure is provided along with an assessment of the risk posed between the establishment and the Terminal 5 Basin development (construction and operation). **Figure 5.2** shows the extent of the Terminal 5 Basin that lies within the consultation distance.

5.3.2 Indaver (Upper Tier)

The Indaver facility operates under a Waste Licence from the EPA for the blending of solvent wastes from industry for recovery as a fuel. To carry out this operation the facility includes a tank farm comprising 700m^3 of tank storage located to the east of the site footprint. This site boundary is approximately 605m from the northern quay of the Terminal 5 Basin and within the consultation distance specified in Appendix 19 of the City Development Plan (700m).

The construction at this terminal basin includes the construction of a new quay wall across the southern boundary of the basin followed by infilling of the basin to create an area for open storage. These operations are confined to the basin area with localised effects. As such, there is a low potential for impacts at 600m from the area. The proposed haul route for the importation of any infilling material by road should be planned and management to ensure that any traffic hazard associated with the Indaver facility on Tolka Quay Road is adequately mitigated. With such measures in place the risk of a hard at the Indaver facility from the construction phase at the Terminal 5 Basin is considered **low**.

During the operation stage of the reclaimed basin, the area will be used for open storage with some mooring structures on the quay. As such, operations within the 700m consultation distance will be largely reduced with the cessation of activity at Berths 52 and 53. While there may be increased operations at the new quay structure, this area lies outside the 700m consultation distance. Considering the above, the risk of hazard to the Indaver establishment during the operation phase of the Terminal 5 area is considered **very low**.

5.3.3 Calor Gas Teo (Upper Tier)

The Calor Gas Teo site is a liquefied petroleum gas (LPG) storage terminal and houses 17 horizontal tanks or varying sizes for LPG storage and associated infrastructure. This site boundary is approximately 492m from the northern quay of the Terminal 5 Basin and within the consultation distance specified in Appendix 19 of the City Development Plan (600m).

As outlined above for the Indaver facility, the main construction works lie outside of the consultation distance and once haulage traffic for the infilling operation is adequately management not to conflict with Calor operations then the risk of a hazard during the construction stage is considered **low**.

Similarly, once construction is completed and this area is employed for open storage, then the risk is reduced. Operations at the quay side will be outside the consultation distance and the risk of a hazard at the operation stage is considered **very low** as above.

5.3.4 Topaz Terminal 3 (Upper Tier)

While not constructed, planning permission has been granted for this facility by Dublin City Council in July 2013 (refer **Section 5.2.3** for further details). The proposed development will include the following bulk storage:

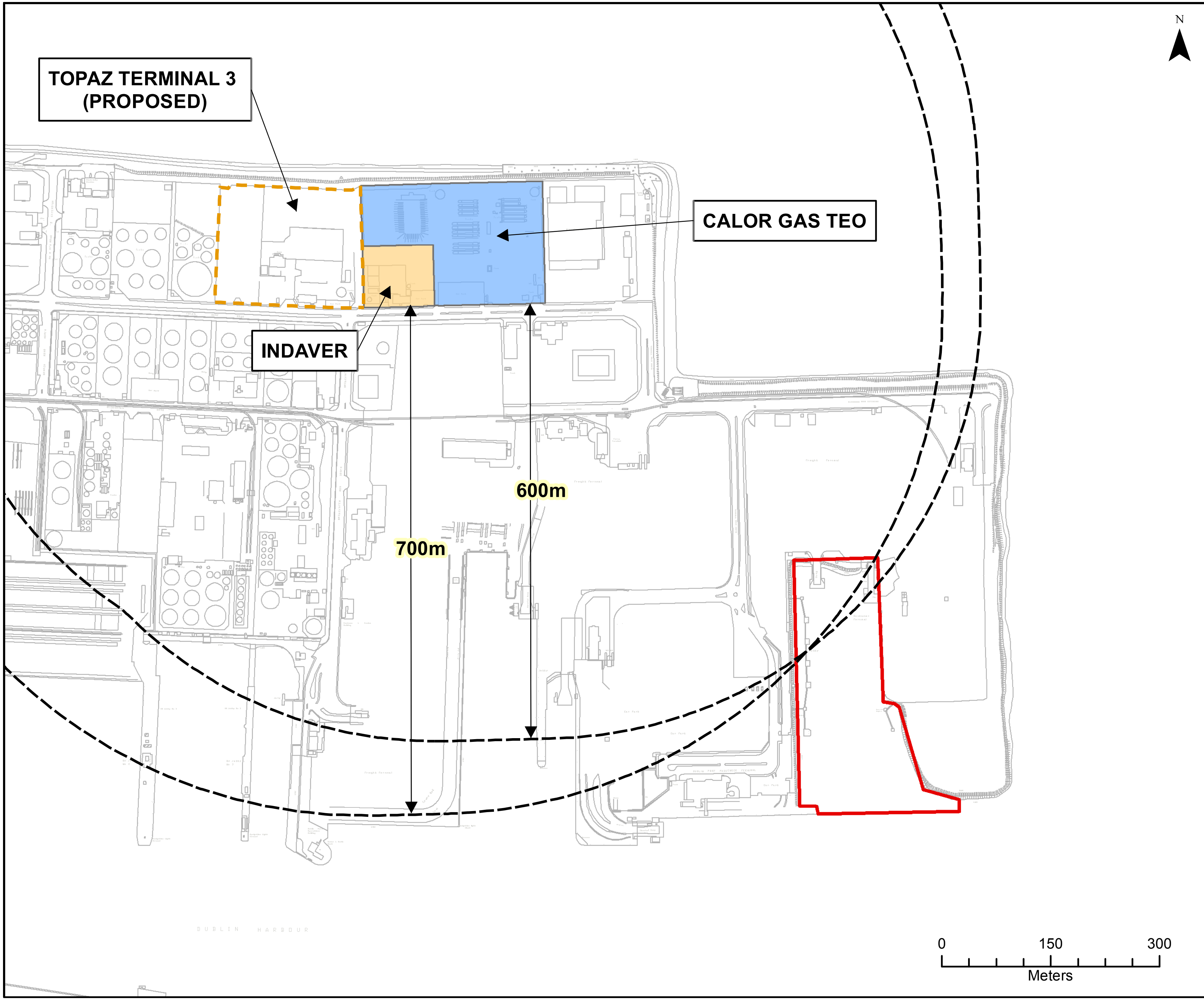
- 1 vertical steel tank for the storage of Kerosene (120m^3);
- 4 vertical steel tanks for the storage of Jet Al Fuel (28,480m^3 in total);
- 1 vertical steel tank for the storage of ethanol (7,120m^3);
- 3 vertical steel tanks for the storage of unleaded gasoline (16,542m^3 in total);
- 8 horizontal steel tanks for the storage of various liquids (63m^3 each); and
- 1 vertical steel tank for the storage of Ethanol (220m^3).

Given the increased capacity from what is currently stored on Terminals 1 and 2 (both lower tier), the Terminal 3 facility is anticipated to be an upper tier site.

The proposed Terminal 3 is bounded to the south by Tolka Quay Road, to the west by Tedcastles Oil Products Yard 2 (upper tier) and to the east by an access lane and the Indaver and Calor sites (both upper tier). The location is shown in **Figure 5.2** and the approximate distance to the Terminal 5 Basin is 700m (boundary to boundary). While no consultation distance is specified for this proposed facility, it is included in this assessment for completeness.

Much like the Indaver and Calor Teo establishments, the risk during the construction stage may be largely limited to infill haulage traffic. Once this is managed then the risk of a hazard from the proposed operation on the Terminal 3 site is considered **low**.

Similarly, once operational, the activities at this terminal present a reduced risk of hazard which is classified as **very low** as above.

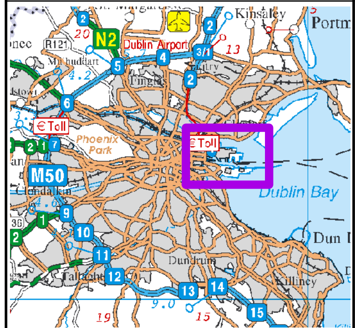


Legend

- Terminal 5 Basin Works

Seveso Sites

- Indaver
- Calor Gas
- Buffer of Seveso Site
- Proposed Site



Client

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Project

Alexandra Basin Redevelopment

Title

Terminal 5 Basin & Adjacent Sites

Figure 5.2

RPS

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Issue Details

Drawn By: NON	**Project No.** MDE1139
Checked By: PC	**File Ref:** MDE1139arc0008D01
Approved By: XXX	
Scale: 1: 7,000 @ A4	**Drawing No.** Arc0008 / **Rev:** D01
Date: 26/09/2013	

6 CONCLUSIONS

This report has been prepared to accompany the planning application for the Alexandra Basin Redevelopment. The document identifies the Seveso sites located in Dublin Port and provides an assessment of the potential impact of the development on these sites. This assessment has been requested by An Bord Pleanála during the pre-planning consultation process.

Appendix 19 of the Dublin City Development Plan 2011 to 2017 identifies a series of consultation distances for Seveso sites that require further assessment. These consultation distances have been used for risk screening of impacts.

The two elements of this project, i.e. the Alexandra Basin and the Terminal 5 Basin, lie within the consultation distances of a number of Seveso sites. As such further risk assessment is provided for each of the Seveso sites affected.

The Alexandra Basin lies within the consultation distance of the Topaz (Irish Shell) Terminal 1. However, planning consent has been granted by Dublin City Council to Topaz in July 2013 for the relocation of this site to an area further north in Dublin Port. Any risk associated with the proximity of the Alexandra Basin to this Topaz site would be eliminated on foot of this relocation. In the event that the Topaz relocation project was delayed and the site were to remain in place for the duration of the construction and/or operation of the Alexandra Basin, the risk of a hazard occurring is considered low.

Elements at the east of the Alexandra Basin are close to the North Wall Generating Station. However, the consultation distance relates to the bund at the distillate tanks and all aspects of the development lie outside the consultation distance. Hence the proposed development is considered to pose a low risk of a hazard occurring.

Elements of the Terminal 5 Basin lie within the consultation distance of two upper tier sites (Indaver and Calor Gas Teo). However, the proposed development of the Terminal 5 Basin includes infilling to create surface open storage where the basin is currently located. The nature of the construction and subsequent operation in this area is low risk and the proposed development is considered to pose a low risk of a hazard occurring. Haulage of infill material may pose a risk if the haul routes are on Tolka Quay Road adjacent to the Seveso sites. Once this traffic element is adequately managed during the construction stage the risk remains low.

In summary, an assessment of the likely significant affect of the proposed development on the Seveso site network has been undertaken for both the construction and operation phases. Where sites are identified as posing a plausible risk, (i.e. within the consultation distances supplied by Dublin City Council) a more detailed review has been undertaken. In all cases the nature of the proposed development, coupled with the distances to the Seveso sites has resulted in a low risk of impact.

APPENDIX 8

MATERIAL ASSETS
(This Appendix is presented in Volume 3 – Appendices)

APPENDIX 9

COASTAL PROCESSES

MODEL CALIBRATION

Surveys were undertaken during June and July 2013 to provide tidal height, speed and direction data in order to calibrate the hydrodynamic models.

The surveys were undertaken by Hydrographic Surveys Ltd and involved the deployment of two acoustic Doppler current profilers (ADCP) in the vicinity of the proposed development in Dublin Harbour for a period of one month. One device was positioned in the Liffey channel of the harbour (Station 3) whilst the other was deployed to the north of the outer approach channel, outside of the harbour walls (Station 2). Further ADCP data was acquired for a site 500m west of Burford bank by Danish Hydraulic Institute in 2010 (Station 1).

These data were used to compare simulated data and recorded data. The locations of all three devices are shown in Figure 1.

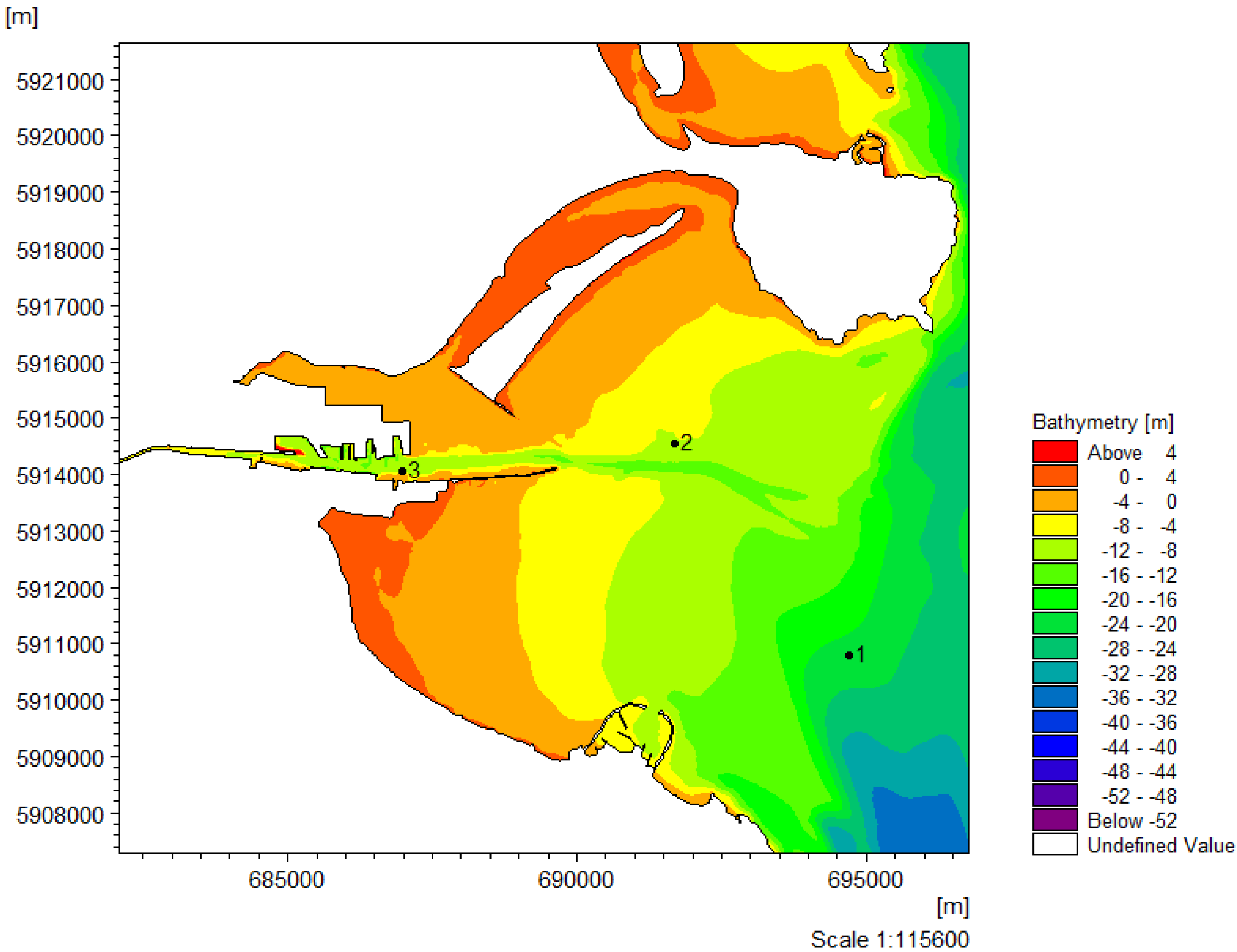


Figure 1 ADCP Current Measurement Locations

In general, the water column throughout the greater Dublin Bay area is very well mixed. Stratification does however occur within the Liffey channel, landward of the Bull Walls, as a result of the freshwater influx of the River Liffey and its tributaries. A ‘salt wedge’ is formed whereby the flow at the surface of the water column differs from that near the seabed. This effect is shown in Figure 6 - 9 for different stages of the tidal cycle.

The salinity gradient is further exacerbated by the discharge of warm water from power station outlets within the inner harbour which also contribute to localised eddying within the water column.

It should be noted that due to navigational restrictions within the harbour, the surveyors were unable to deploy the ADCP at monitoring station 3 in the middle of the harbour channel and instead deployed on the instrument on the sloped bank at the edge of the Liffey channel between two power station outlets. The tidal velocity data recorded at this site was found to be highly variable due to the eddying effect caused by the power station discharge points particularly in the surface layer as can be seen in Figure .

Admiralty tide tables were used to calibrate the model in terms of tidal range and levels at various locations across the model domain. The tidal range and levels at Dublin Port to chart datum and to OD Malin are shown in Table 1.

Table 1 Tidal regime for Dublin Bay as predicted in the Admiralty charts

	Chart Datum	OD Malin
Mean High Water Springs	+4.1m	+1.59m
Mean High Water Neaps	+3.4m	+0.89m
Mean Water Level	+2.41m	-0.1m
Mean Low Water Neaps	+1.5m	-1.01m
Mean Low Water Springs	+0.7m	-1.81m

Calibration of Tidal Height and Range

A comparison of the model output in terms of tidal height and range was made against that predicted in Admiralty charts and with the surface elevation measurements recorded by the acoustic Doppler current profiler (ADCPs).

Typical results for the Station 2 location are shown in Figure 2. The Figure illustrates that the model produced tidal heights and range which were representative of the measured data in Dublin Bay.

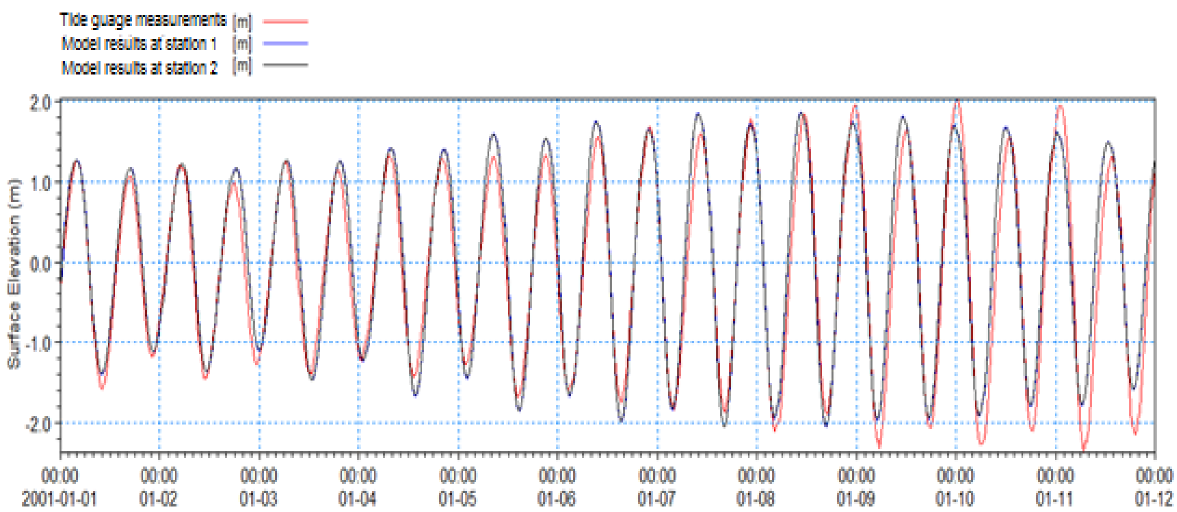


Figure 1 Comparison of model results with recorded surface elevations at ADCP station 2

Calibration of Tidal Speed and Direction

The calibration of the tidal speeds and direction in the hydrodynamic models was made using the tidal velocity measurements recorded by the 3 ADCPs.

The ADCPs deployed at monitoring stations 1-3 provided current speeds and directions at multiple depths throughout the water column. Corresponding data from the hydrodynamic models was used to compare the model results against recorded data.

Calibration of the two-dimensional model of Dublin Bay, where well mixed conditions prevail in the water column, used the measured results from ADCP Station 2 and 1 over complete Spring and Neap tidal cycles. A comparison between the measured tidal speed and direction data and the modelled data at these monitoring locations are presented in Figures 3 and 4.

Figures 3 and 4 show that the model produced tidal speeds and directions which were representative of the measured data in Dublin Bay.

Calibration of the three-dimensional model of the inner harbour, where stratified conditions prevail in the water column, used the measured results from ADCP Station 3 over complete Spring and Neap tidal cycles. A comparison between the measured tidal speed and direction data and the modelled data at this monitoring location is presented in Figure 5a – 5c.

Examination of Figure 5a – 5c shows that the current velocities and direction are generally very well represented across all three layers. The variability of the data observed in the surface layer can be attributed to the localised eddying which is caused by the power station outlets as previously discussed.

A close inspection of both the recorded current and direction indicates the presence of a 'salt wedge' within the Liffey channel. This is a classic phenomena observed at the mouth of any estuary or river that meets the sea, and has been very well represented by the 3-dimensional model of this area as can be seen in Figure - 9. These figures present the salinity of the bottom, middle and surface layers during different stages of the tidal cycle.

Overall, it can be seen from the calibration plots that the spatial distribution of the tidal flow within Dublin Harbour and the greater Dublin Bay area is generally very well represented in the model simulations. The inner harbour flow is complex with some level of circulation, stratification and bi-directional flows; however these phenomena are well represented by the model. The calibration and verification process therefore considered the model to be fit for purpose and utilised within the modelling programme.

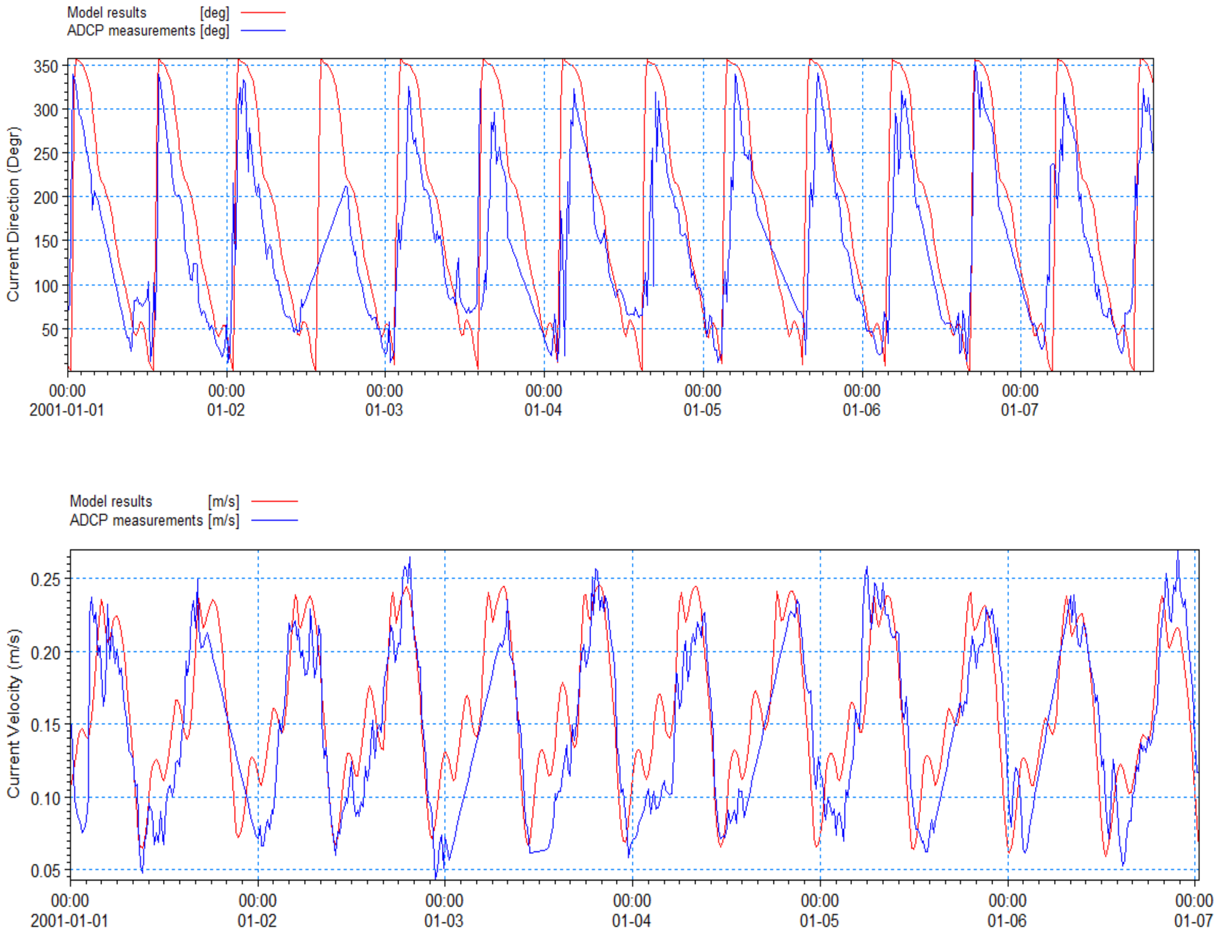
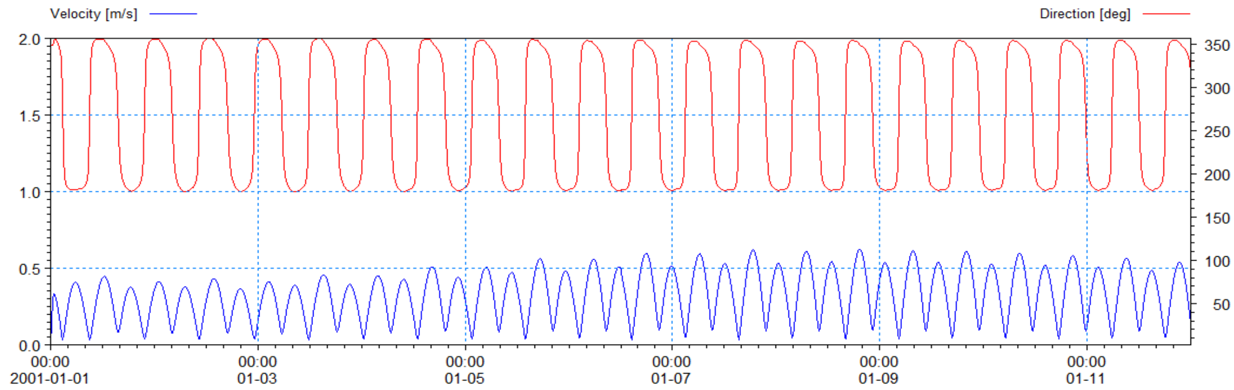
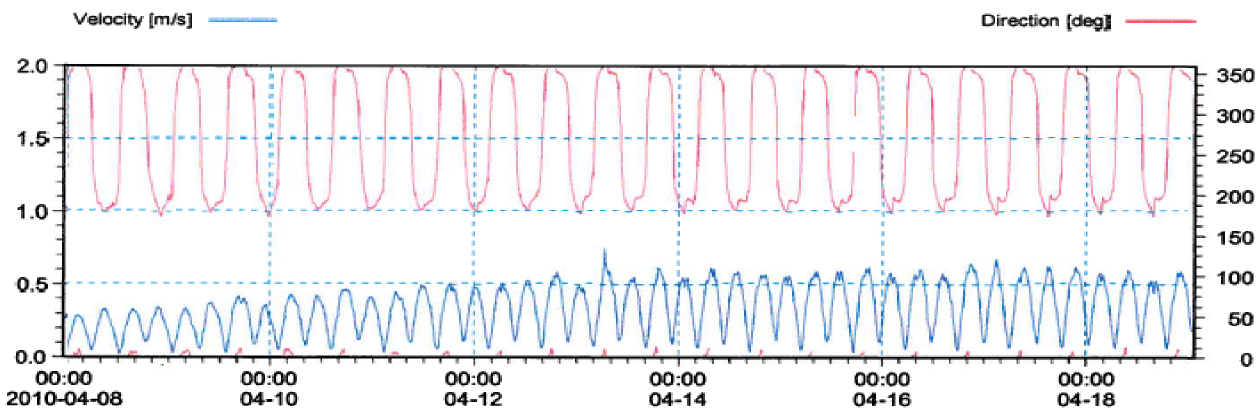


Figure 3 Comparison of modelled and observed spring current directions and speeds at Station 2



Model results of the current direction and velocity at station 1



ADCP results of the current direction and velocity at station 1 (DHI data)

Figure 2 Comparison of modelled and observed spring current directions and speeds at Station 1

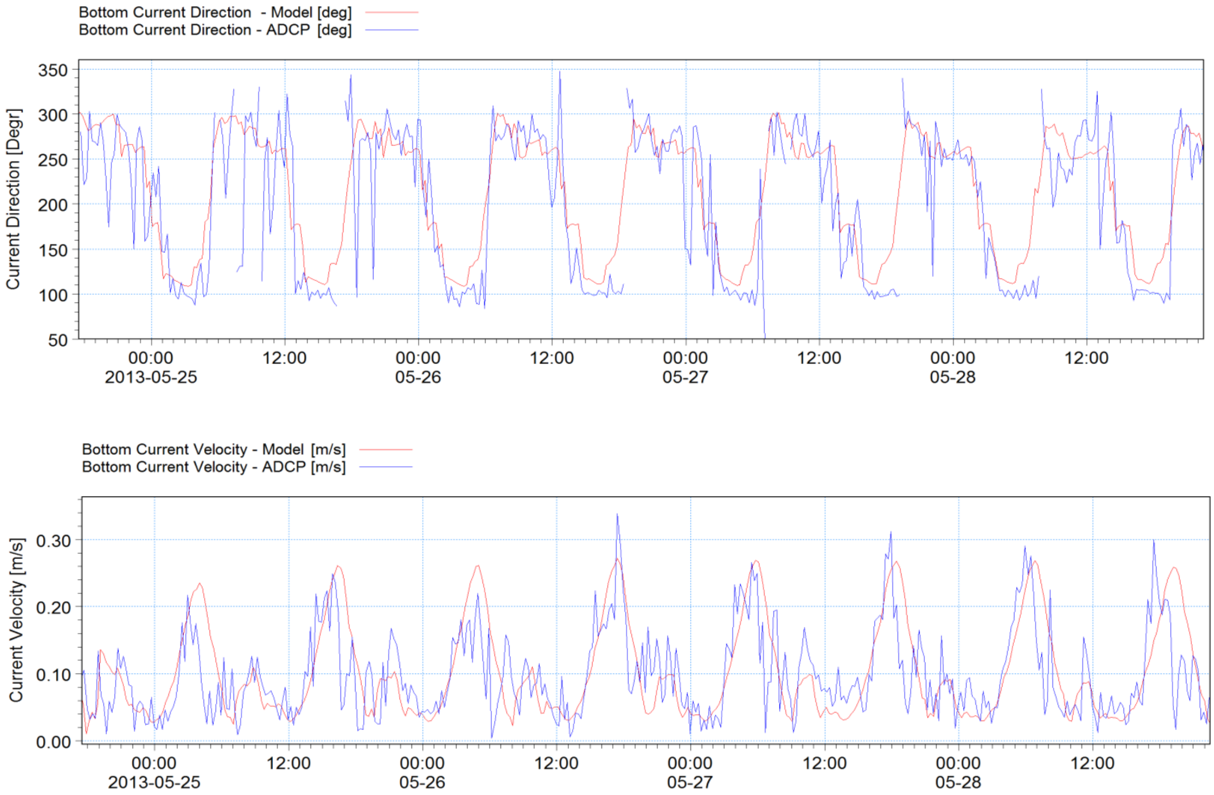


Figure 5a Comparison of modelled and observed spring current directions and speeds at Station 3 - Bottom layer

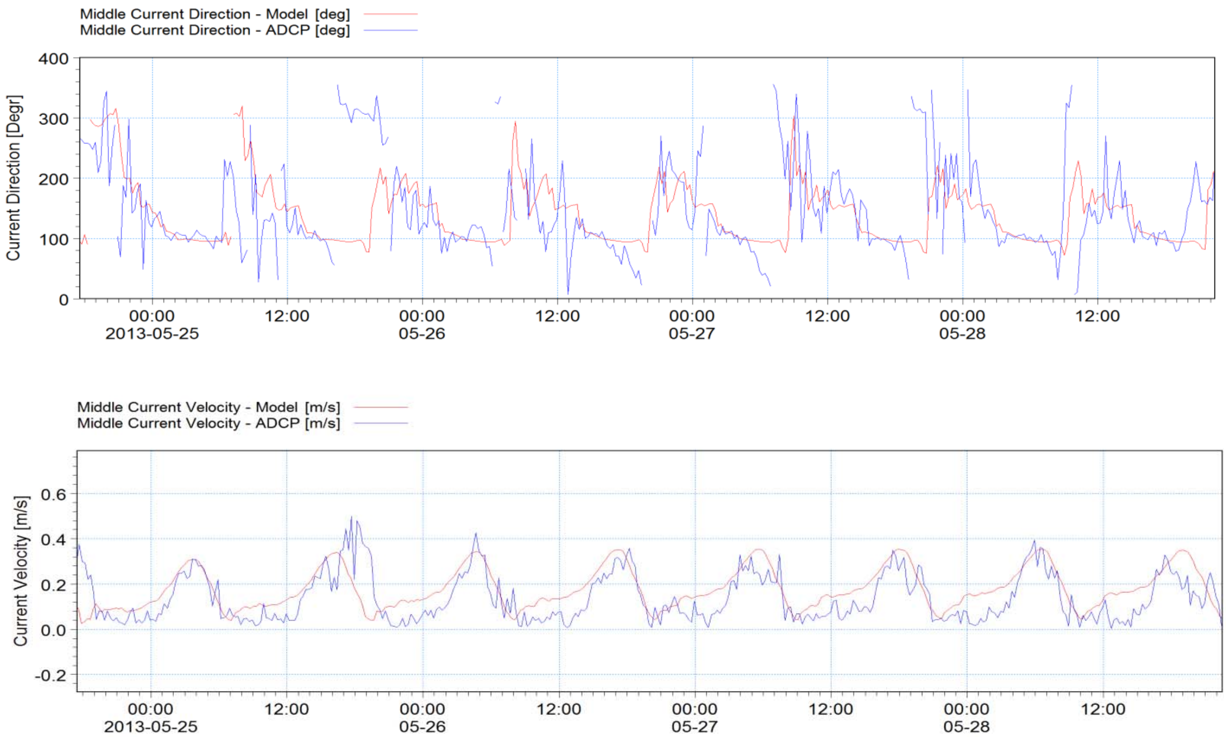


Figure 5b Comparison of modelled and observed spring current directions and speeds at station 3 - Middle layer

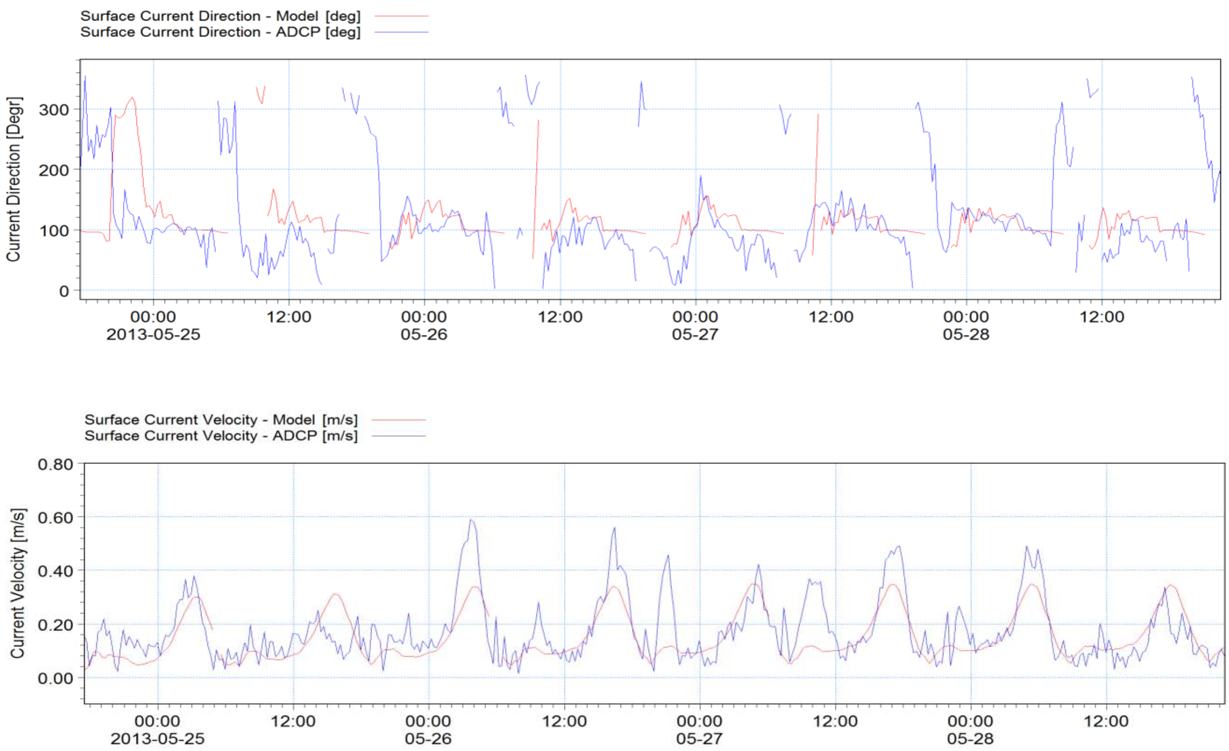


Figure 5c Comparison of modelled and observed spring current directions and speeds at station 3 - Surface layer

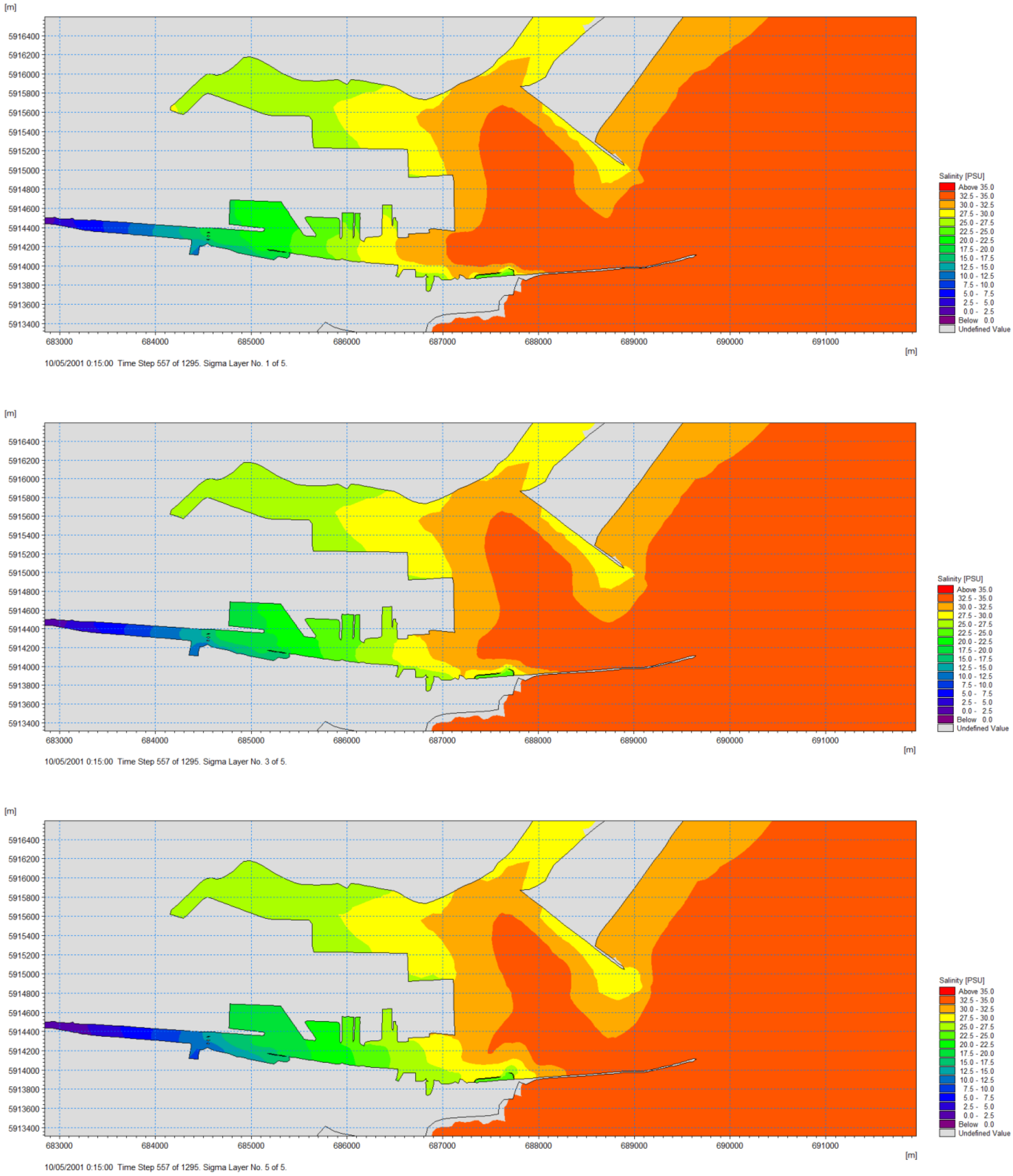


Figure 6 Salinity of the bottom, middle and surface layers respectively, during high tide

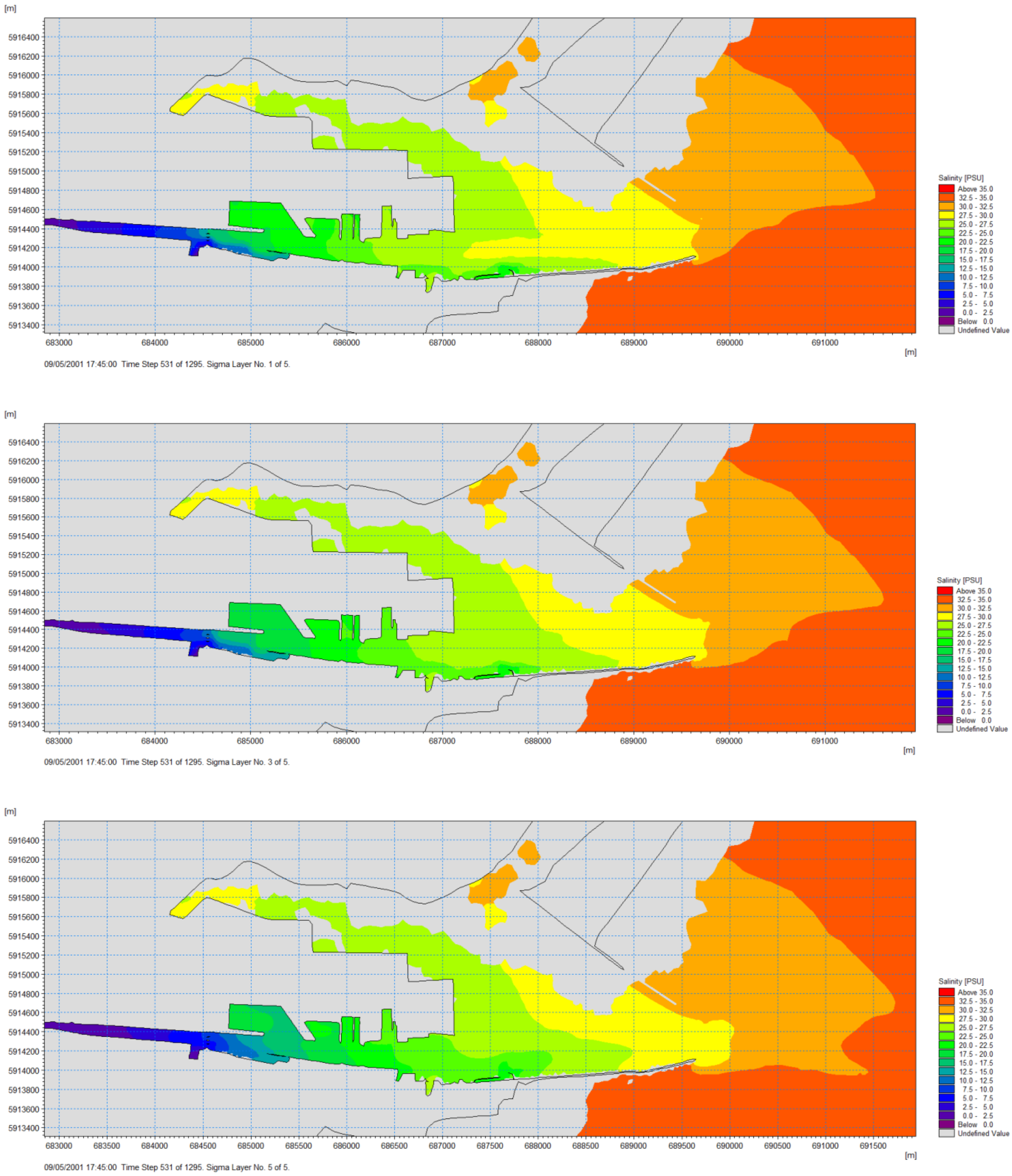


Figure 7 Salinity of the bottom, middle and surface layers respectively, during low tide

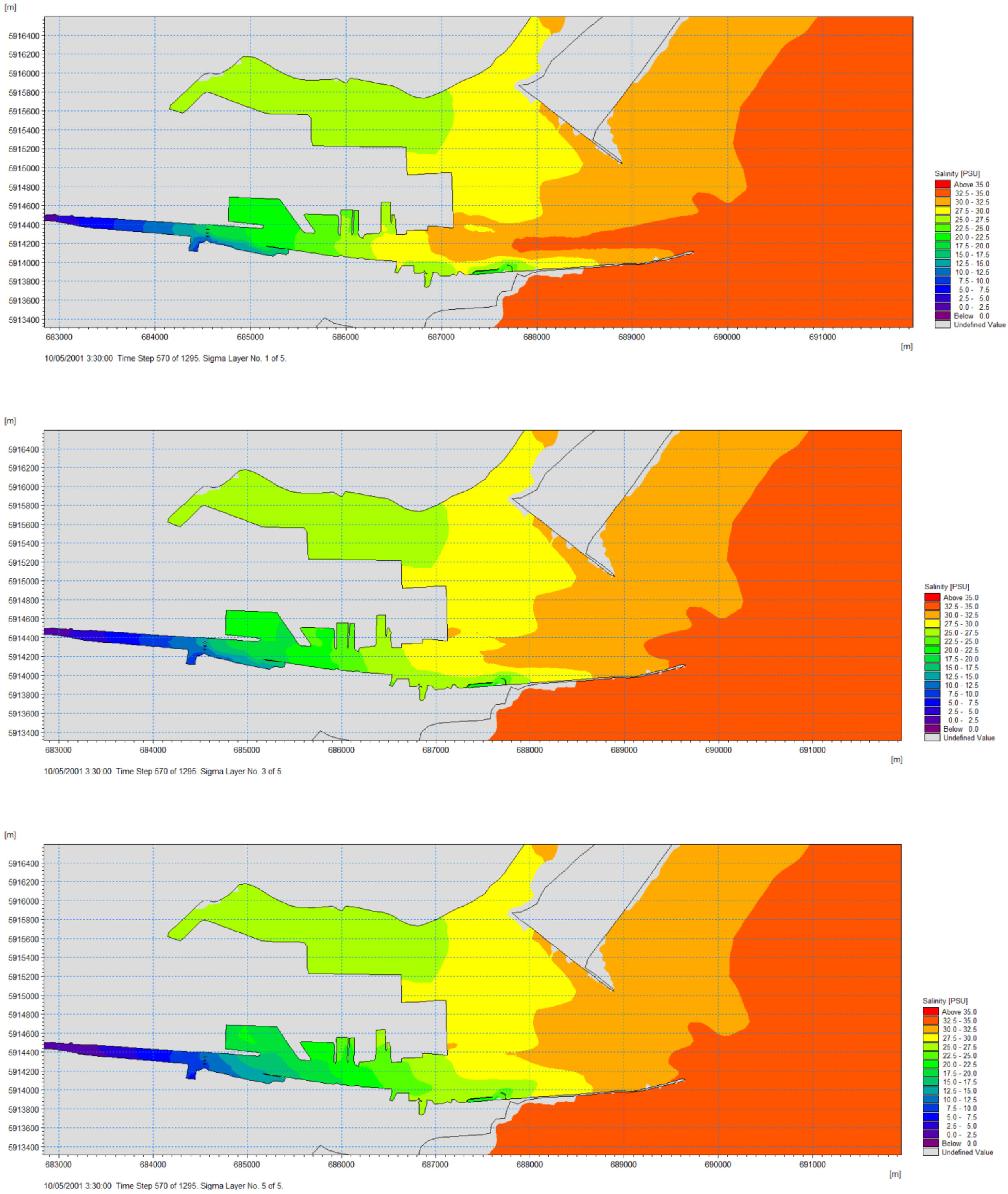


Figure 8 Salinity of the bottom, middle and surface layers respectively, during mid-ebb tide

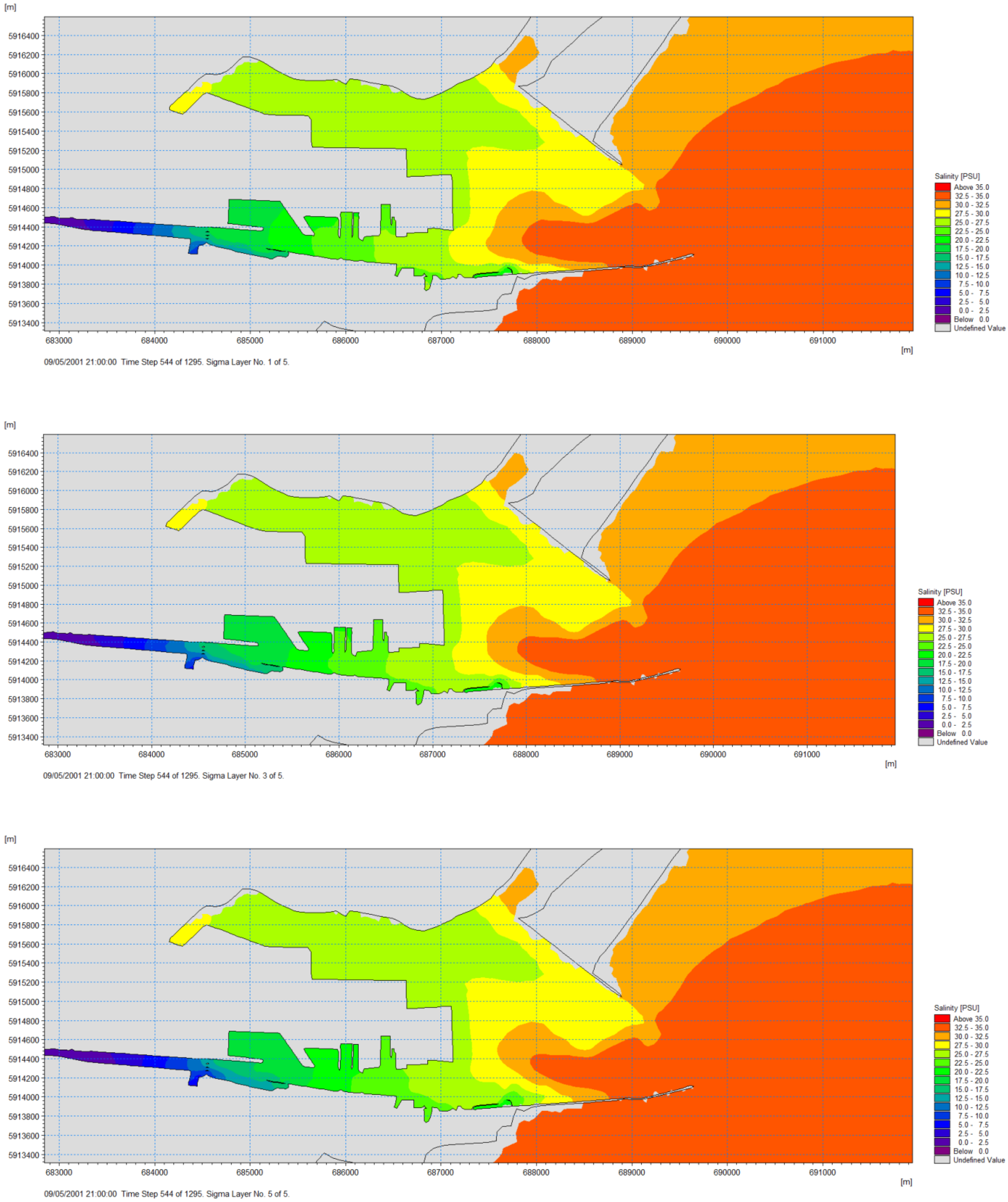


Figure 9 Salinity of the bottom, middle and surface layers respectively, during mid-flood tide

APPENDIX 10

WATER

There is no appendix for this Chapter of the EIS

APPENDIX 11

SOILS AND GEOLOGY

ASSESSMENT OF ALTERNATIVES FOR THE HANDLING AND RECOVERY OF DREDGED MATERIAL

Dredged material is handled and managed differently at ports based on the type of sediment and contamination present. Dredged material is normally deposed of at sea or deposited on land as fill for reclamation. If the dredged material is heavily contaminated it is normally disposed of at a licensed landfill or shipped aboard to be incinerated. However emerging technologies are now becoming available for handling alternatives of contaminated dredged material.

A wide range of legislation is relevant to the management of dredged material. The national legislative framework for the management of dredged material at sea and on land are different. Where dredged materials are unsuitable for sea disposal and are brought to land, it becomes subject to waste management hierarchy. The national legislative framework for the management of dredged material on land is shown in Table A11-1.

Table A11-1 National legislative framework for the management of dredged material on land

Management of dredged material on land	
Waste Management Act (1996–2011) Waste Framework Directive 2008/98/EC	Marine Strategy Framework Directive (2008/56/EC)
Environmental Protection Agency Act 1992 to 2013	Directive on Environmental Quality Standards (Directive 2008/105/EC)
Foreshore Acts (1933–2011)	The Shellfish Waters Directive (2006/113/EC) EC Quality of Shellfish Waters Regulations 2006 (S.I. No. 268/2006) as amended)
EU Industrial Emissions Directive Directive (2010/75/EU) European Union (Industrial Emissions) Regulations 2013 (S.I. 138 of 2013)	Bathing Water Directive (2006/7/EC) Bathing Water Quality Regulations 2008 (S.I. No. 79/2008) as amended
Waste Management (Collection Permit) Regulations, S.I No. 820 of 2007 and amending Regulations, the Waste Management (Collection Permit) (Amendment) Regulations, S.I No. 87 of 2008	Council Directive No. 78/659/EEC of Quality of Salmonid Water Regulations 1988 (S.I. No. 293/1988)
Council Directive 1999/31/EC on the Landfill of Waste EU Waste Acceptance Criteria for landfills 2003/33/EC	EC Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009)
EIA Directive (85/337/EEC) as amended	Birds and Natural Habitats Regulations (2011) (S.I. No. 477 of 2011)
Planning and Development Act, 2000 as amended	Water Framework Directive (WFD), (2000/60/EC) European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) as amended by the European Communities (Water Policy) (Amendment) Regulations, 2005.
European Communities Environmental Objectives (Groundwater) Regulations 2010 S.I. No. 9 of 2010	

Waste Management Hierarchy

The waste hierarchy ranks waste management options in terms of sustainability and environmental impact. The revised Waste Framework Directive (Directive 2008/98/EC) requires the application of the revised waste hierarchy as a priority order in waste prevention. Prevention (at the ‘top’ of the hierarchy) is given top priority as it aims to stabilise and reduce waste generation whilst disposal to landfill is the lowest priority. The revised Directive also sets out 'preparing for reuse' as an additional activity in the waste hierarchy. This is consistent with European and national policy objectives to reduce the amount of waste disposed to landfill.

Figure A11-1 presents this hierarchy in a dredge material management context. The hierarchy ranges from the least favourable disposal option to the most favoured prevention option or in practice minimising the dredge volume generated.

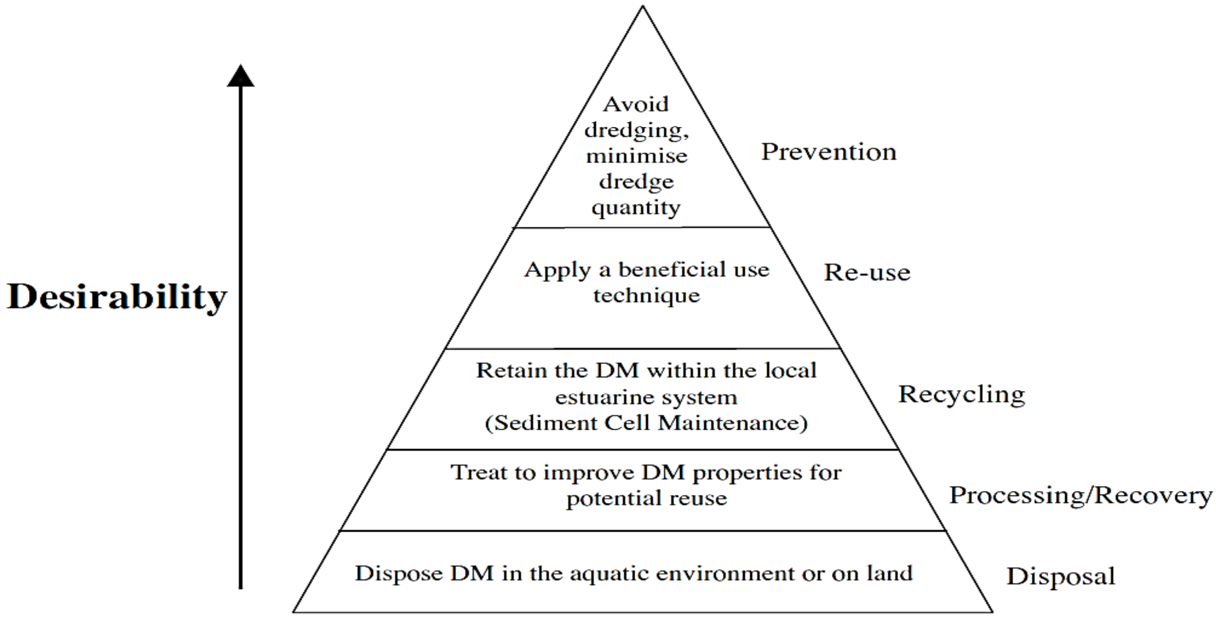


Figure A11-1 Hierarchy for prioritising dredge material management (adapted from Waste Framework Directive, 2008)[1]

If a site is to be dredged there are a number of management options available but these will be dependent on legal, regulatory, technical feasibility (e.g. disposal/treatment site availability, dredged sediment volume), sociol-economic and environmental issues as well as any project specific issues.

Figure A11-2 shows the decision making framework for the management of the contaminated dredged material on the land and sea for Alexandra Basin West. If dredged materials are unsuitable for sea disposal then the materials must be managed on land and the alternative for the location can be either of a beneficial or a disposal type. Therefore, decisions on how to

1 Harrington J.,Smith G. (2013) *Guidance on the Beneficial Use of Dredge Material in Ireland,* School of Building & Civil Engineering Cork Institute of Technology Report commissioned by Environmental Protection Agency (Strive Small Scale Study) October 2013

handle the dredged material can be based on location (landfill or civil engineering application such as infilling) in addition to the contaminants present.

As part of the development, Alexandra Basin West will be dredged to -10m CD. In order to achieve this, approximately 470,000m^3 dredged materials must be removed from the basin. Extensive sampling and environmental testing has shown that this material is contaminated (hazardous and non hazardous) and unsuitable for disposal at sea, therefore it will be brought to land and will be subject to waste management hierarchy. In addition there are areas of the port (Graving Dock #.2 and Berth 52/53) which require significant fill material to allow for future development.

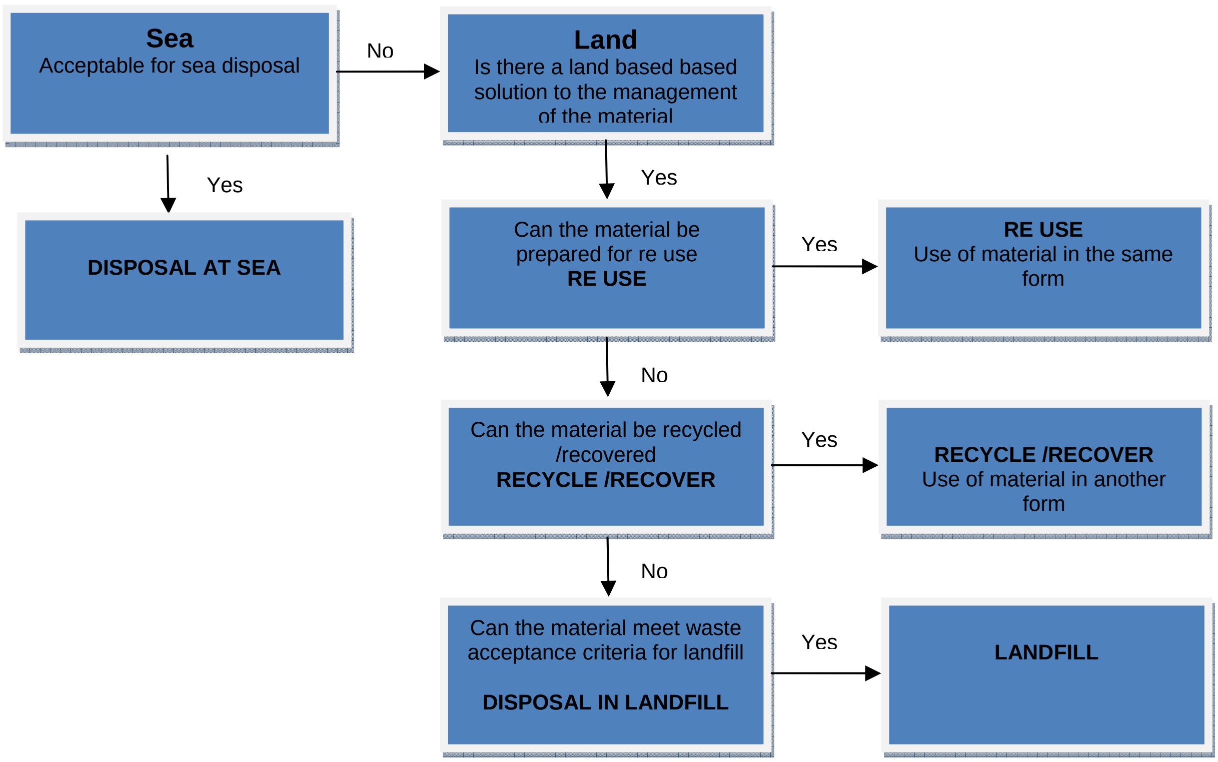


Figure A11-2 Decision making framework for the management of contaminated dredged material on the land and sea for Alexandra Basin West

Options Analysis

Only a relatively small number of dredging projects have encountered contaminated dredged material in Ireland. Contaminated dredged material has not been treated in Ireland to date, excluding basic stockpiling and de-watering.[2]

Disposal to landfill is the lowest priority in the hierarchy for dredge material management. The number of non hazardous landfills in Ireland accepting waste for disposal is continuing to

2 Harrington J.,Smith G. (2013) *Guidance on the Beneficial Use of Dredge Material in Ireland,* School of Building & Civil Engineering Cork Institute of Technology Report commissioned by Environmental Protection Agency (Strive Small Scale Study) October 2013

decrease, as is the remaining licensed landfill disposal capacity. This capacity is not distributed evenly around the Country. Ireland currently has no dedicated hazardous waste landfill disposal facility.[3] Emerging technologies can process dredged materials for various levels of the waste management hierarchy.

It is therefore proposed as part of the development that the dredged material removed from Alexandra Basin West will be treated to allow it to be recovered as a fill material for works identified within the Port in accordance with the Hierarchy for Prioritising dredge material management. As part of this scheme it is proposed to fill Graving Dock #2 and Berth 52/53.

Sediment Handling Process

The sediment handling process is a chain of activities including dredging, transport and treatment until the dredged material reaches its final location. This is show in Figure A11-3 and further described below.[4]

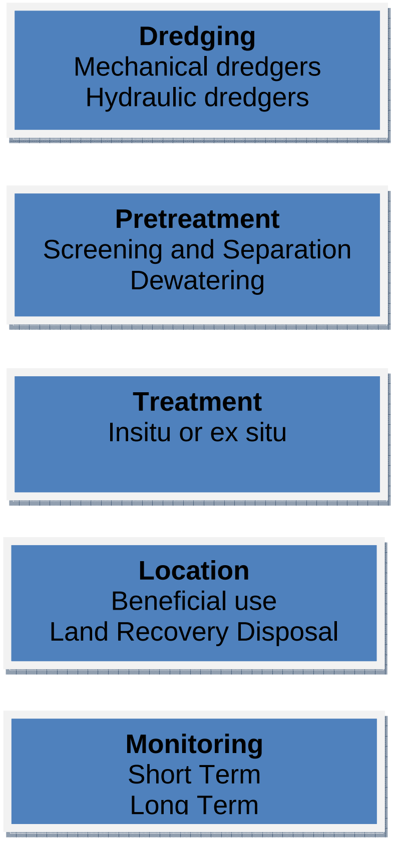


Figure A11-3 Overview of the sediment handling process

[3] McCoole F.,et al (2013). National Waste Report 2011. Environmental Protection Agency, Dublin, Ireland

[4] Blažauskas N, Larsson L., Rostmark S., (2012). *Technologies and Solutions for Handling of Contaminated Sediment* .State of the Art Review Sustainable Management of Contaminated Sediments. Baltic Sea Region Programme Project No #39

Dredging

Dredging can be divided into mechanical dredging and hydraulic dredging. Some of the techniques are also considered as being an environmental dredging method i.e. to remove contaminated sediment as efficiently as possible while minimising environmental impacts such as the re-suspension of contaminated sediments. Mechanically dredged sediments in general have solid content comparable to that of in situ sediments (about 50% by weight for most fine-grained sediments) whilst hydraulically dredged sediments are in slurry form (solids content typically in the range of 10-20%). The potential types of dredging are as follows:

- Mechanical dredging e.g. Grab dredgers, Backhoe dredgers, Bucket (ladder) dredgers;
- Hydraulic dredging e.g. Cutter suction dredger, Trailing suction hopper dredgers, Combined dredging technologies, Freeze dredging; and
- Environmental dredging.

Pretreatment

Screening and Separation

Screening removes extraneous material unsuitable for treatment (e.g. debris). Separation techniques may be applied to separate dredge into fines, sand and gravel in order to take away contaminated fine particles from uncontaminated sediments. Uncontaminated sediment may be used without the requirement for treatment. The need for dewatering will be determined by the water requirements of the treatment technology and the solids content of the sediments following removal, transport and screening and separation pre-treatment.

Dewatering Technologies

The need for dewatering is determined by the solids content of the sediments following removal and transport, and by the water requirements of the proposed treatment or disposal method. To prepare dredged sediments for most treatment or disposal methods, water must be removed and/or the solids content of the sediments must be made more uniform. The possible types of dewatering technologies are as follows:

- Thermo chemical treatment;
- Lagooning/drainage in settling ponds;
- Mechanical dewatering;
- Geotubes;
- Combined technologies;
- Thermally assisted dewatering; and
- Electro-Dewatering

In-situ Treatment Technologies

In-situ treatment allows soil and sediment to be treated without the need to be excavated and transported. This involves applying chemical, biological or physical processes to the subsurface to degrade, remove, or immobilise the contaminants in situ. Treatment methods can be categorized into three major groups as shown in Table A11-2.

Table A11-2 In Situ Treatment

Physical/chemical treatment	Biological treatment	Thermal treatment
In-situ Stabilisation/Solidification	Monitored natural attenuation	Electrical resistance heating
Chemical oxidation	Enhanced natural attenuation	Steam injection and extraction
Electrokinetic separation	Phytoremediation	Conductive heating
In-situ Capping (ISC)		Radio frequency heating
Soil flushing		In situ vitrification

Ex-situ Treatment

Ex-situ treatment requires the excavation and transportation of the sediment. Ex-situ treatment generally requires a shorter time period to undertake than in situ treatment methods. With ex-situ treatment there is more certainty about the uniformity of treatment process because the sediments can be pre treated through screening and mixing to homogenize the sediments. Treatment methods can be categorized into three major groups as shown in Table A11-3.

Table A11-3 Ex-Situ Treatment

Physical/chemical treatment	Biological treatment	Thermal treatment
Ex situ stabilisation/solidification	Bioslurry	Thermal desorption
Gas-phase chemical reduction	Biopiles	Hot gas decontamination
Liquefied gas solvent extraction	Landfarming	Incineration
Separation	Composting	Pyrolysis
Dehalogenation	Phytoremediation	
Soil washing		
Solvent extraction		

Sediment handling process for Alexandra Basin West

The strategy for the sediment handling process for Alexandra Basin West will be to treat the contaminated sediment to allow it to be recovered as a fill material for works identified within the Port. This is consistent with European and national policy objectives to reduce the amount of waste disposed to landfill. Therefore, the objective of pretreatment and treatment is to treat the contaminated dredged material to the appropriate criteria in order to allow it to be recovered as fill material on the site instead of using primary resources. This will be assessed during the treatability studies.

Review of potential ex- situ treatment methods

An initial screening of potential ex-situ treatment methods was undertaken based on the contaminants present in the sediments as discussed in Chapter 11 and the need to treat the material to the appropriate criteria in order to allow it to be recovered as fill material at the port.

Treatment options for Ireland[5] and the screening matrix for ex-situ treatment[6] provide information on the applicability of treatment options for common contaminants found within dredged sediment. It also provides information on the development status of the different treatment processes. This indicates that the stabilisation/solidification (physical-chemical treatment) process has greater potential to achieve the process/recovery option for the site in accordance with the Waste Management Hierarchy i.e. dredged material from Alexandra Basin West will be treated to allow it to be recovered as fill material for infill works identified within the Port. Stabilisation/solidification (S/S) which is a process based on the use of additives to solidify the contaminated dredged material can provide a geotechnical and environmentally stable material. This will be assessed during treatability studies to be undertaken to identify the binders required to treat the range of contaminants present in the dredged material and any further pre -treatment or treatment that may be required.

Further information on the feasibility of the stabilisation/solidification process to treat the contaminants found within dredged material has been obtained through consultation with remediation companies and a literature review. Examples of stabilisation/solidification projects implemented are provided below.

- Port of Gävle, Sweden (2012/2013) - the project involved the deepening and widening of the fairway to the port and beneficial use of the dredged contaminated sediments for the new port areas by treating the sediments by the S/S method hence reducing the use of natural resources. The binder comprised cement, granulated blast furnace slag and fly ash (150 kg/m^3) and were mixed into the dredged material[7]. 550,000 m^3 of contaminated sediments (PCB, PAH, TBT and metals) was treated.

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[5] Harrington J.,Smith G. (2013) *Guidance on the Beneficial Use of Dredge Material in Ireland,* School of Building & Civil Engineering Cork Institute of Technology Report commissioned by Environmental Protection Agency (Strive Small Scale Study) October 2013

[6] Lennart Larsson(2011) Screening Matrix for Initial Evaluation of Methods for Treatment of Sediments ,Sustainable Management of Contaminated Sediments Baltic Sea Region Programme Project No #39

[7] SMOC Newsletter 2 Nov 2010.

- Port of Kokkola, Finland (2011) (Pilot test) - 10,000 m^3 of dredged sediments contaminated with As, Cd, Cu, Pb, Hg, Ni, Zn and TBT were stabilised with a single binder of fly ash (150-200 kg/m^3). After the success of the field test in Port of Kokkola, another dredging and stabilisation project is planned to be carried out[8].

- Finland Vuosaari Harbour in Helsinki (2006) - The application of S/S technology was successfully used for the development of a new harbour area (75 ha). Dredged sediments, comprising peat, mud and clay were highly contaminated with TBT compounds. Elevated PCBs were also found. Portland cement was used as a binder (130 kg/m^3). The mass stabilized sediment was covered immediately with a filter textile. In total nearly 500,000 m^3 of the contaminated sediments were stabilized and utilised as harbour field structure[9],[10].

- Finland Aurajoki – Turku (2008-2009) - The purpose of the project partly funded by EU LIFE-Environment was to create new land area, by filling the lagoon of Pansio harbour with stabilised sediments, dredged from River Aura. 88,000 m^3 of mud, consisting of clayey sludge highly contaminated with TBT, PAH, PCB, hydrocarbons and heavy metals were treated by process stabilization equipment. Binders applied included rapid cement, blast furnace slag and coal fly ash[11].

- Norway Trondheim harbour (2002) - The project included the filling and stabilisation of harbour docks for construction purposes. Sediments were dredged using an environmental grab and stabilised with cement (120 kg/m^3) and fly ash (60 kg/m^3). Dredged masses (silty sand with 11% of clay) were highly contaminated with TBT, PAH and PCB. Mixing of sediments with the binders was carried out in a separate basin (ex situ stabilisation). The project has shown that by stabilising the sediments with binders the leaching potential for contaminants is reduced and the sediments were then be used to expand the harbour .[12]

- Norway Kadettangen, Sandvika. Elvepromenade (2006-2010) - The project related to harbour remediation and deepening of fairway at a total volume of 3,900 m^3 sediments. Dredged sediments, contaminated with As, Cr, Ni, PAH, TBT, PCB were mass stabilised and used for the development of quay and creation of new area for recreational purposes. Fly ash cement and merit (50/50 mix) 140-180 kg/m^3 were used as binders. Environmental benefits of the remediation project were assessed with a mesocosm experiment, which was performed to determine leakage of TBT, PAH, mercury and other heavy metals. Both reduced contaminant leakage from the stabilised sediment and reduced leakage from the dredged area will contribute to reduced spreading of

8 Autiola M., et al (2012) SMOCS (Sustainable Management of Contaminated Sediments in Baltic Sea Region) Field test in Port of Kokkola, Finland Lappeenranta University of Technology Faculty of Technology. LUT Chemistry

9 Suzdalev S.(2012) *Contaminants-Binders-Sediments,* Sustainable Management of Contaminated Sediments Baltic Sea Region Programme Project No #39

10 Leppänen M. et al Mass stabilisation TBT -contaminated sediment as a part of the Harbour in Helsinki. Ramboll Finland Ltd, Espoo &Helsinki, Finland.

11 Suzdalev S.(2012) *Contaminants-Binders-Sediments,* Sustainable Management of Contaminated Sediments Baltic Sea Region Programme Project No #39

12 Suzdalev S.(2012) *Contaminants-Binders-Sediments,* Sustainable Management of Contaminated Sediments Baltic Sea Region No #39

contaminants to biota and water. Dredging has lowered contaminant concentration in surface sediments to background levels. The tests show low to not measurable leakage.[13]

- Sörnäinen, Helsinki (1998) - Contaminated dredged mud waste was reused in the construction of a new shoreline. The sediment layers were contaminated by heavy metals, PCBs and oils. Rapid cement (110 kg/m^3) was used as a binder based on the stabilisation test results[14].

- Fal Estuary, Mylor, UK - Dredged marine sediment contaminated by TBT was subject to ex situ S/S treatment. The treated material was then used as fill material within the former quay area to construct a dry dock and parking area. Validation testing was in accordance the requirements of the Environment Agency[15] .

- Port of New York and New Jersey, USA - Dredged marine sediments which are not suitable for disposal at sea are treated using stabilisation technology with a specially prepared, cement based additive. This transforms the chemical and physical properties creating a new engineered structural fill material. The engineered structural fill is being used as reclamation material in Port Newark.[16]

- Newlyn Harbour, Cornwall (2006) - In order to build a series of floating pontoon moorings, dredging of the harbour bed was required. Silts were contaminated with TBT and heavy metals. A treatability study to demonstrate that S/S would substantially reduce the leachability potential for the contaminants was undertaken. Trials and tests on treated and untreated silts and leachates led to the proposal of a specific mix of pozzolanic binders which was designed to meet Environmental Quality Standards for sea water. A total of 7,300m^3 of contaminated soils was stabilised and reused in a new car park area where it was allowed to cure and later topped off with uncontaminated materials arising from the project earthworks. After treatment, testing showed that leachability was reduced by 90%, and that the majority of leachable contaminants had been reduced by over 99% of their pre - treatment levels.

A comparison of contaminated sediment concentrations recorded at Alexandria Basin West with completed projects using S/S technology is shown in Table A11-4 Contamination levels recorded at Alexandra Basin West are generally comparable with the majority of heavy metals found at the other sites.

The environmental standards applied (i.e. criteria to achieve for the stabilised product) by the regulatory authorities for these projects vary. However the standard environmental testing undertaken on the S/S treated material is batch leaching test on crushed treated material (as this is considered a worst case scenario since the reactive surface is higher than in a reality where the stabilised sediment is as a monolith and diffusion test on the reactive surface of the S/S treated material.

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[13] Suzdalev S.(2012) *Contaminants-Binders-Sediments,* Sustainable Management of Contaminated Sediments Baltic Sea Region Programme Project No #39

[14] Forsman J. et al (2008) Case stories, Harbours – Mass stabilisation of contaminated dredging mud in Sörnäinen, Helsinki. International Mass Stabilisation Conference 2008, October 8th -10th 2008, Lahti, Finland.

[15] Ash Remediation Management (2013). Case Study – Falmouth Harbour, Cornwall

[16] Boskalis Dolman bv (2013) Project sheet Stabilization. From dredged sediment to engineered structural fill, Port of New York and New Jersey, USA

Table A11-4 Comparison of contaminated sediment concentrations recorded at Alexandra Basin West with completed projects using S/S technology

Parameter	Alexandra Basin West (Average Value) mg/kg	Gavle, Sweden		Kokkola, Finland		Newlyn Harbour, Cornwall, UK		Sörnäinen, Helsinki Finland	
		Field Test on Dredging [(2)] mg/kg TS	Leaching Test on stabilised material [(3)] LS/10 (mg/kg)	Field Test on Dredging [(4)]	Leaching Test on stabilised material LS/10 (mg/kg) [(5)]	Total concentration mg/kg [(6)]	US95% leachate results [(7)]	Total concentration mg/kg [(8)]	Leaching Test on stabilised material LS/10 (mg/kg) [(9)]
Mercury : Dry Wt	**0.20**	3.04	n/a	2.40	n/a	0.60	0.30	n/a	
Arsenic, HF Digest : Dry Wt	**15.74**	62.00	0.036-0.11	59.00	0.093-0.16	86.00	14.72	1.4 to 8.9	0.015 to 0.02
Cadmium, HF Digest : Dry Wt	**4.27**	4.07	<0.0006-0.0008	28.00	<0.020-<0.020	<0.1	0.51	<1 - 31	0.000 to 0.0003
Chromium, HF Digest : Dry Wt	**121.56**	138.00	<0.005-0.005	28.00	<0.020-0.083	34.00	2.18	32-120	0.037-0.074
Copper, HF Digest : Dry Wt	**58.24**	166.00	0.041-0.082	230.00	<0.020-1.3	302.00	13.81	48-220	0.863-1.389
Lead, HF Digest : Dry Wt	**138.85**	517.00	<0.002-0.0041	250.00	<0.02-0.023	34.00	1.39	13-280	0.001-0.053
Nickel, HF Digest : Dry Wt	**89.98**	43.50	0.82-1.60	43.00	0.054-0.13	62.00	17.46	23-70	0.422-0.562
Zinc : HF Digest : Dry Wt	**697.66**	794.00	<0.02-0.03	6200.00	<0.020-0.52	230.00	17.58	140-1200	0.018-0.072

(1) samples (37) taken August 2013 from Alexandra Basin

(2) maximum concentration samples taken 10/11 2010 used for construction
(3) Batch leaching test L/S 10 stabilised sediment (crushed material)365 days stabilised in pilot field construction - Field test was used as a base to the design and execution of the S/S method for the expansion of the port area.

Standard - max value for waste in construction. Sweden

(4) maximum concentration samples taken 2011 from dredge area
(5) Batch leaching test L/S 10 stabilised sediment

(6) baseline total concentration for the project
(7)targets adopted were leachability ug/l compared with EQS Seawater standard as agreed with the EA (ug/l)

(8)baseline total concentration for the project

(9)batch leaching test L/S 10 stabilised sediment average

The proposed treatment option for the dredged material from Alexandra Basin West is the ex-situ stabilisation/solidification method. Figure A11-4 provides an indicative sequence of the main stages of the proposed sediment handling process based on the use of additives to solidify the contaminated dredged material.

Dredging
Mechanical dredgers

Transport
By Sea and Land

Pretreatment
Screening and Separation
Dewatering

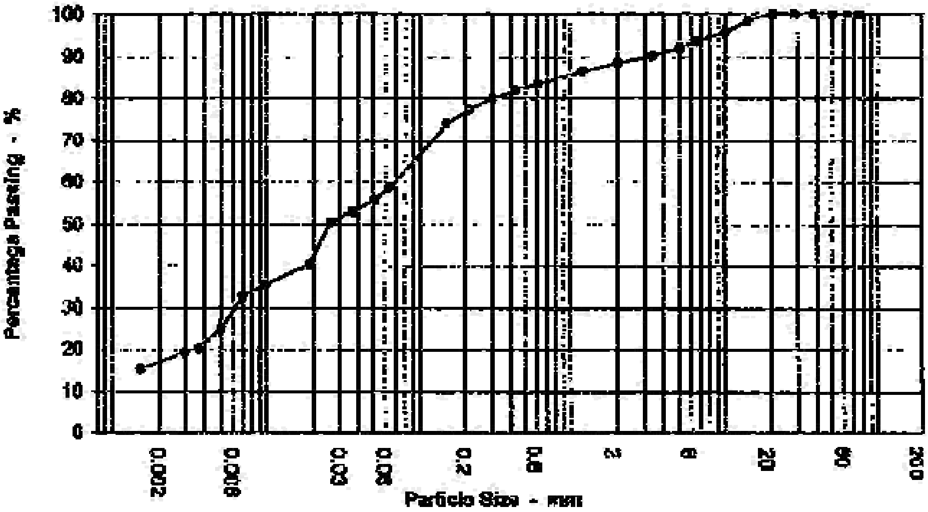
Treatment (ex situ)
Stabilization/
Solidification

Location
Recovery on land as infill at Graving Dock Nr 2, Berths 52/53 and the adjoining area to the East

Monitoring
Short Term
Long Term

Figure A11-4 Proposed sediment handling process for contaminated sediments from Alexandra Basin West

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	001
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	B



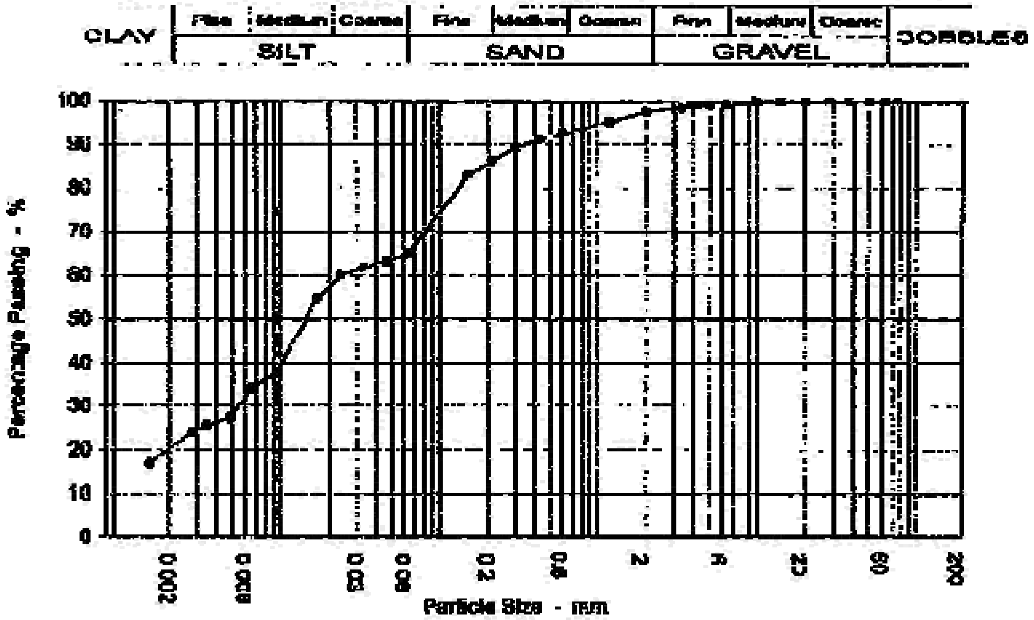
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	59
90	100	0.051	56
75	100	0.036	53
63	100	0.026	51
50	100	0.019	40
37.5	100	0.010	35
28	100	0.007	33
20	100	0.005	25
14	98	0.004	20
10	96	0.003	19
6.3	93	0.002	15
5	92		
3.35	90		
2	88		
1.18	86		
0.6	83		
0.425	82		
0.3	80		
0.212	77		
0.15	74		
0.063	59		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	11.6
Sand	30.6
Silt	41.3
Clay	16.6

Grading Analysis	
D100	20.000
D60	0.071
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL	**PARTICLE SIZE DISTRIBUTION** BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D02
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



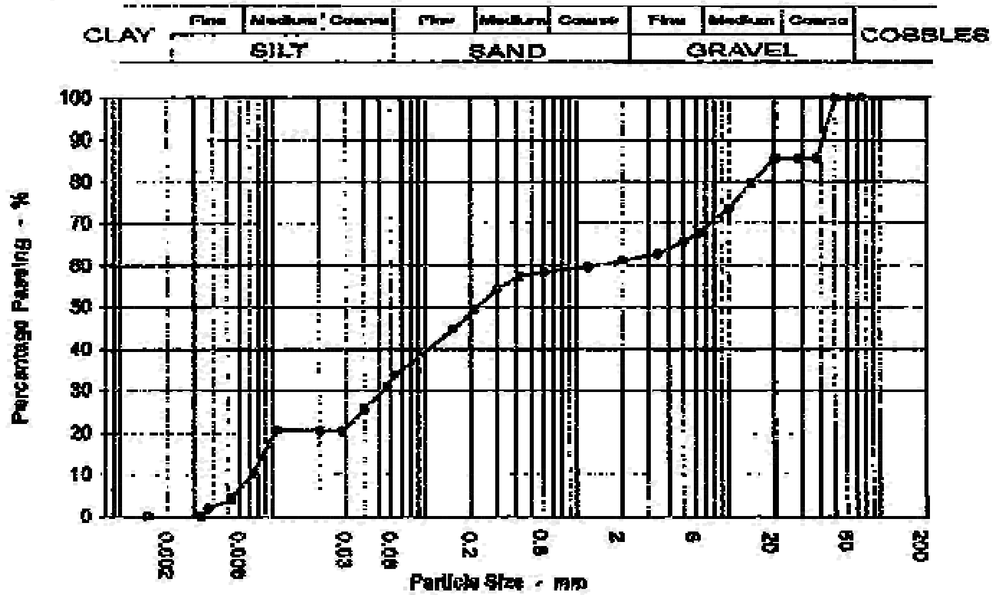
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	65
90	100	0.046	63
75	100	0.033	61
63	100	0.023	60
50	100	0.017	55
37.5	100	0.009	36
28	100	0.007	34
20	100	0.005	27
14	100	0.003	26
10	100	0.003	24
6.3	99	0.002	17
5	99		
3.35	99		
2	97		
1.18	95		
0.6	93		
0.425	91		
0.3	89		
0.212	86		
0.15	83		
0.063	65		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	2.5
Sand	33.0
Silt	44.8
Clay	19.7

Grading Analysis	
D100	10.000
D60	0.025
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL	**PARTICLE SIZE DISTRIBUTION** BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D03
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



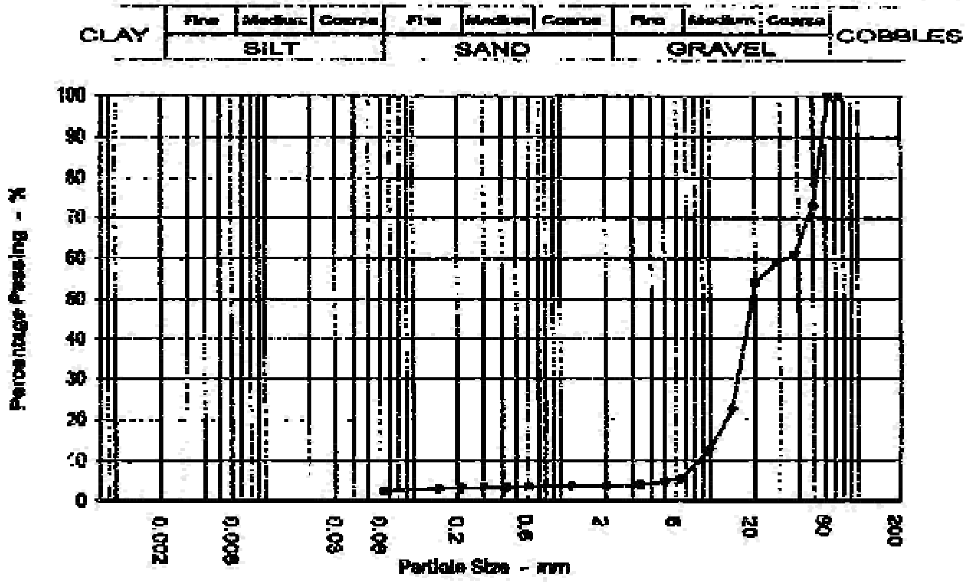
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	34
90	100	0.057	31
75	100	0.040	28
63	100	0.028	21
50	100	0.020	21
37.5	86	0.010	21
28	86	0.007	10
20	86	0.006	4
14	80	0.004	2
10	74	0.003	0
6.3	68	0.002	0
5	66		
3.35	63		
2	61		
1.18	60		
0.6	58		
0.425	57		
0.3	54		
0.212	49		
0.15	45		
0.063	34		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	39.0
Sand	28.6
Silt	32.3
Clay	0.0

Grading Analysis	
D100	50.000
D60	1.425
D10	0.007
Uniformity Coefficient	195

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D04
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	73		
37.5	61		
28	58		
20	54		
14	22		
10	13		
6.3	5		
5	5		
3.35	4		
2	4		
1.18	4		
0.6	3		
0.425	3		
0.3	3		
0.212	3		
0.15	3		
0.063	2		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

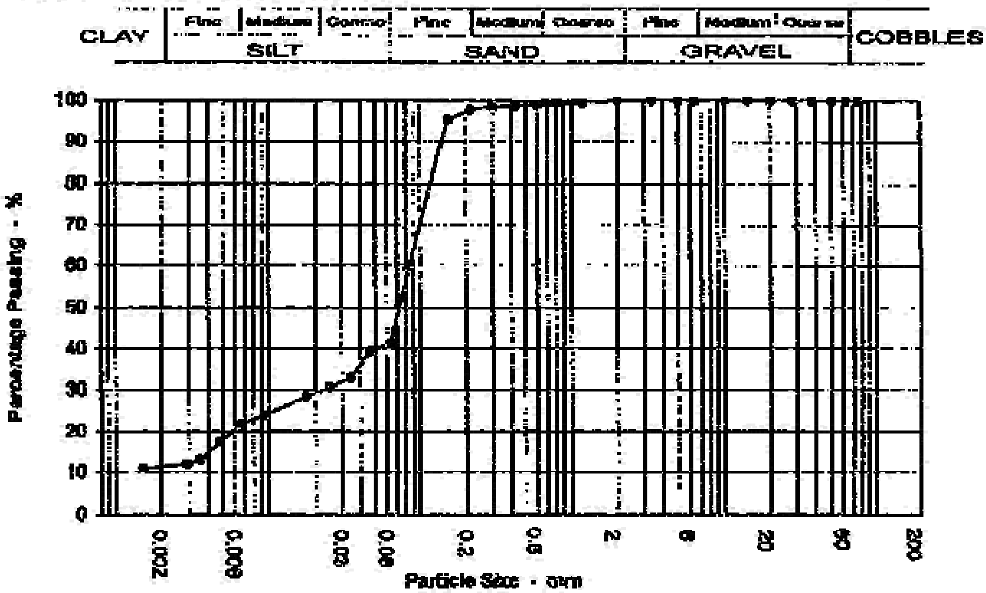
Sample Proportions	
Cobbles	6.2
Gravel	90.2
Sand	1.3
Silt & Clay	2.3

Grading Analysis	
D100	63.000
D60	33.298
D10	8.591
Uniformity Coefficient	4

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D05
		Sample No	0
Soil Description		Depth	0.00 m
		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	41
90	100	0.048	39
75	100	0.034	33
63	100	0.024	31
50	100	0.018	28
37.5	100	0.009	24
28	100	0.007	22
20	100	0.005	17
14	100	0.004	13
10	100	0.003	12
6.3	100	0.002	11
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	98		
0.15	96		
0.063	41		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

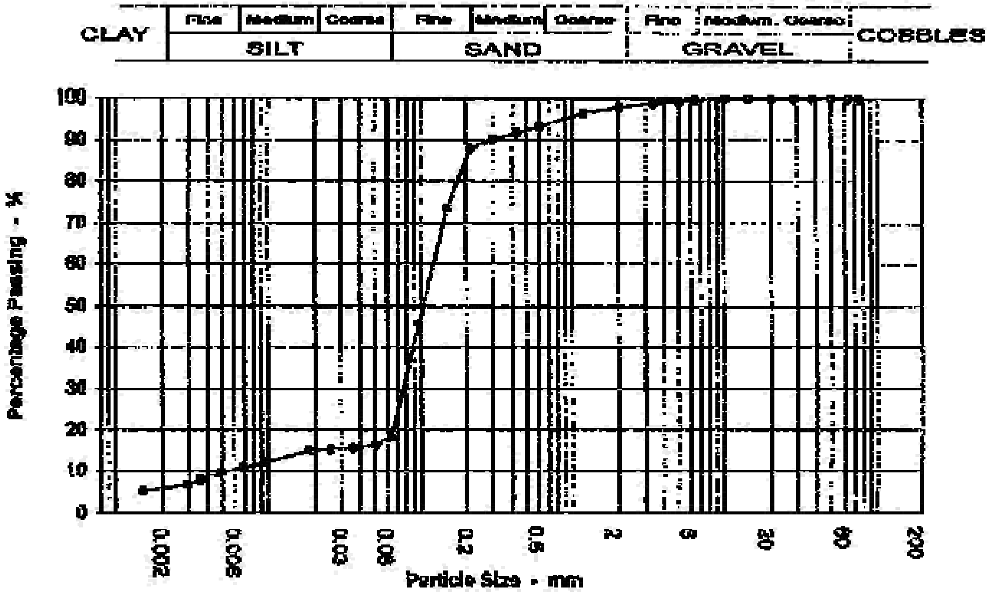
Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	59.0
Silt	29.7
Clay	11.3

Grading Analysis	
D100	3.350
D60	0.093
D10	
Uniformity Coefficient	N/A

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D08
		Sample No	0
Soil Description		Depth	0.00 m
		Sample type	D



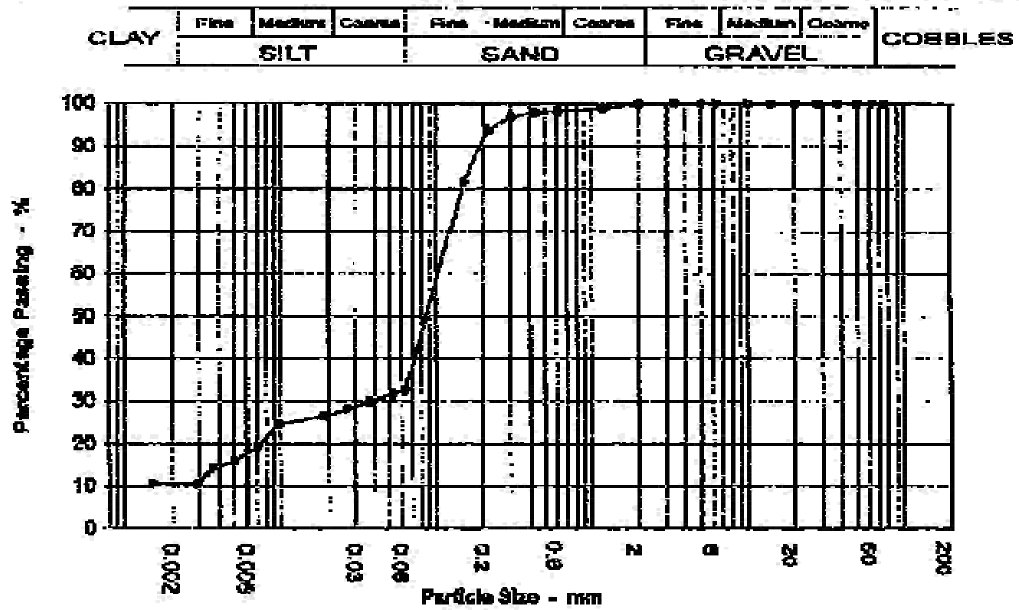
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	18
90	100	0.050	16
75	100	0.036	16
63	100	0.025	15
50	100	0.018	15
37.5	100	0.010	12
28	100	0.007	11
20	100	0.005	9
14	100	0.004	8
10	100	0.003	7
6.3	100	0.002	6
5	99		
3.35	98		
2	98		
1.18	97		
0.6	93		
0.425	92		
0.3	90		
0.212	88		
0.15	74		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	2.1
Sand	80.3
Silt	11.6
Clay	6.0

Grading Analysis	
D100	10.000
D60	0.129
D10	0.006
Uniformity Coefficient	23

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D07
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



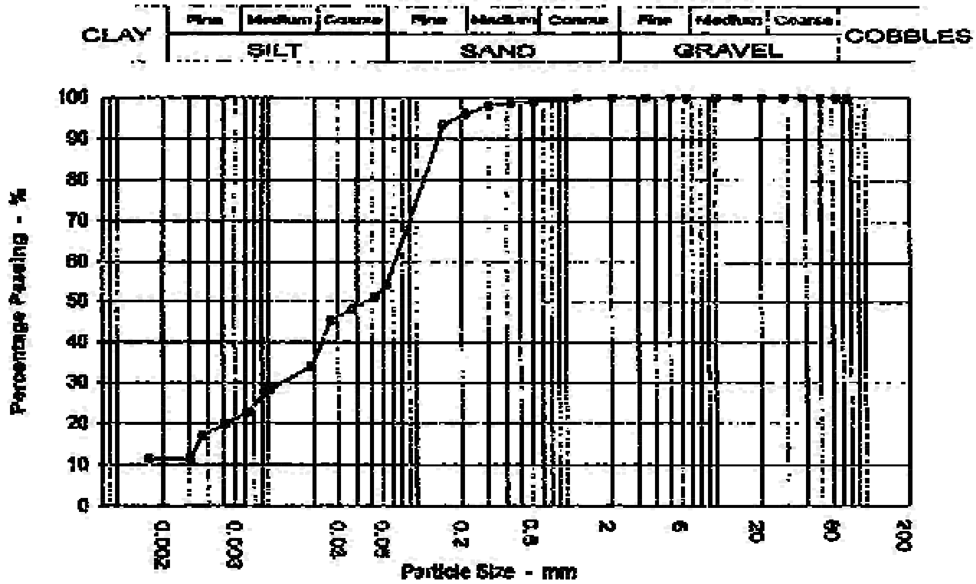
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	33
90	100	0.052	32
75	100	0.037	30
63	100	0.028	28
50	100	0.019	26
37.5	100	0.010	25
28	100	0.007	19
20	100	0.005	16
14	100	0.004	14
10	100	0.003	11
6.3	100	0.002	11
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	98		
0.3	97		
0.212	94		
0.15	62		
0.063	33		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	0.2
Sand	67.5
Silt	21.7
Clay	10.5

Grading Analysis	
D100	3.350
D60	0.112
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D02
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	54
90	100	0.052	51
75	100	0.037	48
63	100	0.026	45
50	100	0.019	34
37.5	100	0.010	29
28	100	0.007	23
20	100	0.005	20
14	100	0.004	17
10	100	0.003	11
6.3	100	0.002	11
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	98		
0.212	96		
0.15	93		
0.063	54		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

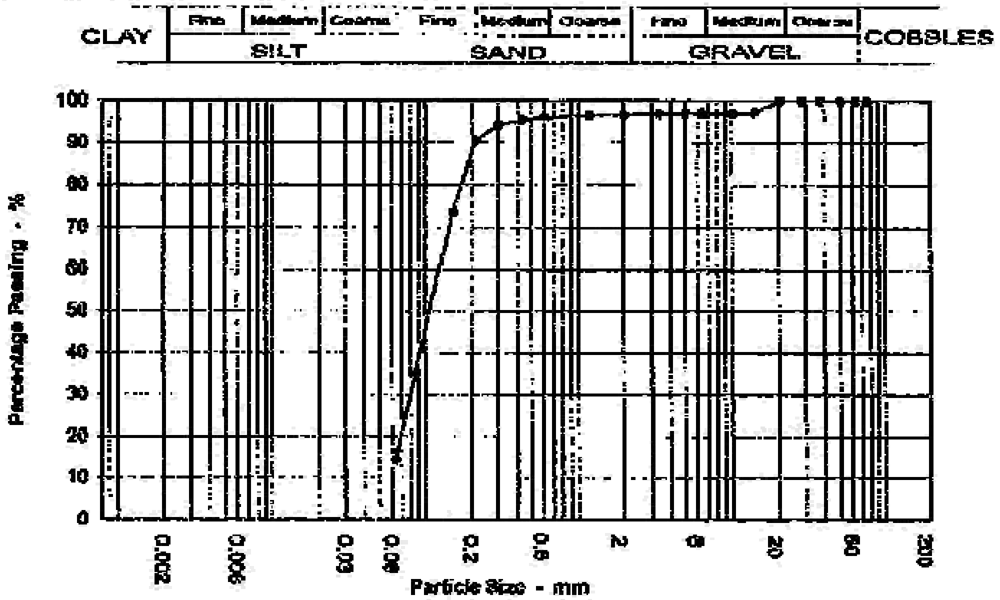
Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	46.9
Silt	41.8
Clay	11.3

Grading Analysis	
D100	2.000
D60	0.076
D10	
Uniformity Coefficient	N/A

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D09
		Sample No	0
Soil Description		Depth	0.00 m
		Sample type	D



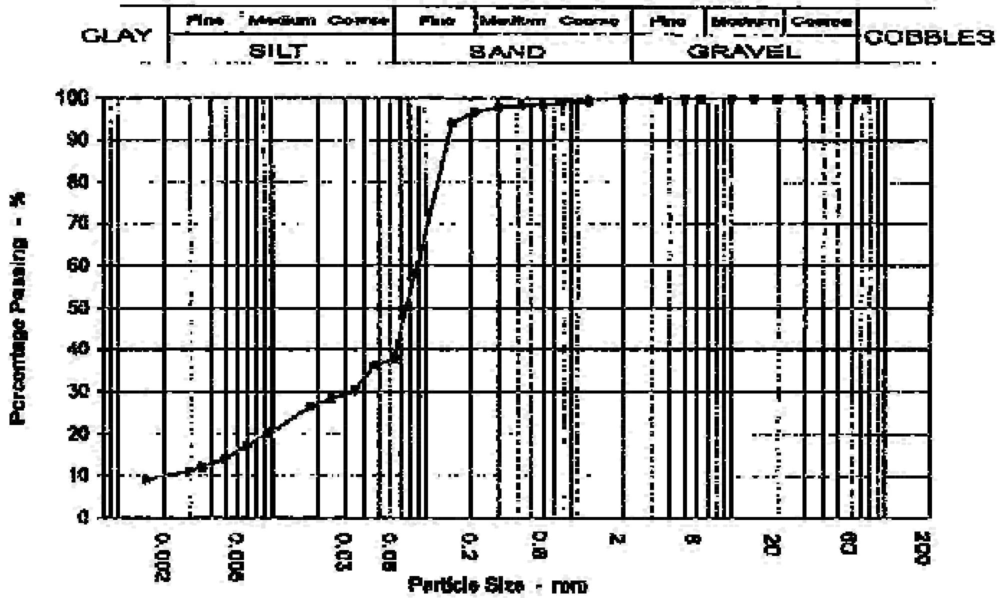
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	97		
6.3	97		
5	97		
3.35	97		
2	97		
1.18	97		
0.6	96		
0.425	95		
0.3	94		
0.212	91		
0.15	74		
0.063	14		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	3.3
Sand	82.5
Silt & Clay	14.2

Grading Analysis	
D100	20.000
D60	0.130
D10	
Uniformity Coefficient	N/A

PARTICLE SIZE DISTRIBUTION		Job Ref	P13054
BS 1377 : Part 2 : 1990 : Clause 9		Borehole / Pit No	D10
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



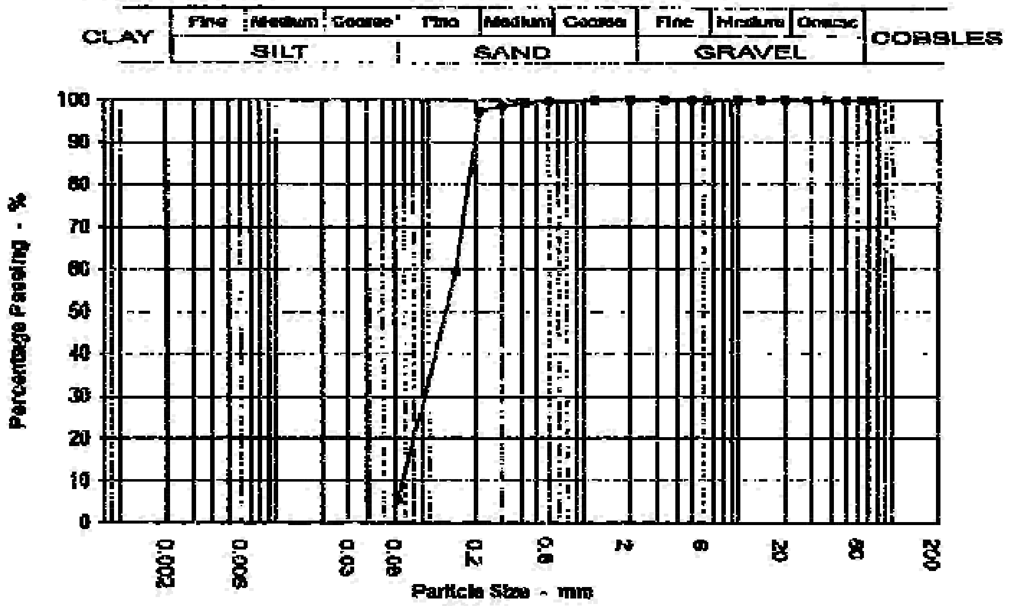
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	38
90	100	0.046	38
75	100	0.034	30
63	100	0.024	28
50	100	0.018	26
37.5	100	0.009	20
28	100	0.007	17
20	100	0.005	14
14	100	0.004	12
10	100	0.003	11
6.3	100	0.002	9
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	98		
0.3	98		
0.212	97		
0.15	94		
0.063	38		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	62.2
Silt	28.0
Clay	9.8

Grading Analysis	
D100	3.350
D60	0.097
D10	0.002
Uniformity Coefficient	46

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D11
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	99		
0.212	97		
0.15	59		
0.063	6		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	94.5
Silt & Clay	5.5

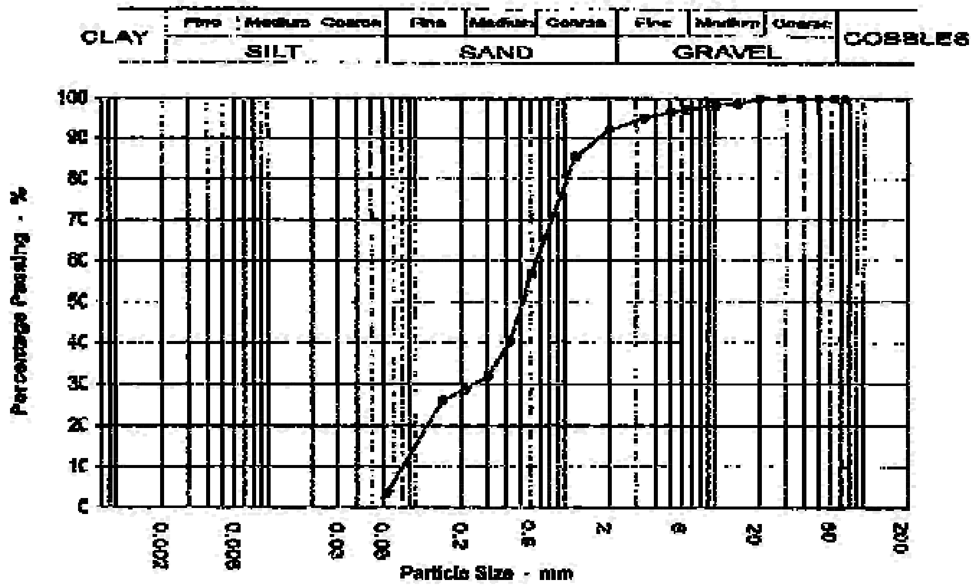
Grading Analysis	
D100	3.350
D60	0.161
D10	0.070
Uniformity Coefficient	2

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	O'2
Soil Description		Sample No	0
		Depth	0.00 m
		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	97		
5	97		
3.35	95		
2	92		
1.18	85		
0.6	57		
0.425	40		
0.3	32		
0.212	29		
0.15	25		
0.063	4		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	7.7
Sand	88.7
Silt & Clay	3.6

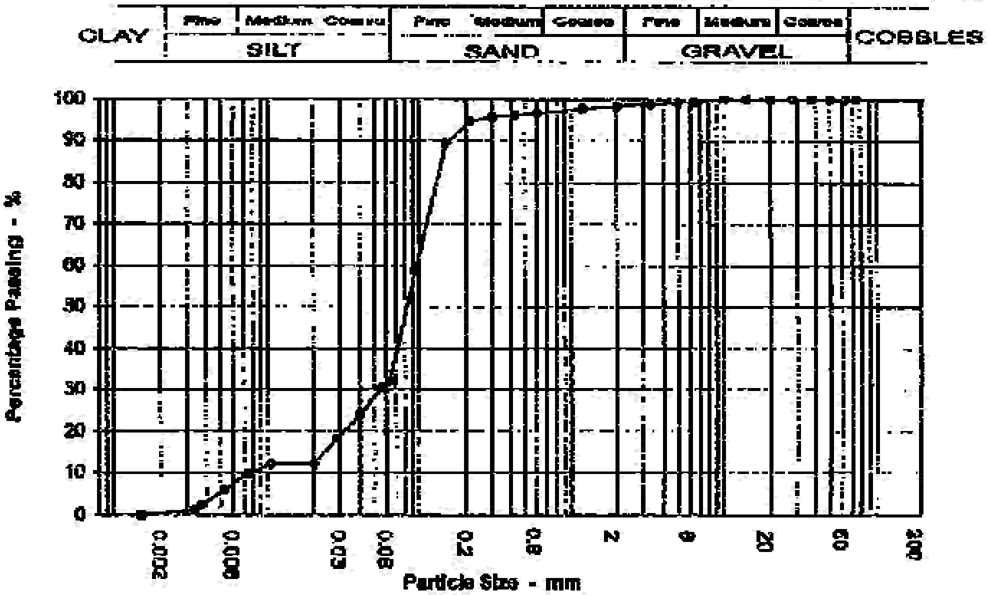
Grading Analysis	
D100	20.000
D60	0.669
D10	0.088
Uniformity Coefficient	8

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D13
		Sample No	0
Soil Description		Depth	0.00 m
		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	32
90	100	0.056	30
75	100	0.040	24
63	100	0.028	18
50	100	0.020	12
37.5	100	0.010	12
28	100	0.007	10
20	100	0.005	6
14	100	0.004	2
10	100	0.003	1
6.3	99	0.002	0
5	99		
3.35	99		
2	98		
1.18	98		
0.6	97		
0.425	98		
0.3	98		
0.212	95		
0.15	89		
0.063	32		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

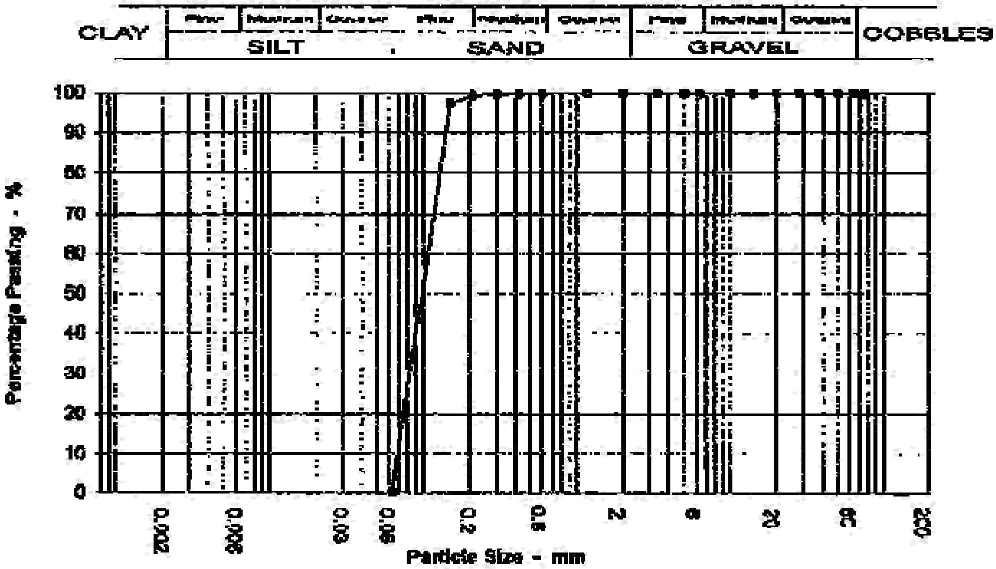
Sample Proportions	
Cobbles	0.0
Gravel	1.7
Sand	67.0
Silt	31.0
Clay	0.3

Grading Analysis	
D100	10.000
D60	0.108
D10	0.008
Uniformity Coefficient	14

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D14
		Sample No	0
Soil Description		Depth	0.00 m
		Sample type	D



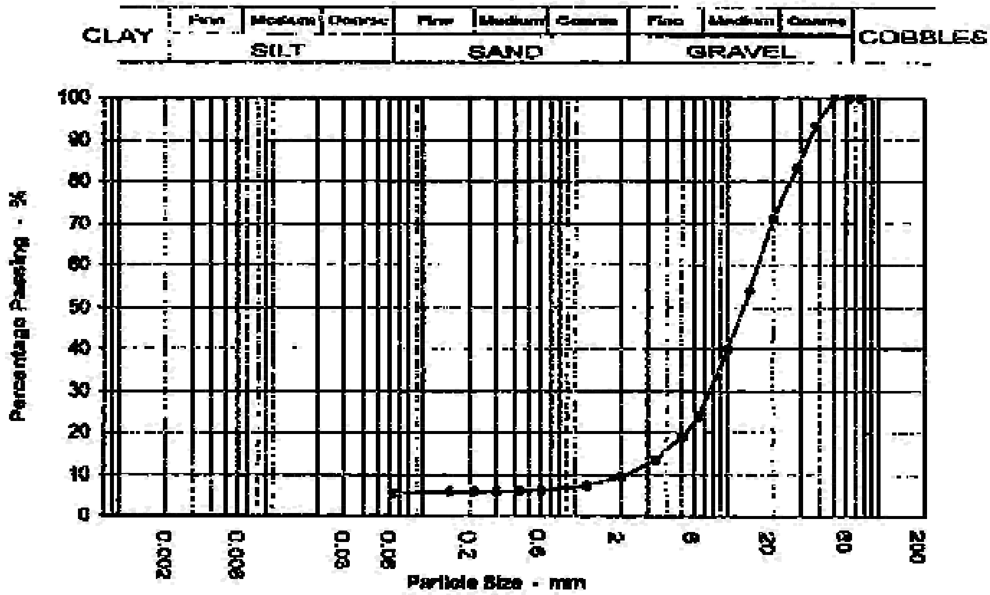
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	97		
0.063	0		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	99.6
Silt & Clay	0.4

Grading Analysis	
D100	3.350
D60	0.116
D10	0.072
Uniformity Coefficient	2

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D15
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



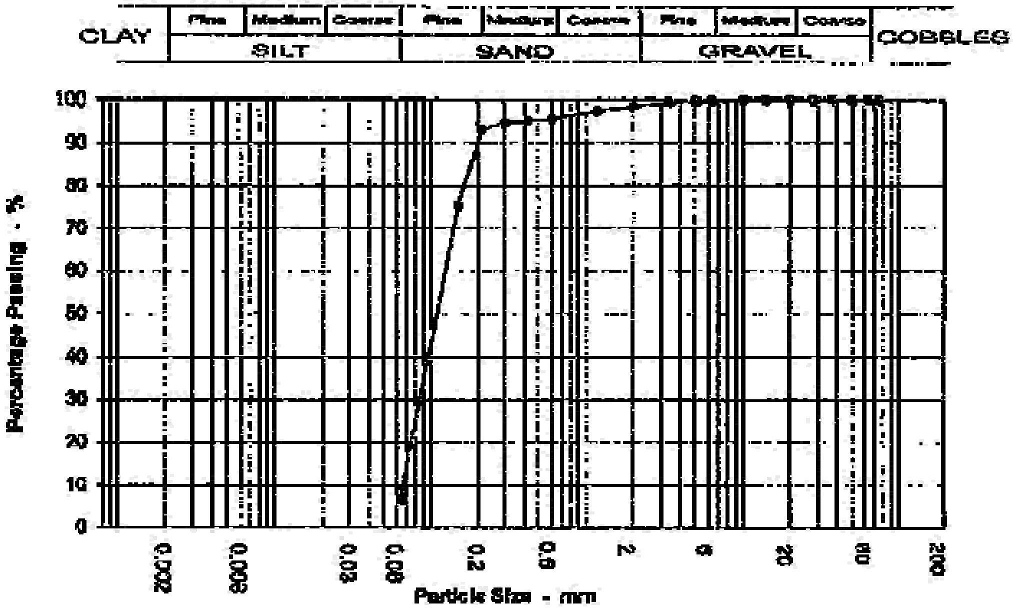
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	83		
20	71		
14	54		
10	40		
6.3	24		
5	19		
3.35	14		
2	10		
1.18	7		
0.6	6		
0.425	6		
0.3	6		
0.212	6		
0.15	6		
0.063	6		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	90.3
Sand	4.1
Silt & Clay	5.6

Grading Analysis	
D100	50.000
D60	16.137
D10	2.105
Uniformity Coefficient	8

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D16
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	98		
1.18	97		
0.6	96		
0.425	96		
0.3	95		
0.212	93		
0.15	76		
0.063	7		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

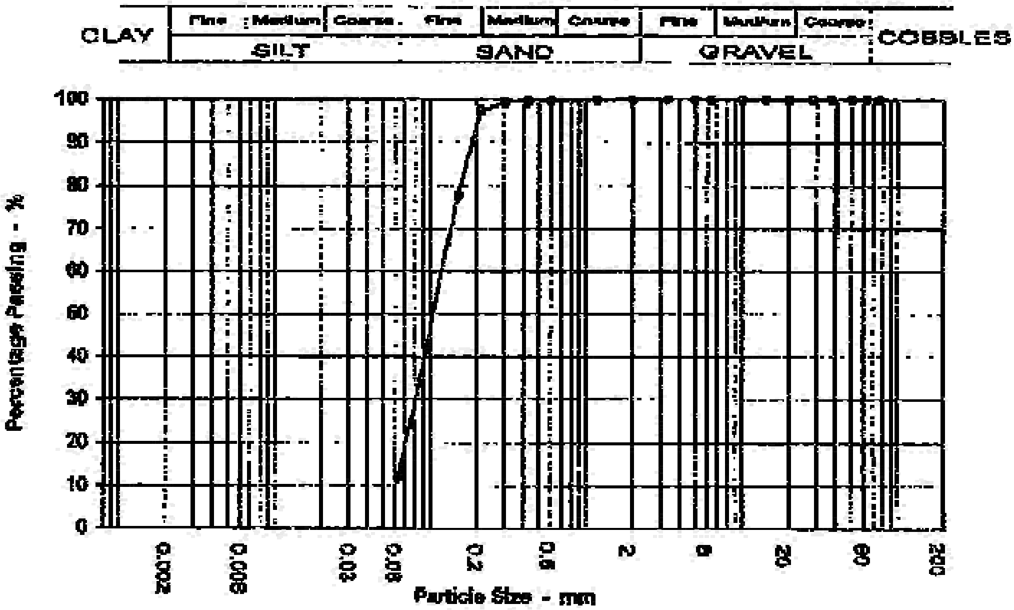
Sample Proportions	
Cobbles	0.0
Gravel	1.5
Sand	91.9
Silt & Clay	6.5

Grading Analysis	
D100	14.000
D60	0.131
D10	0.067
Uniformity Coefficient	2

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D17
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



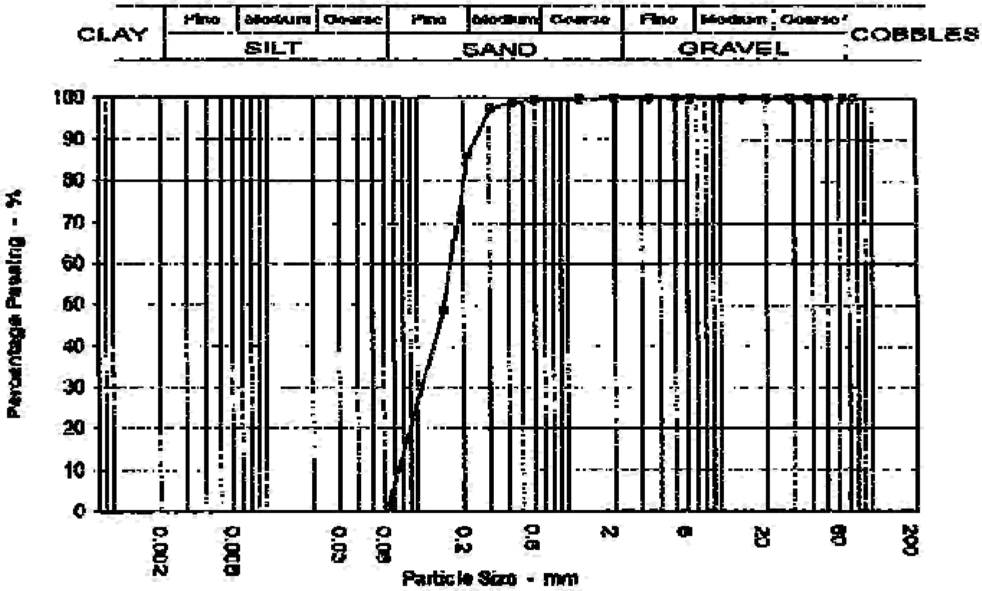
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	96		
0.15	78		
0.063	12		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	88.3
Silt & Clay	11.7

Grading Analysis	
D100	5.000
D60	0.127
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D18
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	0



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	98		
0.212	86		
0.15	49		
0.063	1		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

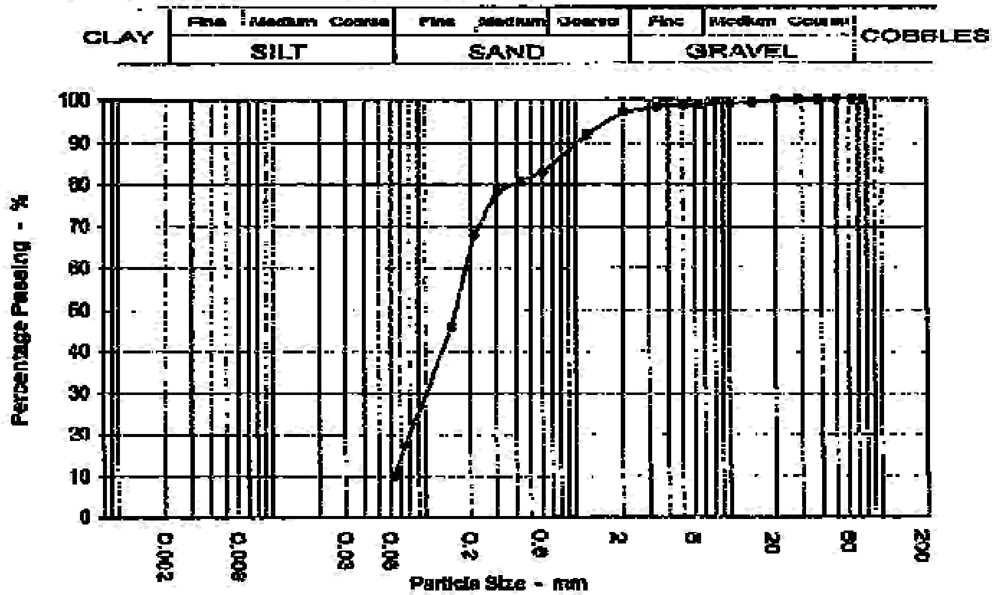
Sample Proportions	
Cobbles	0.0
Gravel	0.1
Sand	98.9
Silt & Clay	1.0

Grading Analysis	
D100	10.000
D60	0.169
D10	0.079
Uniformity Coefficient	2

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref	P13054
Borehole / Pit No	D19
Sample No	0
Depth	0.00 m
Sample type	D
Location	Dublin Port
Soil Description	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	99		
5	99		
3.35	98		
2	97		
1.18	92		
0.6	83		
0.425	81		
0.3	79		
0.212	68		
0.15	46		
0.063	10		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	3.0
Sand	86.9
Silt & Clay	10.1

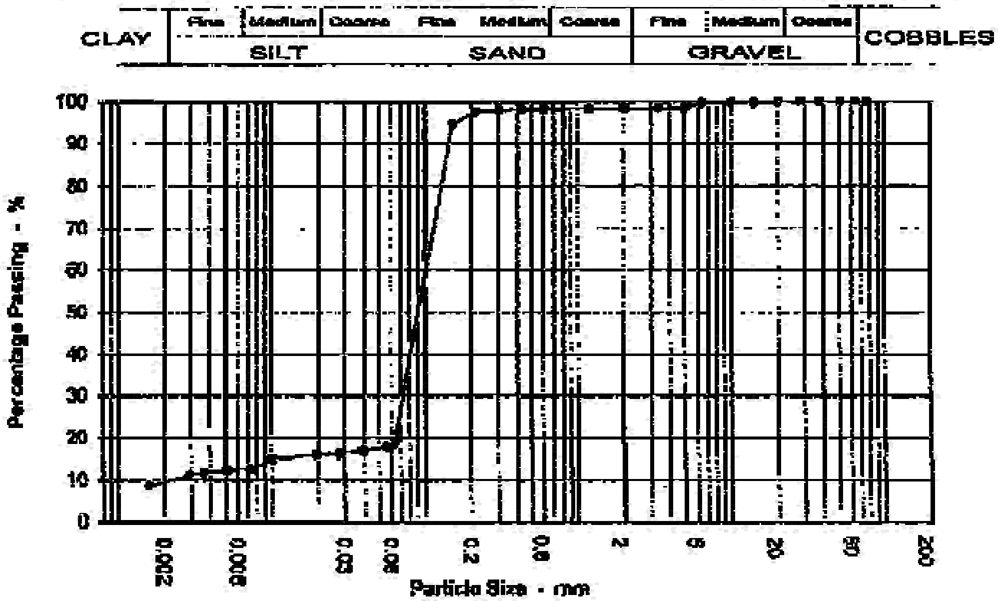
Grading Analysis	
D100	20.000
D60	0.189
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	020
Soil Description		Sample No	0
		Depth	0.00 m
		Sample type	D



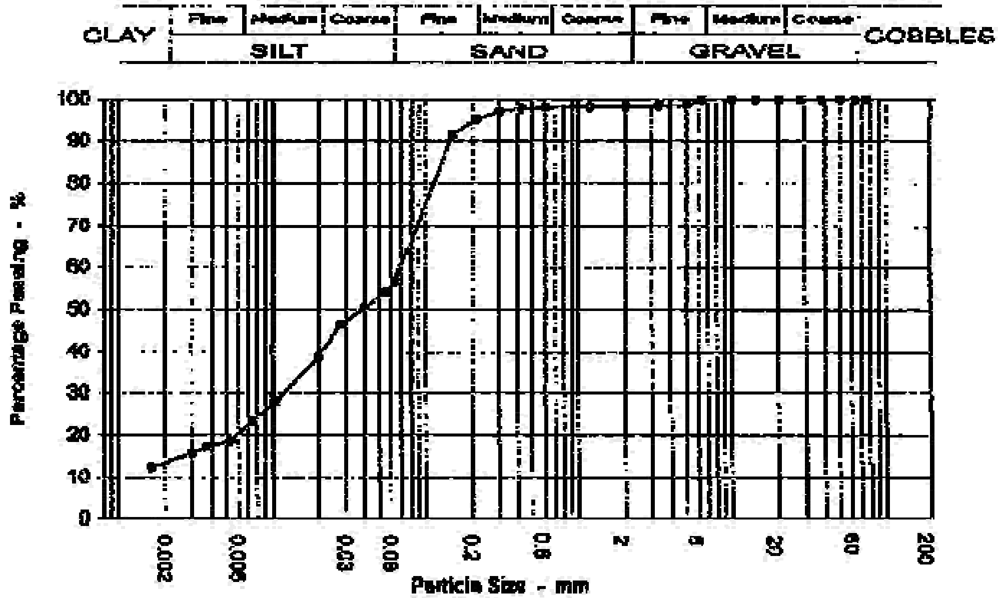
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	18
90	100	0.055	18
75	100	0.039	17
63	100	0.028	18
50	100	0.020	16
37.5	100	0.010	15
28	100	0.007	13
20	100	0.005	12
14	100	0.004	12
10	100	0.003	11
6.3	100	0.002	9
5	98		
3.35	98		
2	98		
1.18	98		
0.6	98		
0.425	98		
0.3	98		
0.212	98		
0.15	96		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	1.7
Sand	80.1
Silt	8.8
Clay	9.4

Grading Analysis	
D100	20.000
D60	0.110
D10	0.002
Uniformity Coefficient	47

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D21
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



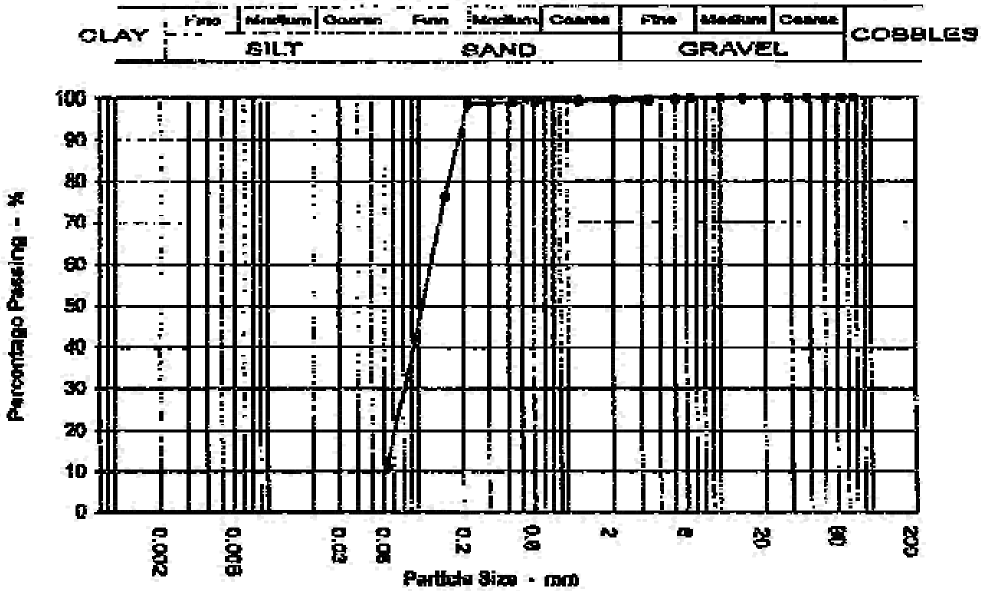
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	57
90	100	0.055	54
75	100	0.039	50
63	100	0.028	46
50	100	0.020	39
37.5	100	0.010	28
28	100	0.007	23
20	100	0.005	19
14	100	0.004	17
10	100	0.003	15
6.3	100	0.002	12
5	99		
3.35	98		
2	98		
1.18	98		
0.6	98		
0.425	98		
0.3	97		
0.212	95		
0.15	91		
0.063	57		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	1.7
Sand	42.6
Silt	42.5
Clay	13.3

Grading Analysis	
D100	6.300
D60	0.071
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13064
		Borehole / Pit No	D22
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	98		
0.212	98		
0.15	75		
0.063	11		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

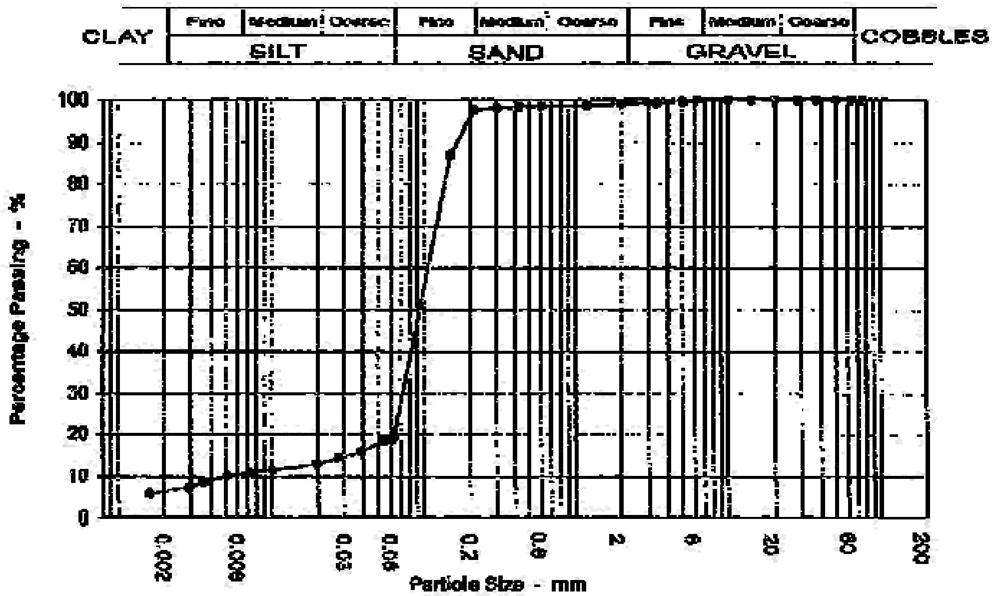
Sample Proportions	
Cobbles	0.0
Gravel	0.5
Sand	88.6
Silt & Clay	10.9

Grading Analysis	
D100	6.300
D60	0.128
D10	
Uniformity Coefficient	N/A

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D23
Soil Description		Sample No	0
		Depth	0.00 m
		Sample type	D



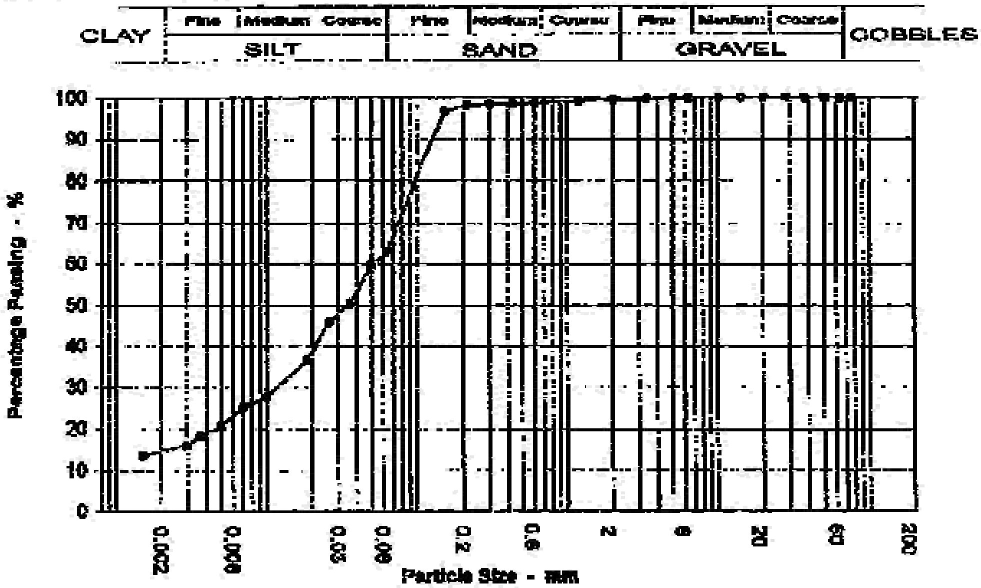
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	19
90	100	0.054	19
75	100	0.038	16
63	100	0.027	14
50	100	0.019	13
37.5	100	0.010	12
28	100	0.007	11
20	100	0.005	10
14	100	0.004	9
10	100	0.003	7
6.3	100	0.002	6
5	99		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	98		
0.3	98		
0.212	98		
0.15	87		
0.063	19		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	1.1
Sand	79.8
Silt	13.0
Clay	6.2

Grading Analysis	
D100	10.000
D60	0.115
D10	0.005
Uniformity Coefficient	23

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D24
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



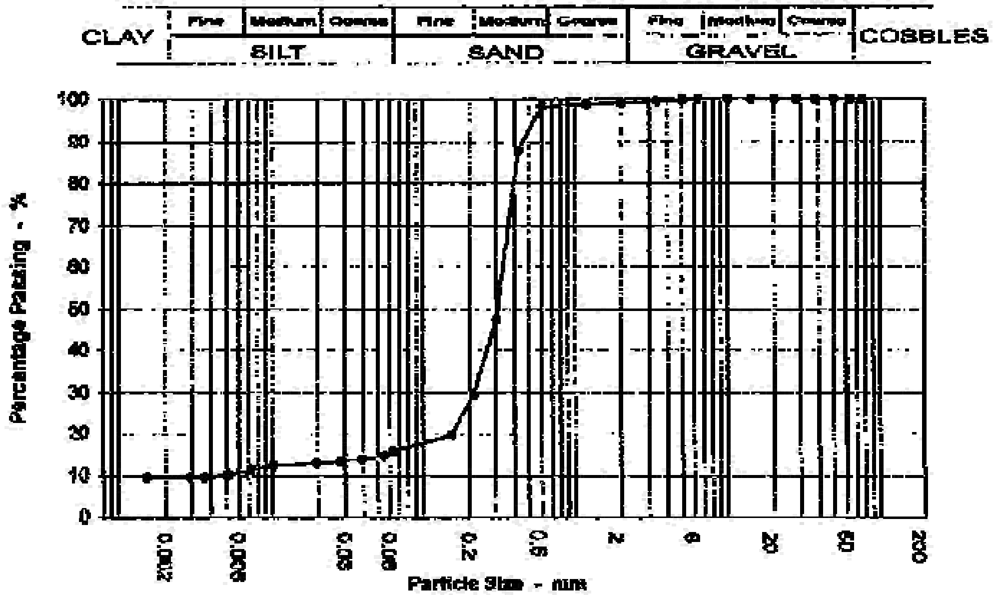
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	63
90	100	0.050	60
75	100	0.036	50
63	100	0.026	46
50	100	0.019	37
37.5	100	0.010	28
28	100	0.007	25
20	100	0.005	21
14	100	0.004	18
10	100	0.003	16
6.3	100	0.002	14
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	98		
0.212	98		
0.15	97		
0.063	63		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	0.5
Sand	37.4
Silt	47.5
Clay	14.6

Grading Analysis	
D100	14.000
D60	0.051
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D25
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



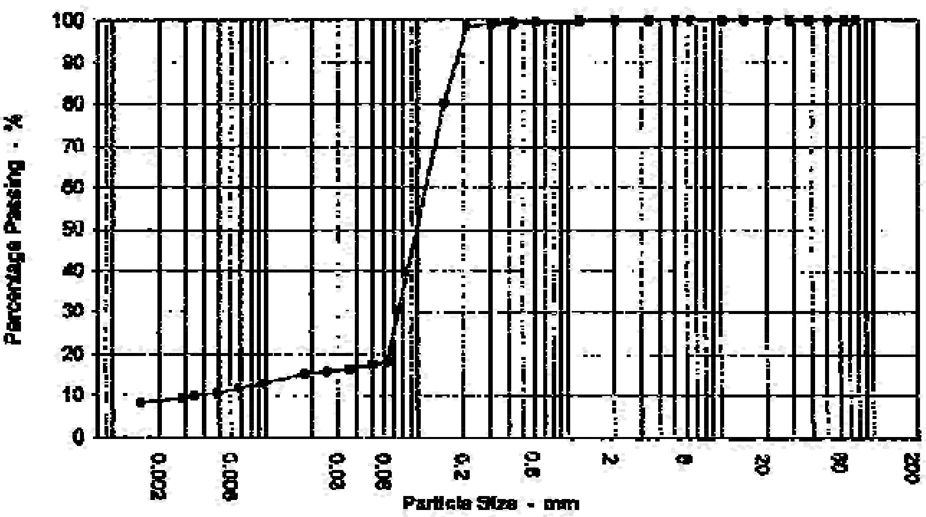
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	16
90	100	0.055	15
75	100	0.039	14
63	100	0.028	13
50	100	0.020	13
37.5	100	0.010	12
28	100	0.007	11
20	100	0.005	10
14	100	0.004	10
10	100	0.003	10
6.3	100	0.002	10
5	100		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	88		
0.3	47		
0.212	29		
0.15	20		
0.063	16		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	1.0
Sand	83.7
Silt	5.6
Clay	9.7

Grading Analysis	
D100	10.000
D60	0.339
D10	0.004
Uniformity Coefficient	78

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D26
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



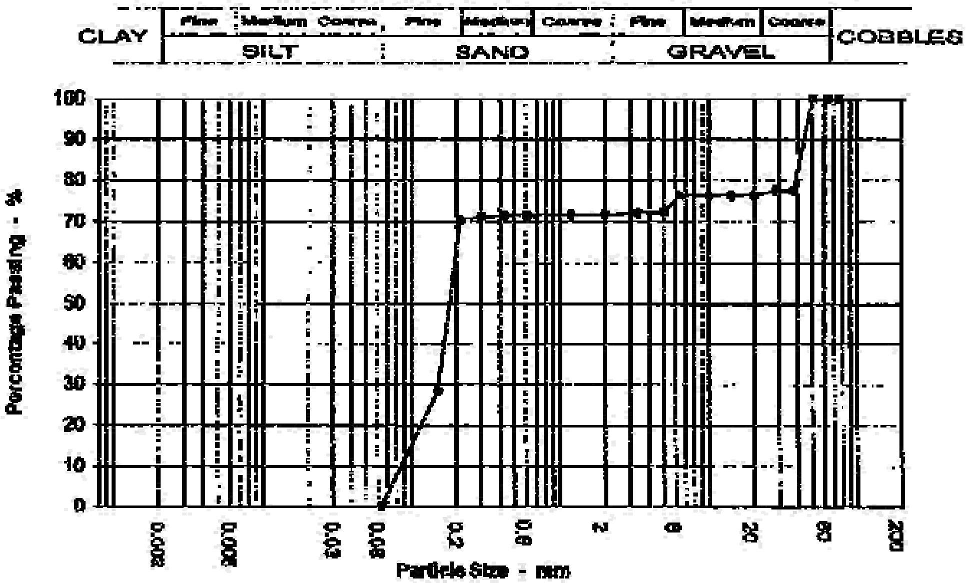
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	18
90	100	0.050	18
75	100	0.036	16
63	100	0.025	16
50	100	0.018	16
37.5	100	0.009	13
28	100	0.007	12
20	100	0.005	11
14	100	0.003	10
10	100	0.003	9
6.3	100	0.002	8
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	99		
0.212	99		
0.15	80		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	81.9
Silt	9.5
Clay	8.6

Grading Analysis	
D100	6.000
D60	0.122
D10	0.004
Uniformity Coefficient	34

PRIORITY GEOTECHNICAL	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D27
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



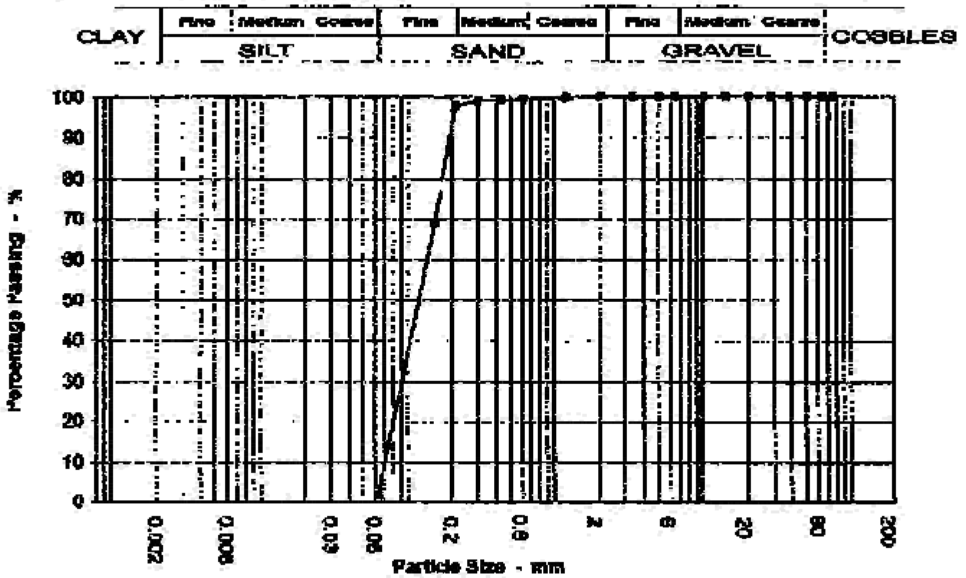
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	78		
28	78		
20	76		
14	76		
10	76		
6.3	76		
5	72		
3.35	72		
2	72		
1.18	72		
0.6	71		
0.425	71		
0.3	71		
0.212	70		
0.15	29		
0.063	0		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	28.3
Sand	71.5
Silt & Clay	0.2

Grading Analysis	
D100	50.000
D60	0.197
D10	0.093
Uniformity Coefficient	2

PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9		Job Ref	P13054
		Borehole / Pit No	D28
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



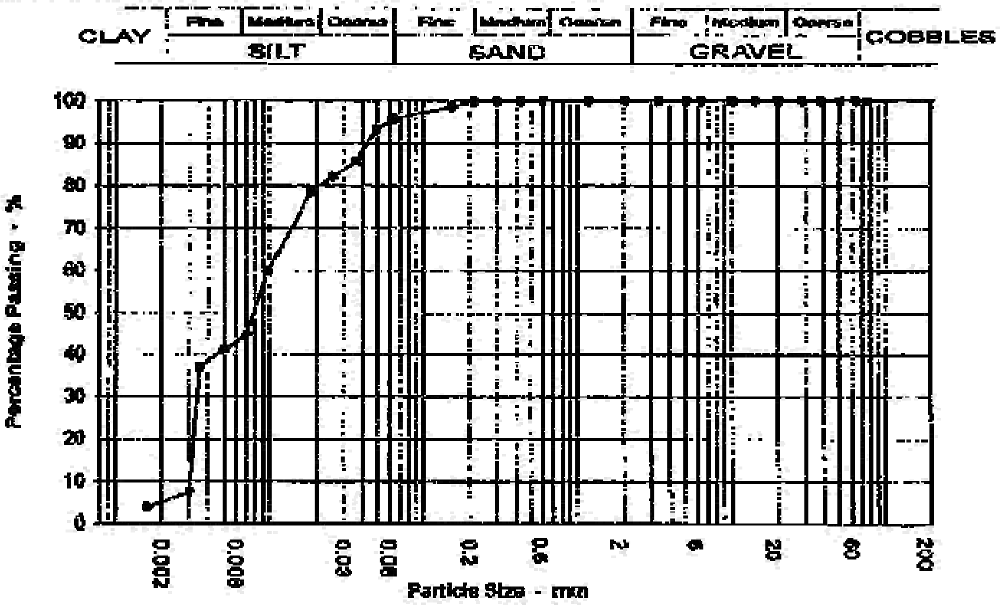
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	99		
0.212	96		
0.15	69		
0.063	2		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.1
Sand	98.1
Silt & Clay	1.9

Grading Analysis	
D100	6.300
D60	0.138
D10	0.074
Uniformity Coefficient	2

PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9		Job Ref	P13054
		Borehole / Pit No	D29
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



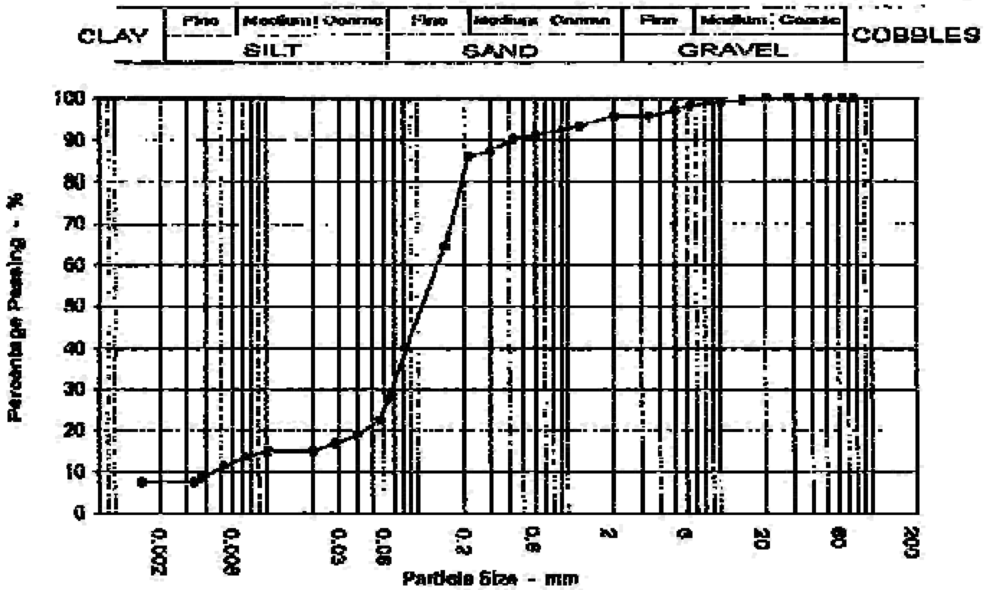
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	96
90	100	0.050	93
75	100	0.036	88
63	100	0.025	82
50	100	0.016	78
37.5	100	0.010	60
28	100	0.007	45
20	100	0.005	41
14	100	0.004	37
10	100	0.003	7
6.3	100	0.002	4
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	99		
0.063	96		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	4.9
Silt	90.4
Clay	4.6

Grading Analysis	
D100	5.000
D60	0.010
D10	0.003
Uniformity Coefficient	3

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D30
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	28
90	100	0.058	23
75	100	0.040	19
63	100	0.028	17
50	100	0.020	15
37.5	100	0.010	15
28	100	0.007	14
20	100	0.005	11
14	99	0.004	8
10	99	0.003	8
6.3	99	0.002	8
5	97		
3.35	96		
2	96		
1.18	93		
0.6	91		
0.425	90		
0.3	87		
0.212	86		
0.15	64		
0.063	28		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

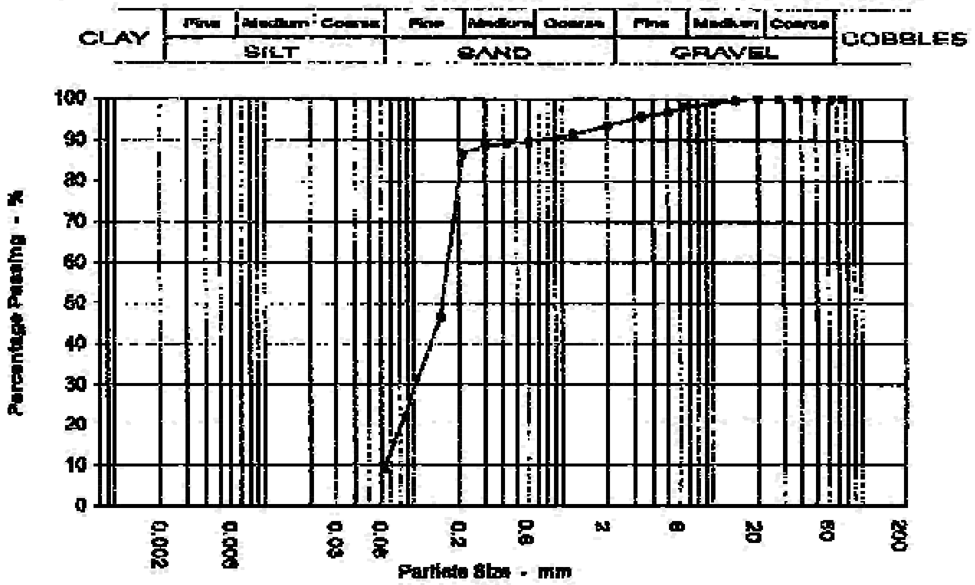
Sample Proportions	
Cobbles	0.0
Gravel	4.4
Sand	70.1
Silt	18.0
Clay	7.5

Grading Analysis	
D100	20.000
D60	0.140
D10	0.005
Uniformity Coefficient	31

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref	P13054
Borehole / Pit No	D31
Sample No	0
Depth	0.00 m
Sample type	D
Location	Dublin Port
Soil Description	



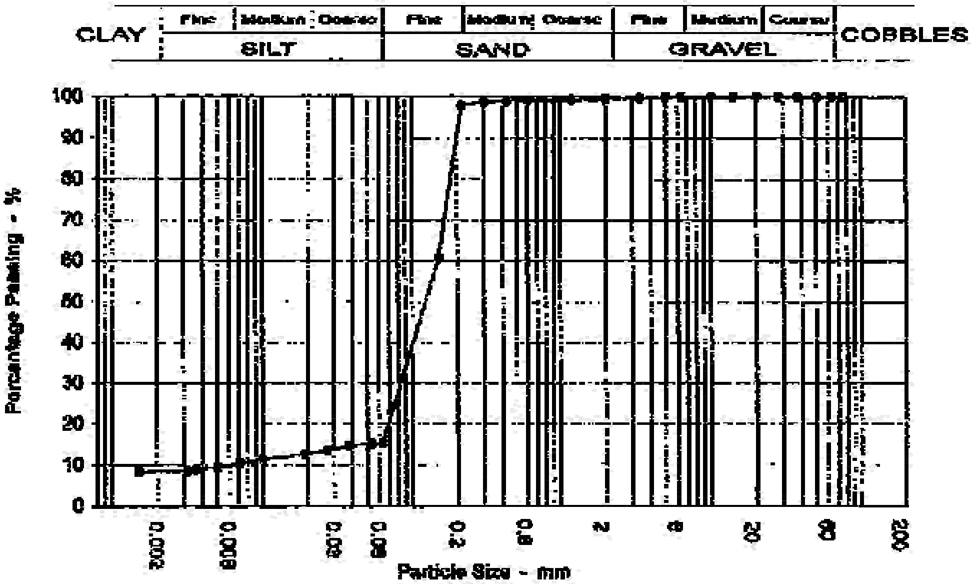
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	98		
5	97		
3.35	96		
2	93		
1.18	91		
0.6	90		
0.425	89		
0.3	89		
0.212	86		
0.15	47		
0.063	9		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	6.6
Sand	84.5
Silt & Clay	9.0

Grading Analysis	
D100	20.000
D60	0.171
D10	0.065
Uniformity Coefficient	3

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D32
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	15
90	100	0.053	15
75	100	0.038	16
63	100	0.027	13
50	100	0.019	12
37.5	100	0.010	11
28	100	0.007	10
20	100	0.005	9
14	100	0.004	9
10	100	0.003	9
6.3	100	0.002	8
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	98		
0.15	61		
0.063	15		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	0.7
Sand	84.1
Silt	6.8
Clay	8.4

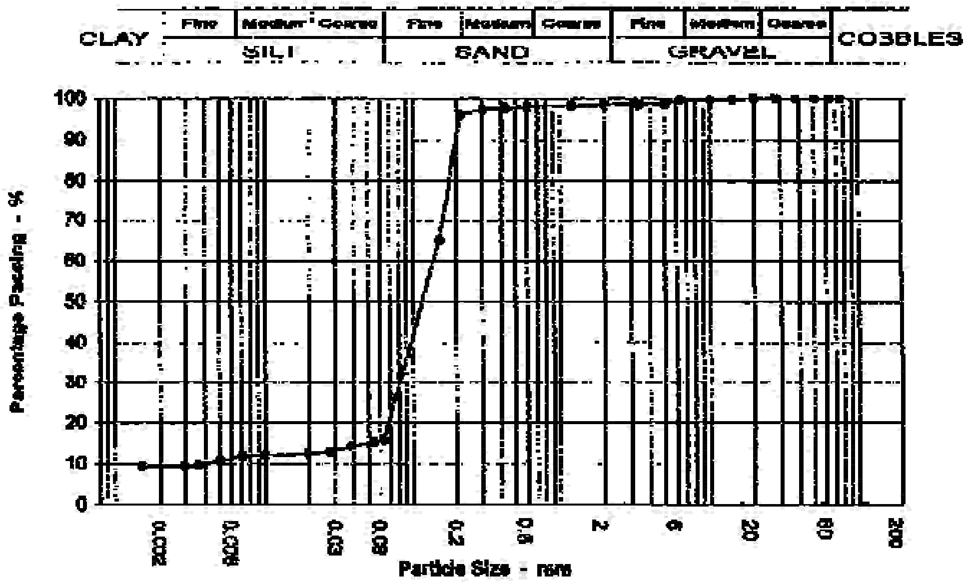
Grading Analysis	
D100	20.000
D60	0.149
D10	0.006
Uniformity Coefficient	24

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref	P13054	Borehole / Pit No	D33
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



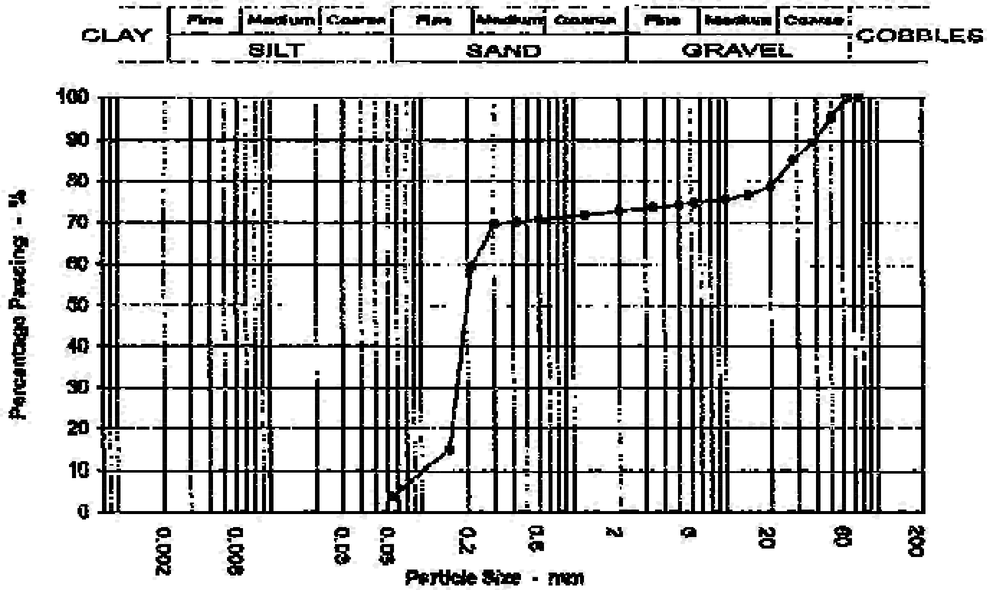
Sieving: Particle Size mm	Sieving: % Passing	Sedimentation: Particle Size mm	Sedimentation: % Passing
125	100	0.063	16
90	100	0.054	15
75	100	0.036	14
63	100	0.027	13
50	100	0.019	12
37.5	100	0.010	12
28	100	0.007	12
20	100	0.005	11
14	100	0.004	10
10	100	0.003	9
6.3	100	0.002	9
5	99		
3.35	99		
2	98		
1.18	98		
0.6	98		
0.425	98		
0.3	97		
0.212	96		
0.15	65		
0.063	16		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	1.5
Sand	82.9
Silt	6.2
Clay	9.4

Grading Analysis	
D100	20.000
D60	0.141
D10	0.004
Uniformity Coefficient	34

PRIORITY GEOTECHNICAL	**PARTICLE SIZE DISTRIBUTION** BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P13054
		Borehole / Pit No	D34
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	95		
37.5	89		
28	85		
20	79		
14	77		
10	76		
6.3	75		
5	74		
3.35	74		
2	73		
1.18	72		
0.6	71		
0.425	70		
0.3	70		
0.212	60		
0.15	15		
0.063	4		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

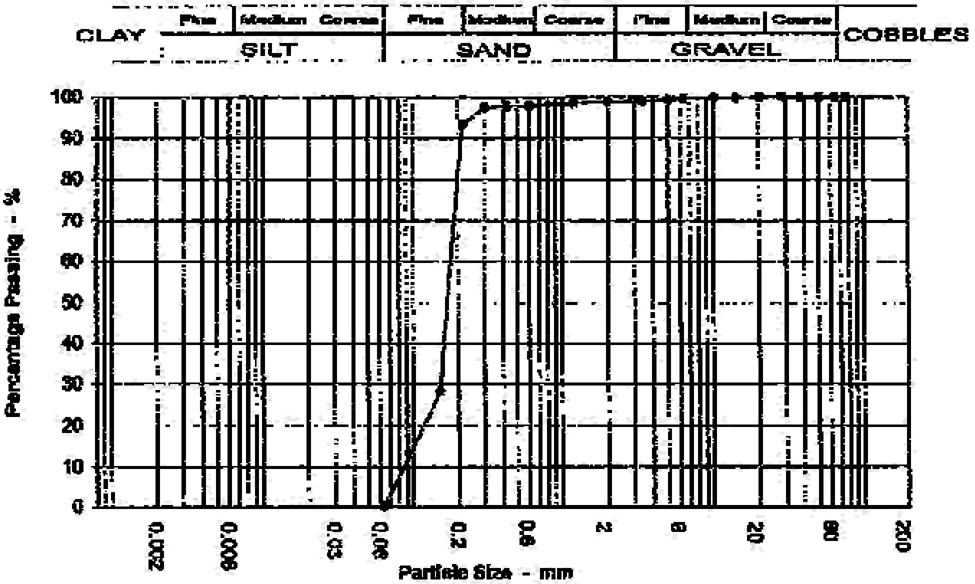
Sample Proportions	
Cobbles	1.1
Gravel	26.2
Sand	68.8
Silt & Clay	3.9

Grading Analysis	
D100	63.000
D60	0.216
D10	0.112
Uniformity Coefficient	2

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	Dublin Port	Job Ref	P13054
		Borehole / Pit No	D35
		Sample No	0
Soil Description		Depth	0.00 m
		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	98		
0.6	98		
0.425	98		
0.3	97		
0.212	93		
0.15	28		
0.063	0		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

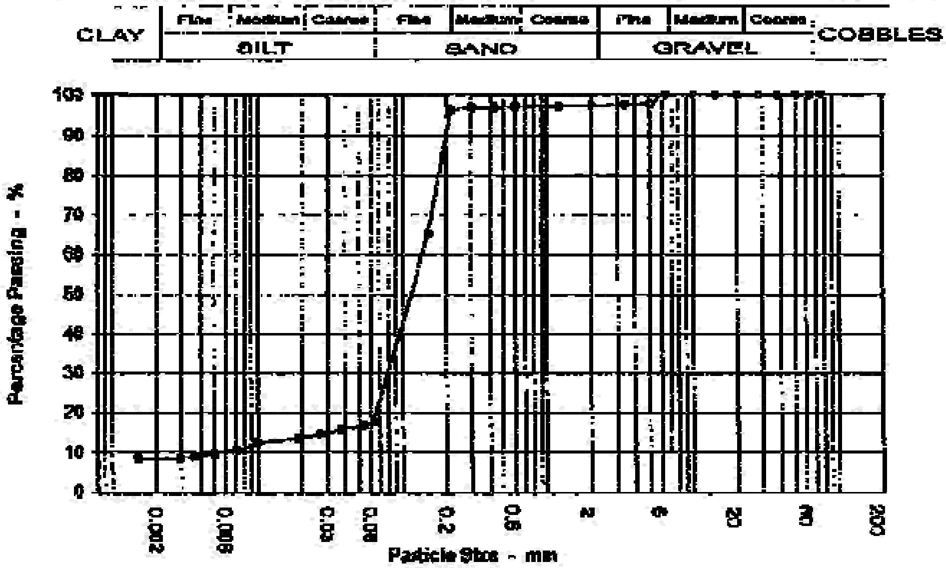
Sample Proportions	
Cobbles	0.0
Gravel	1.2
Sand	98.8
Silt & Clay	0.1

Grading Analysis	
D100	20.000
D60	0.180
D10	0.094
Uniformity Coefficient	2

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P13054
		Borehole / Pit No	036
Location	Dublin Port	Sample No	0
		Depth	0.00 m
Soil Description		Sample type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.062	18
90	100	0.053	17
75	100	0.036	16
63	100	0.027	15
50	100	0.019	14
37.5	100	0.010	13
28	100	0.007	10
20	100	0.005	9
14	100	0.004	9
10	100	0.003	8
6.3	100	0.002	8
5	98		
3.35	97		
2	97		
1.18	97		
0.6	97		
0.425	97		
0.3	97		
0.212	96		
0.15	65		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	2.7
Sand	79.8
Silt	9.1
Clay	8.4

Grading Analysis	
D100	0.300
D60	0.141
D10	0.006
Uniformity Coefficient	23

Sample ID code	Sampling depth m	Location	Sampling date (dd/mm/yyyy)	Sampling Location ID	Position Latitude (dd mm.mmm)	Position Longitude (dd mm.mmm)	Lab Report ID	Sample appearance (e.g. colour, texture, signs of life)	% Moisture
DC01	surface	Dublin Port	09/08/2013	DC01	53.3455409	6.2205564	20055445-1	black silt sediment with some gravel	44.4
DC01	1m	Dublin Port	09/08/2013	DC01	53.3455409	6.2205564	20055856-1	Silty sand.	14.9
DC01	2m	Dublin Port	09/08/2013	DC01	53.3455409	6.2205564	20055856-1	Silt	16.3
DC02	surface	Dublin Port	09/08/2013	DC02	53.3442301	6.2087211	20055445-1	Silt	45
DC02	1m	Dublin Port	09/08/2013	DC02	53.3442301	6.2087211	20055856-1	Silt	37.9
DC02	9.6m	Dublin Port	09/08/2013	DC02	53.3442301	6.2087211	20055856-1	Silty sand with stones.	13.3
DC03A	surface	Dublin Port	09/08/2013	DC03A	53.3432028	6.1911586	20055445-1	Silt	34.8
DC03	1m	Dublin Port	09/08/2013	DC03	53.3436579	6.1923912	20055856-1	Silty sand with stones.	7.1
DC04	surface	Dublin Port	09/08/2013	DC04	53.3436917	6.1834616	20055445-1	Silt	29.4
DC04	1m	Dublin Port	09/08/2013	DC04	53.3436917	6.1834616	20055856-1	Silt	29
DC05	surface	Dublin Port	09/08/2013	DC05	53.3433158	6.1482896	20055445-1	Silt	39.9
DC06	surface	Dublin Port	09/08/2013	DC06	53.3360775	6.0888059	20055775-1	Silty sand.	26.7
DC06	1m	Dublin Port	09/08/2013	DC06	53.3360775	6.0888059	20055775-1	dark brown clay sediment	23.7
DC07	surface	Dublin Port	09/08/2013	DC07	53.3327382	6.0888059	20055445-1	Silt with shell fragments and a few stones.	19.9
15VC04	0.5-1.0	Dublin Port	11/08/2013	VC04	53.3469787 N	6.22084142 W	20055775-1	V.Hard compacted grey clay.No vis. Life forms	16.7
16VC04	15-2.0	Dublin Port	11/08/2013	VC04	53.3469787 N	6.22084142 W	20055775-1	V.Hard compacted grey clay.No vis. Life forms	18.8
19VC05	0.5-1.0	Dublin Port	11/08/2013	VC05	53.34682399 N	6.2192072 W	20055856-1	Sandy coarse silt.No vis life forms	16.5
20VC05	1.5-2.0	Dublin Port	11/08/2013	VC05	53.34682399 N	6.2192072 W	20055856-1	Sandy coarse silt.No vis life forms	18.3
23VC07	0.5-1.0	Dublin Port	11/08/2013	VC07	53.34872583 N	6.22002813 W	20055856-1	Smelly grey mix silt & sand .No vis life forms	28.3
24VC07	1.5-2.0	Dublin Port	11/08/2013	VC07	53.34872583 N	6.22002813 W	20055856-1	Smelly grey sand & clay.No vis life forms	18.7
27VC08	0.5-1.0	Dublin Port	11/08/2013	VC08	53.34803384 N	6.21936015 W	20055856-1	Soft black silty mud & some sand.No vis life.	46.9

Sample ID code	Sampling depth m	Particle size >2mm %	Particle size <2mm >63um %	Particle size <63um %	OC %	TEH g kg^{-1}	Cu mg kg^{-1}	Zn mg kg^{-1}	Cd mg kg^{-1}	Hg mg kg^{-1}	Pb mg kg^{-1}	As mg kg^{-1}	Cr mg kg^{-1}	Mn mg kg^{-1}	Ni mg kg^{-1}
DC01	surface	17.67	28.57	53.76	1.1		124	624	3.55	0.232	192	32.5	316	n/a	164
DC01	1m	0	0.74	99.24	0.5		39.7	131	2.36	23.3	23.3	13	87.9	n/a	78.1
DC01	2m	0	0.73	99.26	0.6		41.6	141	2.38	27.4	27.4	13	90.7	n/a	84.2
DC02	surface	0	37.98	62.02	1.4		57.7	219	1.08	0.155	70.1	13.3	99.3	n/a	47.5
DC02	1m	0	8.96	88.34	1.5		59.1	242	1.91	114	114	19.5	189	n/a	109
DC02	9.6m	52.64	24.54	7.39	0.4		41.7	154	1.9	27.6	27.6	14.6	74.9	n/a	55.9
DC03A	surface	0	61.6	38.35	1.0		64.6	136	0.462	0.048	46.2	7.93	139	n/a	65.4
DC03	1m	92.33	7.33	0.01	<0.4		49	150	1.65	24.3	24.3	19.9	95.5	n/a	81.6
DC04	surface	0	71.69	28.27	0.8		57.1	119	0.427	0.091	44.5	8.73	136	n/a	63.8
DC04	1m	0	13.62	83.05	0.8		23.3	90.3	0.513	17.1	17.1	15.8	114	n/a	66.9
DC05	surface	0	71.78	28.16	1.07		40.8	100	0.254	0.038	34.1	9.61	115	n/a	41.5
DC06	surface	0	85.41	14.65	0.46		73.6	93.8	0.178	0.022	33.1	6.99	197	n/a	48.5
DC06	1m	0	55.94	16.75	<0.4		22.9	74.9	0.243	0.015	14.3	7.04	133	n/a	38.3
DC07	surface	13.03	86.98	0	<0.4		3.25	22.3	0.051	<0.002	10	2.75	25.3	n/a	5.84
15VC04	0.5-1.0	0	9.26	90.74	0.7	<0.05	43.5	147	2.74	0.052	24.3	12.9	97.4	n/a	83.5
16VC04	15-2.0	0	1.32	98.68	0.6	<0.05	50.4	146	2.79	0.085	29.2	15.1	129	n/a	106
19VC05	0.5-1.0	0	2.81	97.19	0.5	0.13	54.8	158	2.83	0.05	30.9	16.8	132	n/a	97.6
20VC05	1.5-2.0	0	2.27	97.73	0.5	<0.05	39.4	147	2.68	0.067	25.3	11	69.4	n/a	72.5
23VC07	0.5-1.0	0	6.45	93.55	1.1	55.1	79.8	1670	6	0.28	328	29.3	135	n/a	90.7
24VC07	1.5-2.0	0	10.2	89.8	0.7	8.7	50.2	178	50.2	0.072	32.3	14	100	n/a	90.5
27VC08	0.5-1.0	0	6.21	93.79	1.3	401	82.3	5240	18.7	0.921	1130	27.4	229	n/a	144

Sample ID code	Sampling depth m	Li mg kg^{-1}	Al mg kg^{-1}	DBT mg kg^{-1}	TBT mg kg^{-1}	Σ TBT + DBT mg kg^{-1}	PCB 028 ug kg^{-1}	PCB 052 ug kg^{-1}	PCB 101 ug kg^{-1}	PCB 138 ug kg^{-1}	PCB 153 ug kg^{-1}	PCB 180 ug kg^{-1}	PCB 118 ug kg^{-1}	PCB Σ7 PCB ug kg^{-1}	PAH Acenaphthene ug kg^{-1}
DC01	surface	94.3	92400	0.0161	0.0358		9.68	<3	2.8	1.92	2.48	1.28	<1	18.16	26.8
DC01	1m	27.4	39000	<0.003	<0.003									0	<2
DC01	2m	30.9	44500	<0.004	<0.004									0	11.3
DC02	surface	48.9	50500	0.0191	0.0259		2.32	<0.8	<0.4	0.4	0.64	0.28	<0.4	3.64	10.5
DC02	1m	56.5	55400	<0.005	<0.005		59.2	<20	9.16	<5	8.64	<6	8	85	81.1
DC02	9.6m	23.7	35600	<0.004	<0.004									0	<2
DC03A	surface	45.1	44800	<0.004	<0.004		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	16.4
DC03	1m	22.6	30700	<0.003	<0.003									0	3.3
DC04	surface	39.2	38900	<0.004	<0.004		<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	16.9
DC04	1m	46.1	52000	<0.003	<0.003									0	5.5
DC05	surface	36.7	39600	<0.004	<0.004									0	5
DC06	surface	34.9	38100	<0.004	<0.004									0	3.7
DC06	1m	24.9	0.015	<0.003	<0.003									0	5.2
DC07	surface	11	14300	<0.004	<0.004									0	2.7
15VC04	0.5-1.0	32.1	55000	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6.18
16VC04	15-2.0	40.2	48100	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<3
19VC05	0.5-1.0	31.1	51600	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<2
20VC05	1.5-2.0	25.8	38400	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.36
23VC07	0.5-1.0	44.6	53200	n/a	n/a	n/a	3.04	<1	2.52	2.2	2.72	1.8	1.92	12.48	28.9
24VC07	1.5-2.0	33.3	47100	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.4
27VC08	0.5-1.0	53.5	52600	n/a	n/a	n/a	8.6	6.16	7.72	6.58	8.76	6.32	6.28	50.42	48.4

Sample ID code	Sampling depth m	PAH Acenaphthylene ug kg^{-1}	PAH Anthracene ug kg^{-1}	PAH Benzo (a) anthracene ug kg^{-1}	PAH Benzo (a) pyrene ug kg^{-1}	PAH Benzo (b) fluoranthene ug kg^{-1}	PAH Benzo (ghi) perylene ug kg^{-1}	PAH Benzo (k) fluoranthene ug kg^{-1}	PAH Chrysene ug kg^{-1}	PAH Dibenz (a,h) anthracene ug kg^{-1}
DC01	surface	129	140	310	382	322	202	140	272	51.6
DC01	1m	<2	<2	2.2	3.2	38	18.6	<10	59.8	<5
DC01	2m	<2	<2	<2	3.2	52.3	23.1	<10	78.6	5
DC02	surface	24.8	36.4	90.2	94.6	100	59.1	40.3	88.4	14.6
DC02	1m	684	496	1520	1740	1360	942	748	1270	262
DC02	9.6m	<2	<2	<2	<2	21.1	<10	<10	23	<5
DC03A	surface	83.8	91.3	210	259	219	134	111	175	34.1
DC03	1m	<2	<2	<2	<2	12.2	<10	<10	14.5	<5
DC04	surface	37.9	55.3	142	146	126	71.1	53.6	121	18.7
DC04	1m	4.1	2.1	4.2	4.3	10.8	<10	<10	13	<5
DC05	surface	23.1	12.3	32.4	59.6	55.4	37.2	25	36.6	10.1
DC06	surface	6.1	5.8	14.3	15.5	22.2	11.9	<10	15.3	<5
DC06	1m	<2	<2	<2	<2	<10	<10	<10	3.29	<5
DC07	surface	<2	<2	<2	<2	<10	<10	<10	<3	<5
15VC04	0.5-1.0	2.6	<2	3.9	5.3	44.8	20.6	<10	68	<5
16VC04	15-2.0	<2	<2	2.5	4.5	64.6	31.5	<10	106	6.4
19VC05	0.5-1.0	<2	<2	3.2	3.3	23.5	11	<10	35.8	<5
20VC05	1.5-2.0	<2	<2	2.74	3.8	44	18.7	<10	61.6	<5
23VC07	0.5-1.0	79.8	70	203	240	215	148	85.8	222	40.3
24VC07	1.5-2.0	4.8	<2	5.3	7.6	65.1	27	<10	86.4	6
27VC08	0.5-1.0	324	254	579	874	712	457	341	573	123

Sample ID code	Sampling depth m	PAH Flourene ug kg^{-1}	PAH Fluoranthene ug kg^{-1}	PAH Indeno (1,2,3–cd) pyrene ug kg^{-1}	PAH Naphthalene ug kg^{-1}	PAH Phenanthrene ug kg^{-1}	PAH Pyrene ug kg^{-1}	PAH Σ 16 ug kg^{-1}	γ–HCH (Lindane) ug kg^{-1}	HCB ug kg^{-1}	Dieldrin ug/kg	Tri-butyl Tin ug/kg	Di-butyl Tin ug/kg
DC01	surface	61.5	348	180	96	227	420	3307.9			<3	35.8	16.1
DC01	1m	27.8	7.8	<10	<30	86.9	18.4	262.7			<3	<3	<3
DC01	2m	40.8	8	<10	62.8	113	19.8	417.9			<3	<4	<4
DC02	surface	22.5	120	51	47.3	99.7	134	1033.4			<3	25.9	19.1
DC02	1m	119	991	850	241	571	2370	14245.1			no result	<5	<5
DC02	9.6m	<10	2.1	<10	<30	12	4.1	62.3			<3	<4	<4
DC03A	surface	42.7	210	117	59.7	129	273	2165			<3	<4	<4
DC03	1m	<10	<2	<10	<30	18	<3	48			<3	<3	<3
DC04	surface	25.6	184	62.7	46.7	123	219	1449.5			<3	<4	<4
DC04	1m	<10	6.7	<10	77.7	16.2	8.9	153.5			<3	<3	<3
DC05	surface	10.7	36.8	33.4	33.4	32.4	40.9	484.3			no result	<4	<4
DC06	surface	<10	18.6	11.5	40.3	16.3	17.2	198.7			no result	<4	<4
DC06	1m	<10	<2	<10	57.5	<10	<3	65.99			no result	<3	<3
DC07	surface	<10	<2	<10	50.4	<10	<3	53.1			no result	<4	<4
15VC04	0.5-1.0	35.5	10.6	<10	54	99.5	22.9	n/a	<2	<1	<3	<3	<3
16VC04	15-2.0	46.4	12.3	<10	75.6	146	28.4	n/a	<2	<1	<3	<3	<3
19VC05	0.5-1.0	12.4	6.2	<10	<30	46.6	13.8	n/a	<2	<1	<3	<4	<4
20VC05	1.5-2.0	30.9	<2	<10	<30	97	21.3	n/a	<2	<1	<3	23.5	<4
23VC07	0.5-1.0	53.6	211	127	129	194	270	n/a	<2	<1	<3	165	26
24VC07	1.5-2.0	40.8	15.3	<10	69.5	125	28.2	n/a	<2	<1	<3	18.7	<4
27VC08	0.5-1.0	84.6	529	441	172	368	801	n/a	no result	no result	no result	655	154

Sample ID code	Sampling depth m	Location	Sampling date (dd/mm/yyyy)	Sampling Location ID	Position Latitude (dd mm.mmm)	Position Longitude (dd mm.mmm)	Lab Report ID	Sample appearance (e.g. colour, texture, signs of life)	% Moisture
28VC08	1.5-2.0	Dublin Port	11/08/2013	VC08	53.34803384 N	6.21936015 W	20055856-1	Black silty mud & more sand.No vis life.	23
31VC09	0.5-1.0	Dublin Port	11/08/2013	VC09	53.34839891 N	6.21716737 W	20055856-1	Black soft mud.No vis life	47.9
32VC09	1.5-2.0	Dublin Port	11/08/2013	VC09	53.34839891 N	6.21716737 W	20055856-1	Coarse grey mud /sand.No vis life	18.6
35VC10	0.5-1.0	Dublin Port	11/08/2013	VC10	53.3479803 N	6.2157762 W	20055856-1	Sandy clay.No vis life	42.6
36VC10	1.5-2.0	Dublin Port	11/08/2013	VC10	53.3479803 N	6.2157762 W	20055856-1	Sandy clay.No vis life	14.8
39VC12	0.5-1.0	Dublin Port	11/08/2013	VC12	53.34717109 N	6.2174361 W	20055856-1	Black mud.No vis life	25.7
40VC12	1.2-2.0	Dublin Port	11/08/2013	VC12	53.34717109 N	6.2174361 W	20055856-1	Sandy silt.No vis life	16.7
43VC13	0.5-1.0	Dublin Port	11/08/2013	VC13	53.34642874 N	6.21427305 W	20055856-1	Black smelly mud @ surface V.dense clay @ 1.4m.No vis life	25.1
47VC15	0.5-1.0	Dublin Port	11/08/2013	VC15	53.3459341 N	6.2160503 W	20055856-1	V. hard ,gravels & stones.No vis life	39.5
51VC16	0.5-1.0	Dublin Port	11/08/2013	VC16	53.34573981 N	6.2135178 W	20055856-1	Coarse sand & gravel.No vis life	6.9
52VC16	1.5-2.0	Dublin Port	11/08/2013	VC16	53.34573981 N	6.2135178 W	20055856-1	Coarse sand .No vis life	21
55VC17	0.5-1.0	Dublin Port	11/08/2013	VC17	53.34580352 N	6.21894498 W	20055775-1	V.dense compacted smooth grey clay.No vis life	18.9
56VC17	1.5-2.0	Dublin Port	11/08/2013	VC17	53.34580352 N	6.21894498 W	20055775-1	V.dense compacted smooth grey clay.No vis life	15.4
59VC18	0.5-1.0	Dublin Port	11/08/2013	VC18	53.34611489 N	6.22292447 W	20055775-1	V.compacted hard clay.No vis life.	22.4
60VC18	1.5-2.0	Dublin Port	11/08/2013	VC18	53.34611489 N	6.22292447 W	20055775-1	V.compacted hard clay.No vis life.	16.9
63VC19	0.5-1.0	Dublin Port	11/08/2013	VC19	53.34794384 N	6.22206431 W	20055775-1	Soft black mud.No vis life	62.7
64VC19	1.5-2.0	Dublin Port	11/08/2013	VC19	53.34794384 N	6.22206431 W	20055775-1	Thicker black mud.No vis life	50.8
67VC20	0.5-1.0	Dublin Port	11/08/2013	VC20	53.3487282 N	6.22215244 W	20055775-1	Soft black sticky mud.No vis life forms.	54.3
68VC20	1.5-2.0	Dublin Port	11/08/2013	VC20	53.3487282 N	6.22215244 W	20055775-1	Denser coarser black mud.No vis life forms.	20.2

Sample ID code	Sampling depth m	Particle size >2mm %	Particle size <2mm >63um %	Particle size <63um %	OC %	TEH g kg^{-1}	Cu mg kg^{-1}	Zn mg kg^{-1}	Cd mg kg^{-1}	Hg mg kg^{-1}	Pb mg kg^{-1}	As mg kg^{-1}	Cr mg kg^{-1}	Mn mg kg^{-1}	Ni mg kg^{-1}
28VC08	1.5-2.0	0	4.34	95.66	0.7	273	56.8	1760	7.66	0.306	298	18.2	134	n/a	93.4
31VC09	0.5-1.0	0	6.95	93.05	1.7	463	74.1	956	4.12	0.278	240	17.9	208	n/a	130
32VC09	1.5-2.0	0	6.01	93.99	0.6	9.47	47.6	177	2.64	0.075	36.8	15.8	98.8	n/a	91.9
35VC10	0.5-1.0	51.7	2.36	45.94	1.4	850	88.7	1690	7.06	0.617	317	22.2	169	n/a	93.6
36VC10	1.5-2.0	0	5.97	94.03	0.5	5.15	45	165	2.72	0.087	26.9	15.3	88.5	n/a	77.5
39VC12	0.5-1.0	0	6.15	93.85	1	12.3	64.9	300	2.77	0.224	81.9	18.3	120	n/a	100
40VC12	1.2-2.0	0	2.41	97.59	0.46	3.73	48.4	172	2.2	0.04	30.7	16.5	106	n/a	75.3
43VC13	0.5-1.0	0	3.3	96.7	1.07	7.38	53.2	318	2.7	0.186	75.2	15.1	133	n/a	108
47VC15	0.5-1.0	51.06	3.14	45.8	1.46	199	71	994	3.84	0.409	240	19.2	239	n/a	153
51VC16	0.5-1.0	12.3	0	87.7	0.56	2.82	51.6	150	2.92	0.077	47	10.4	233	n/a	157
52VC16	1.5-2.0	0	2.03	97.97	1.05	3.78	55	114	4.91	0.054	39.2	7.02	110	n/a	76.6
55VC17	0.5-1.0	0	1.15	98.85	0.66	<0.05	50.3	149	2.76	0.098	25.2	14	121	n/a	114
56VC17	1.5-2.0	0	1.41	98.59	0.55	<0.05	46.2	137	2.62	0.057	23.6	13.4	88.9	n/a	78.9
59VC18	0.5-1.0	0	2.83	97.17	0.67	9.49	71.4	164	2.91	0.073	33.9	17	149	n/a	125
60VC18	1.5-2.0	0	0.52	99.48	0.61	<0.05	47.9	134	2.72	0.078	23.5	14.1	92.3	n/a	82.1
63VC19	0.5-1.0	0	6.89	93.11	1.39	165	109	1870	5.67	0.413	278	20.4	214	n/a	125
64VC19	1.5-2.0	0	6.27	93.73	1.6	273	106	5180	19.9	1.57	1030	27.8	160	n/a	102
67VC20	0.5-1.0	0	6.47	93.53	1.92	328	155	1990	7.09	0.663	353	19.2	157	n/a	95.9
68VC20	1.5-2.0	0	3.53	96.47	0.66	<0.05	49.2	128	2.88	0.057	24.6	14.7	114	n/a	81.4

Sample ID code	Sampling depth m	Li mg kg-1	Al mg kg-1	DBT mg kg-1	TBT mg kg-1	Σ TBT + DBT mg kg-1	PCB 028 ug kg-1	PCB 052 ug kg-1	PCB 101 ug kg-1	PCB 138 ug kg-1	PCB 153 ug kg-1	PCB 180 ug kg-1	PCB 118 ug kg-1	PCB Σ7 PCB ug kg-1	PAH Acenaphthene ug kg-1
28VC08	1.5-2.0	34.8	43800	n/a	n/a	n/a	7.12	<3	2.44	1.56	2.24	1.28	<1	18.64	27
31VC09	0.5-1.0	49.8	44700	n/a	n/a	n/a	36.8	17.9	11	7.84	10.3	12.9	13.8	110.54	146
32VC09	1.5-2.0	35.3	48000	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<2
35VC10	0.5-1.0	63.5	44100	n/a	n/a	n/a	22.4	24.6	8.64	8.44	9.08	9.64	8.56	91.36	160
36VC10	1.5-2.0	33.2	40900	n/a	n/a	n/a	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5
39VC12	0.5-1.0	40	51800	n/a	n/a	n/a	5.6	<3	2.04	1.76	1.8	1.44	1.72	17.36	22.6
40VC12	1.2-2.0	31.9	58300	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.4
43VC13	0.5-1.0	39.2	48200	n/a	n/a	n/a	4.08	<2	1.64	1.6	1.56	1.2	1.4	13.48	23.1
47VC15	0.5-1.0	54.1	53700	n/a	n/a	n/a	8.68	5.56	5.96	6.16	7.4	5.44	5.08	44.28	51.4
51VC16	0.5-1.0	37.2	42500	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3
52VC16	1.5-2.0	31.5	42300	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5.9
55VC17	0.5-1.0	36.8	52500	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.31
56VC17	1.5-2.0	34.8	35400	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.8
59VC18	0.5-1.0	44	33100	n/a	n/a	n/a	<0.3	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	27.9
60VC18	1.5-2.0	35	43600	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.2
63VC19	0.5-1.0	58.3	32600	n/a	n/a	n/a	3.64	<1	1.32	0.96	1.48	<0.5	<0.7	9.6	37.1
64VC19	1.5-2.0	57.5	50600	n/a	n/a	n/a	7.2	<2	<4	2.44	6	3.8	<2	27.44	84.2
67VC20	0.5-1.0	52.7	41500	n/a	n/a	n/a	6.12	<3	4.52	<2	3.84	2.68	3.28	627	103
68VC20	1.5-2.0	31.6	57500	n/a	n/a	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.6

Sample ID code	Sampling depth m	PAH Acenaphthylene ug kg^{-1}	PAH Anthracene ug kg^{-1}	PAH Benzo (a) anthracene ug kg^{-1}	PAH Benzo (a) pyrene ug kg^{-1}	PAH Benzo (b) fluoranthene ug kg^{-1}	PAH Benzo (ghi) perylene ug kg^{-1}	PAH Benzo (k) fluoranthene ug kg^{-1}	PAH Chrysene ug kg^{-1}	PAH Dibenz (a,h) anthracene ug kg^{-1}
28VC08	1.5-2.0	196	150	339	419	386	245	188	309	62.4
31VC09	0.5-1.0	380	651	1620	1550	1620	934	747	1730	282
32VC09	1.5-2.0	4.1	<2	7.3	9.1	50.7	22.3	<10	70.5	5.1
35VC10	0.5-1.0	380	855	1510	1550	1530	850	638	1830	223
36VC10	1.5-2.0	<2	<2	2.7	3.5	36.2	16.2	<10	60.6	<5
39VC12	0.5-1.0	116	123	237	391	361	233	160	260	58.1
40VC12	1.2-2.0	<2	<2	<2	<2	25.3	18.5	<10	27	<5
43VC13	0.5-1.0	162	124	288	351	303	208	138	276	49.3
47VC15	0.5-1.0	234	228	509	708	596	369	276	481	101
51VC16	0.5-1.0	13.5	7	15.2	15.9	24.4	10.3	<10	23	<5
52VC16	1.5-2.0	<2	<2	<2	<2	39.6	<10	<10	46.8	<5
55VC17	0.5-1.0	<2	<2	2.3	4.1	64.4	27.3	<10	88.8	5.5
56VC17	1.5-2.0	<2	<2	<2	3	47.4	21.3	<10	69.9	<5
59VC18	0.5-1.0	76.7	99	237	248	245	131	92.3	281	34.9
60VC18	1.5-2.0	6.3	<2	7.54	9.3	58.6	29.1	<10	91.1	6
63VC19	0.5-1.0	236	152	404	506	455	280	199	378	76
64VC19	1.5-2.0	309	302	757	1100	897	557	387	809	151
67VC20	0.5-1.0	337	268	661	775	773	470	356	680	128
68VC20	1.5-2.0	15.4	7.8	16.7	19.4	40.8	20.2	<10	54.7	<5

Sample ID code	Sampling depth m	PAH Flourene ug kg^{-1}	PAH Fluoranthene ug kg^{-1}	PAH Indeno (1,2,3–cd) pyrene ug kg^{-1}	PAH Naphthalene ug kg^{-1}	PAH Phenanthrene ug kg^{-1}	PAH Pyrene ug kg^{-1}	PAH Σ 16 ug kg^{-1}	γ–HCH (Lindane) ug kg^{-1}	HCB ug kg^{-1}	Dieldrin ug/kg	Tri-butyl Tin ug/kg	Di-butyl Tin ug/kg
28VC08	1.5-2.0	55.4	330	224	95.3	212	526	n/a	<2	<1	<3	25.2	13.5
31VC09	0.5-1.0	320	2200	896	259	1800	2380	n/a	no result	no result	no result	no result	no result
32VC09	1.5-2.0	27.9	13.2	<10	62	96.1	27.1	n/a	<2	<1	<3	<4	<4
35VC10	0.5-1.0	390	2320	852	401	1790	2470	n/a	<2	<1	<3	13.7	120
36VC10	1.5-2.0	27.3	9.5	<10	54.9	87.9	20	n/a	<2	<1	<3	<3	<3
39VC12	0.5-1.0	40.1	260	213	81.8	189	426	n/a	<2	<1	<3	23	<5
40VC12	1.2-2.0	<10	3.9	<10	<30	24.3	8.54	n/a	<2	<1	<3	<4	<4
43VC13	0.5-1.0	41.1	244	173	72.9	200	475	n/a	<2	<1	<3	220	9.69
47VC15	0.5-1.0	72.8	500	348	174	333	785	n/a	no result	no result	no result	1620	24.5
51VC16	0.5-1.0	<10	11.9	<10	<30	12.8	31.8	n/a	<2	<1	<3	<3	<3
52VC16	1.5-2.0	17.3	5.7	<10	30	58.1	20.6	n/a	<2	<1	<3	<4	<4
55VC17	0.5-1.0	41.1	11.4	<10	54	129	26.2	n/a	<2	<1	<3	<3	<3
56VC17	1.5-2.0	34	<2	<10	40.6	101	19.9	n/a	<2	<1	<3	<3	<3
59VC18	0.5-1.0	84.5	196	105	111	289	338	n/a	<2	<1	<3	13.8	<3
60VC18	1.5-2.0	46.7	13.8	<10	64.3	126	31.7	n/a	<2	<1	<3	16.5	<3
63VC19	0.5-1.0	51.1	457	275	135	265	557	n/a	<2	<1	<3	380	76.9
64VC19	1.5-2.0	128	911	511	274	643	1170	n/a	<2	<1	<3	4110	568
67VC20	0.5-1.0	128	846	435	247	510	911	n/a	<2	<1	<3	11200	627
68VC20	1.5-2.0	23.1	27.6	10.6	69.2	78.8	38.7	n/a	<2	<1	<3	4.42	3.2

APPENDIX 12

CULTURAL HERITAGE

APPENDIX 12.1: GAZETTEER OF KNOWN ARCHAEOLOGICAL AND ARCHITECTURAL/INDUSTRIAL HERITAGE DATA RELEVANT TO THE PORT OF DUBLIN ABR PROJECT.

Known information that occurs within the proposed development area is highlighted in blue.

Readers will observe that several sites are identified under different headings, indicating the spectrum of interest attaching to them.

Cartographic Sources

Shortlist of relevant cartographic sources that can be examined to reveal the changing nature of Dublin's Deepwater Port and Approach Channel.

Reference No.	Date	Type	Title/Description	Source
Down Survey	1650s	Maps	The Down Survey was a national assessment commissioned by Cromwellian interests to record the values and assets of lands available for redistribution. William Petty, Surgeon-General, oversaw the mapping project which occurred between 1656-58. It accompanies a manuscript record known as the Civil Survey. A series of levels of mapping was made, including county maps, barony maps and parish maps. Dublin is well served in the various levels of mapping. The city's focus remained upriver at this time, and despite a relatively low level of details for maritime issues, the maps clearly highlight the extension of sand flats far into the Bay, with principal passages available through the sands for shipping.	http://downsurvey.tcd.ie/
Bernard de Gomme	1673	Map	The city and suburbs of Dublin, from Kilmainham to Ringe-End werein the rivers, streets, lanes, alleys, churches, gates &c. are exactly described. Scale 1760 yards to 1 English mile.	Facsimile in Richview Library, UCD See Figure 12.2
Thomas Phillips	1685	Map	Map of Dublin, showing in outline the development of the prosperous city, with the river mouth area broadly sketched out, highlighting the principal channels through the sand flats.	NLI
John Rocque	1757	Map	A Survey of the city harbour and environs of Dublin is the earliest detailed map that conveys the complexity of the city's streets and housing, and its development eastwards to extend around both sides of the Bay. The map, which is based on an earlier version dated to 1610, provides details of the principal sand flats, and shows shipping navigating along, suggesting the nature of the principal constraints.	http://bibliotecadigitalhispanica.bne.es/ See Figures 12.3-12.5
George Semple	1762	Charts	Surveys of Dublin Bay. Semple's surveys reflect an older school of cartography, whose details were not sufficient for the emerging needs of a new and vibrant port.	
Capt. William Bligh	1800	Chart	Survey of the Bay of Dublin. Bligh's is the first detailed and professional admiralty chart completed for Dublin Bay, and it remains of considerable interest because of the detail it	BM Add Ms 35,913 (extracts);

Reference No.	Date	Type	Title/Description	Source
			includes.	NLI microfilm n.918 p.993; Facsimile on display in the Dublin Port Co.
Plan of Dublin	1817	Map	Map of the city extending east to what is now East Wall, the detail shows the process of gradual infill of the North Lots.	Warburton, Whitelaw and Walsh, "History of the City of Dublin, etc." London, Cadell & Davies, 1818
Ordnance Survey 6-inch sheets Dublin 18, 19	1837	Map	The Ordnance Survey's First Edition 6-inch to the mile series is the first metrically-accurate national survey of Ireland, and is an essential source for understanding the historic landscape. It provides a detailed measured view of the country prior to widespread industrialization, and records systematically a wide range of small-scale features for the first time, such as field boundaries, fish traps, and archaeological monuments and ruins.	www.osiviewer.ie See Figure 12.6
Admiralty Chart 1447	1880	Chart	Ireland. Dublin Bar and the River Liffey to Carlisle Bridge. Issued in 1880 based on survey by Staff Commander Langdon. Detailed soundings of the approach channel along the Liffey, with representation of the emerging deepwater port prior to its official naming, and showing the still unfinished extent of NQE, which is recorded simply as, 'quay building'.	UKHO, paper copy in ADCO's archive See Figure 12.8
Admiralty Chart 1468	1883	Chart	Wicklow to Skerries Islands with Dublin Bay, based on information acquired between 1853-80. The chart provides an accurate record of the developing deepwater port, the training walls and the approach channel, showing depths and hazards	Admiralty Office See Figure 12.7
Ordnance Survey 25-inch sheets	1907	Map	The 25-inch to the mile OS maps provide a much more detailed record of specific locations, which includes the principal cities, and reveals the extent of change in the intervening period	www.osiview.ie
Valuation Maps, Dublin sheets XVIII, XIX	1909	Map	Based on the 1837 OS map and including 1907 revisions, the 1909 Valuation Maps were prepared at a scale of 5-feet to the mile. The maps are annotated to cross-references with the Valuation Books (North Dock 1906-1915), which record the landowners, land use and rates payable from each property.	Valuation Office, Dublin

National Museum of Ireland Topographical Files

Registration No.	Type	Findplace / Location	Description	Easting	Northing	Distance to development	Mitigation
RIA 1918:368	Bead	Pigeon House Fort	Glass bead, blue with white and blue ridges and white and blue spiral knobs				None

Registration No.	Type	Findplace / Location	Description	Easting	Northing	Distance to development	Mitigation
			with yellow insets, a good deal broken. It was found in June 1918 by C Keane, Museum attendant, in the water at the Pigeon House Fort. It measures 6/8" by 7/8"				
L1931:002	Bronze Axe	Clontarf	Axehead. Exact provenance unknown				None
1941:972	Flint Axe	31 Castle Ave, Clontarf	Found in backfill of house foundations to the rear. Flint Axe-head				None
1954:004	Jug	Pigeon House	Medieval Ceramic Jug Sherd. Found in gravel below estuarine clay, Pigeon House				None
1954:168	Knife	East Wall	Tanged iron knife. Found in foundation trench for Church, East Wall				None
1968:300	Bronze Axe	Clontarf	Flat axe head. Salisbury Collection				None
1968:312	Bronze Axe	Clontarf	Flanged axe head. Salisbury Collection				None
1970:190	Clay Pipe	Near North Quay Extension	Clay pipe bowl. Dredged up from sunken vessel/boat, north side of channel near North Wall Quay Extension	Not recorded	Not recorded	Within	Monitoring of dredging works
1970:191	Pottery	Near North Quay Extension	Pottery fragment, rimsherd. Dredged up from sunken vessel/boat, north side of channel near North Wall Quay Extension	Not recorded	Not recorded	Within	Monitoring of dredging works
1970:192	Copper vessel	Near North Quay Extension	Portion of thin copper vessel. Dredged up from sunken vessel/boat, north side of channel near North Wall Quay Extension	Not recorded	Not recorded	Within	Monitoring of dredging works
2000:088	Horseshoe	Sir John Rogerson's Quay	Possibly 19th / early 20th century Dray Horse Shoe				

Department of Arts, Heritage, and Local Government, Record of Monuments and Places.

Reference No.	Classification	Townland	Description	Easting	Northing	Distance to development	Mitigation
DU018-020201	Quay	Dublin South City	Sir John Rogerson's Quay	717208	734319	500m	None
DU018-020564	Quay	Dublin North City	North Wall Quay	717709	734434	0m	None
DU018-053	Settlement cluster	Dublin South City	No details available	718006	734002	300m	None
DU018-066	Building	Dublin South City	No details available	718505	734063	100m	None
DU019-027	Blockhouse	Dublin South City	A blockhouse was built in 1760 on the east side of Pigeon House fort (RPS 6794). The blockhouse was used for the storage of tools and materials and as a repository for flotsam and jetsam claimed by the Corporation (Kerrigan 1995, 177-8; De Courcy 1996, 299).	720330	733674	300m	None
DU019-028	Battery	Dublin South City	In 1793 the Board of Ordnance built a battery on the South Wall, c. 800m from the Poolbeg lighthouse. It was known as the Half Moon or Five Gun Battery, and was armed with five 24-pounder guns with which it controlled the channel of the river and the water around the Poolbeg lighthouse, providing some defence for the port and for Sandymount Strand. An addition was made to the batter in 1795. The battery was subsequently dismantled and the site is used as a swimming-place (Kerrigan 1995, 176-7; De Courcy 1996, 185).	722291	733901	150m	None
DU019-029002	Sea wall	Dublin South City	In 1759 the Ballast Office wall, a double stone wall was constructed at Ringsend. The two walls varied from 11m to 14m apart and the space between was filled with sand (De Courcy 1996, 377). See also RPS 6798.	720637	733805	100m	None

National Inventory of Architectural Heritage.

The online database of the NIAH does not yet include Dublin.

Dublin Development Plan, 2011-2017

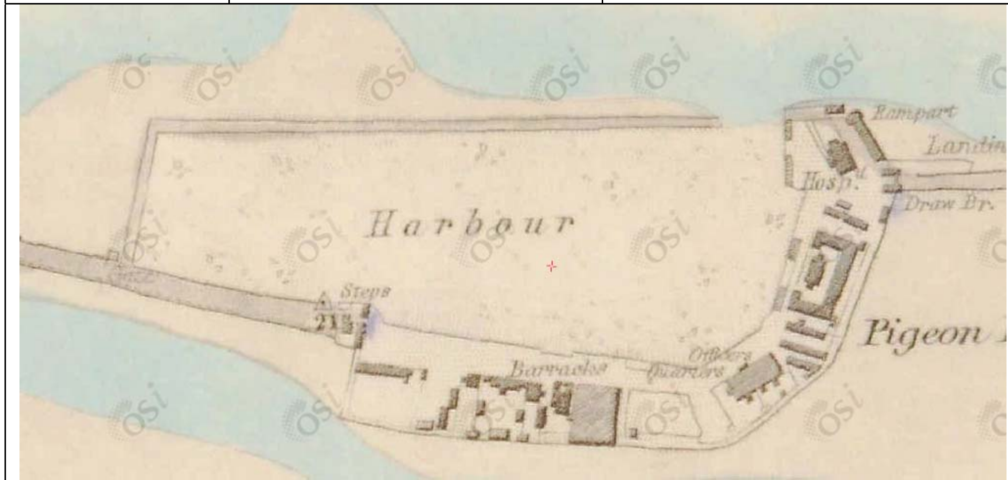
Information drawn from Volume 2, Map F, and from Volume 3, Record of Protected Structures.

The bulk of the Port lands within the project area are zoned ‘Z7’, which are deemed ‘to provide for the protection and creation of industrial uses and facilitate opportunities for employment creation’. This includes the entirety of Alexandra Basin, and the reclaimed lands of the Port area to the east. It also includes much of the South quays, however this area is considered to be a Zone of Archaeological Interest, and the locations of the Pigeon House and the South Bull wall out to and including Poolbeg Light house are further considered to be Conservation Areas.

The North Bull wall is not highlighted but Bull Island is zoned ‘Z9’, which is deemed ‘to preserve, provide and improve recreational amenity and open space and green networks’.

RPS No.	Name	Description	Easting	Northing	Distance to development	Mitigation
6782	70 Pigeon House Rd	House			135m	None
6783	71 Pigeon House Rd	House			135m	None
6784	72 Pigeon House Rd	House			135m	None
6785	73 Pigeon House Rd	House			135m	None
6786	74 Pigeon House Rd	House			135m	None

RPS No.	Name	Description	Easting	Northing	Distance to development	Mitigation
6787	75 Pigeon House Rd	House			135m	None
6788	76 Pigeon House Rd	House			135m	None
6789	77 Pigeon House Rd	House			135m	None
6790	78 Pigeon House Rd	House			135m	None
6791	79 Pigeon House Rd	House			135m	None
6792	80 Pigeon House Rd	House, including former coastguard premises			135m	None
6793	Pigeon House Rd	St Catherine's Hospital and surviving boundary walls			230m	None
6794	Pigeon House Rd	Pigeon House Fort, remnants. Pigeon House Fort was established as a military post shortly before the outbreak of the 1798 Rising. The site was formerly a landing place since at least the late 1600s, when it was known as the 'Green Patch'. A formal harbour was developed in the 18th-century when the Great South Wall was constructed. A blockhouse was built, and after John Pidgeon became the resident caretaker it developed as a place for refreshment. The harbour facility continued to develop and when it became a fort the site was intended to serve as a citadel for Dublin and as a refuge with its own harbour. The fort absorbed the pre-existing dock, blockhouse and hotel complex, and occupied the curving perimeter of the Great South Wall that enclosed the south side of Pigeon House Basin, also known as Poolbeg Harbour. The South Wall was extended south and east to accommodate the fort. Several of the fort's buildings remain, including parts of the perimeter wall on the west and south sides. The fort was entered from the west and from the east by drawbridges, and both entrances were heavily protected with gun embrasures. The fort provides good defensive cover to the			300m	None

RPS No.	Name	Description	Easting	Northing	Distance to development	Mitigation
		harbour, and included a series of buildings within, including the blockhouse that survives (RMP DU 19-027). The site today is occupied by the power station, which was begun in 1903 (Kerrigan 1995, 176-8; Giacometti 2009, 94).				
						
Extract from OS First Edition 6-inch map showing outline of Pigeon House Fort, c. 1837. www.osi.ie			Extract from OS Ortho image showing development of Pigeon House Fort site, 2005			
6795	Pigeon House Rd	Former Pigeon House Hotel, on the site of Pigeon House Fort			150m	None
6796	Pigeon House Rd	Pigeon House Power Station, former red-brick generating station, built in 1903 and now dilapidated.			Close to	None
6797	Pigeon House Rd	Limestone and granite ashlar sea wall			0	None
6798	Pigeon House Rd South Port /	South Wall (to lighthouse). See DU019-029002.			0	None

RPS No.	Name	Description	Easting	Northing	Distance to development	Mitigation
	Dublin Bay					
5835	North Quay Wall	Granite ashlar quay walls, setts, mooring rings, steps, bollards, lamp standards and machinery			0m	None
5843	North Quay Wall	Former Goods depot, now the O2			50m	None
7542	Sir John Rogerson's Quay	Granite ashlar quay walls, setts, mooring rings, steps, bollards, lamp standards and machinery			500m	None

Dublin City Industrial Heritage Record (DCIHR)

The DCIHR is maintained by Dublin City Council and seeks to be a comprehensive inventory of sites of industrial heritage within the city, based on information collated from documentary, cartographic and photographic sources, and from field inspection. Sites included are those within 400m of the North Quay Extension, those within Alexandra Basin, and those at or close to the Bull walls.

DCIHR No.	Name	Description	Easting	Northing	Distance to development	Mitigation
18-08-079	East Wall Rd	Port and Docks Board depot	718255	718255	300m	None
18-08-080	Alexandra Basin	Shipbuilding Yard	718238	734745	365m	Avoid Impacts
18-08-081	Alexandra Basin	North Wall Graving Dock	718377	734782	265m	Re-exposure to be achieved as an archaeologically directed operation
18-08-082	Alexandra Basin	Engine House	718386	734858	450m	None
18-08-083	Alexandra Basin	Flour Mill	718611	734812	340m	None
18-08-084	Alexandra Basin	Grain Silo	718515	734807	340m	None
18-08-092	East Wall	Gasometer	718397	734715	60m	None
18-08-094	East Wall Rd	Quay	718130	734616	Within	Avoid direct impacts

DCIHR No.	Name	Description	Easting	Northing	Distance to development	Mitigation
18-08-099	East Wall Rd	Lighthouse			Within	Avoid direct impacts
18-08-101	Alexandra Basin	North Wall Graving Dock Pumphouse	718397	734715	Within	Renovation to be achieved as an archaeologically directed operation
18-12-005	North Wall Quay Extension	Quays	718542	734315	Within	Archaeological recording in advance of development, Archaeological monitoring during development
18-12-079	North Wall Quay	Goods Station, GSWR	717964	734470	80m	None
18-12-080	Various	Great Southern and Western Rail	717964	734604	80m	None
18-12-082	East Wall Rd	Harbour Master's Office	718135	734442	Within	Archaeological Monitoring during development
18-12-083	North Wall Quay Extension	Goods Shed	718542	734315	Within	Archaeological Monitoring during development

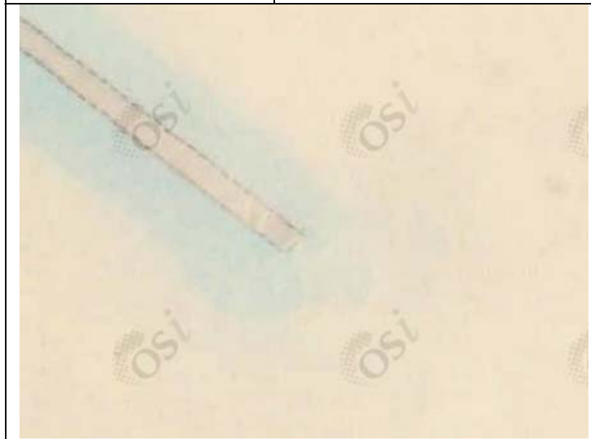
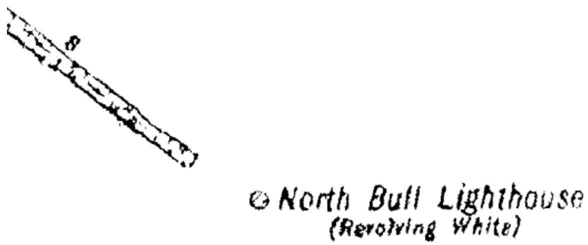
DCIHR No.	Name	Description	Easting	Northing	Distance to development	Mitigation
18-12-084	North Wall Quay Extension	Quay	718542	734315	Within	Archaeological recording in advance of development, Archaeological monitoring during development
18-12-085	North Wall Quay Extension	Goods Shed	718440	734383	Within	Archaeological Monitoring during development
18-12-086	North Wall Quay Extension	Goods Shed	718406	734347	Within	Archaeological Monitoring during development
18-12-087	North Wall Quay Extension	Revenue Watch House	718697	734316	Within	Archaeological Monitoring during development
18-12-088	North Wall Quay Extension	North Wall Lighthouse	718797	734292	Within	Archaeological Monitoring during development
18-12-089	Alexandra Basin	Quay	718227	734626	Within	None
18-12-090	North Wall Quay Extension	Alexandra Quay	718750	734645	Within	Archaeological Monitoring during

DCIHR No.	Name	Description	Easting	Northing	Distance to development	Mitigation
						development
18-12-091	Alexandra Basin	Alexandra Basin	718514	734477	Within	Archaeological Monitoring during development
18-12-092, 93	North Wall Quay Extension	Lighthouse (site)	718062	734413	Within	Archaeological Monitoring during development
18-12-094	North Wall /North Wall Quay Extension	Landing Stage	718084	734396	Within	Archaeological Monitoring during development
18-12-151	Pigeon House Rd	Syphone House	718758	733985	160m	None
18-12-152	Pigeon House Rd	Dublin Main Drainage Pumping Station	718866	733933	160m	None
19-05-012	North Bull	Breakwater/Retaining Wall	721914	735318	Adjacent	None
19-09-001	Pigeon House Rd	Boat slip	719072	733950	135m	None
19-09-002	Breakwater	Breakwater	719702	734226	Adjacent	None
19-09-003	Breakwater	Light house	719705	734226	Adjacent	None
19-09-004	Pigeon House Rd	Outfall works	720120	733771	Adjacent	None

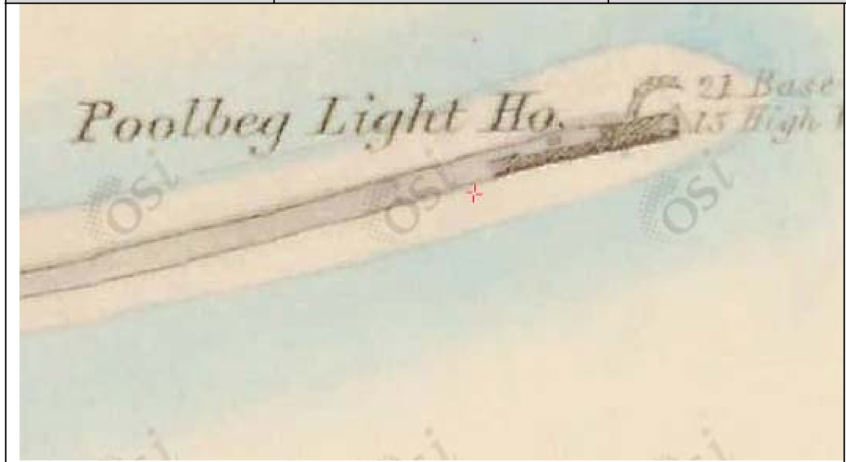
DCIHR No.	Name	Description	Easting	Northing	Distance to development	Mitigation
19-09-005	Pigeon House Rd	Lifeboat House	720338	733816	Adjacent	None
19-09-006	Pigeon House Rd	Electricity works	720457	733750	300m	None
19-09-007	Dublin Harbour	Life boat house	721370	733813	Adjacent	None
19-09-009	South Wall	Sluice House	721427	733833	200m	None
19-09-010	South Wall	Causeway	721420	733860	Adjacent	None
19-09-011	South Wall	Slip	721420	733860	Adjacent	None
19-09-015	Pigeon House	Poolbeg Generating Station chimneys	720539, 720617	733728, 733751	50m	None

National Civil Engineering Heritage Database The NCEHD identifies sites of interest to this interest group. Of some 275 current entries nationwide, 12 are based within or adjacent to the project area.

NCEHD No.	Name	Description	Distance to development	Mitigation
3138	East Wall Rd	Alexandra Bridge		None
3266	Alexandra Basin	Alexandra Quay	Adjacent	None
3152	Clontarf	Bull Rock Lighthouse, or the North Bull lighthouse, stands at the outer end of the submerged portion of the North Bull wall, and was originally separated from the wall. It is a relatively	Adjacent	None

<table>
<tr><th>NCEHD No.</th><th>Name</th><th>Description</th><th>Distance to development</th><th>Mitigation</th></tr>
<tr><td></td><td></td><td>modern construction.</td><td></td><td></td></tr>
<tr><td colspan="3"></td><td colspan="2">
</td></tr>
<tr><td colspan="3">Extract from OS 6-inch 1st edition map showing terminus of North Bull wall c. 1837. www.osi.ie</td><td colspan="2">Extract from OS 6-inch 3rd edition map 1912, showing addition of North Bull lighthouse, separated from the Bull wall.</td></tr>
<tr><td>3016</td><td>Clontarf</td><td>Bull Walls</td><td>Adjacent</td><td>None</td></tr>
<tr><td>3080</td><td>Alexandra Basin</td><td>Dublin Port</td><td>Within</td><td>Archaeological recording, Archaeological monitoring of impact areas</td></tr>
<tr><td>3251</td><td>North Wall Quay / York Rd</td><td>Liffey Service Tunnel</td><td></td><td>None</td></tr>
<tr><td>3024</td><td>Alexandra Basin</td><td>No. 1 Graving Dock</td><td>Within</td><td>Re-exposure to be achieved as an archaeologically</td></tr>
</table>

NCEHD No.	Name	Description	Distance to development	Mitigation
				directed operation
3093	Clontarf	North Bull Bridge		None
3253	Alexandra Basin	North Wall Quay Extension	Within	Archaeological recording in advance of development, Archaeological monitoring during development
3271	Pigeon House Rd	Pigeon House Power Station		None
3051	Poolbeg	Poolbeg Lighthouse, Great South Wall	Within	Archaeological Monitoring during development

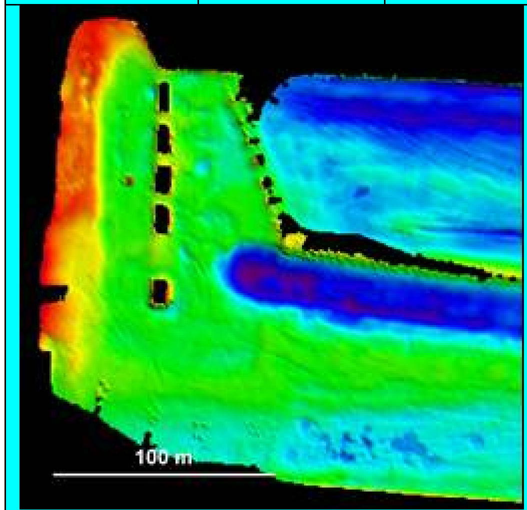
NCEHD No.	Name	Description	Distance to development	Mitigation
				
Detail from OS First Edition 6-inch map showing extent of Poolbeg Lighthouse c. 1837, showing an incomplete roundel at the terminus. www.osi.ie		Poolbeg Lighthouse, view looking South from within the Approach Channel, showing extent of modern rock armour protection at base of lighthouse, at Low Water.		
3047	Bridge Street	Ringsend		None

Department of the Environment, Heritage and Local Government, Historic Shipwreck Inventory.

Source: Underwater Archaeology Unit, National Monuments Section, DAHG

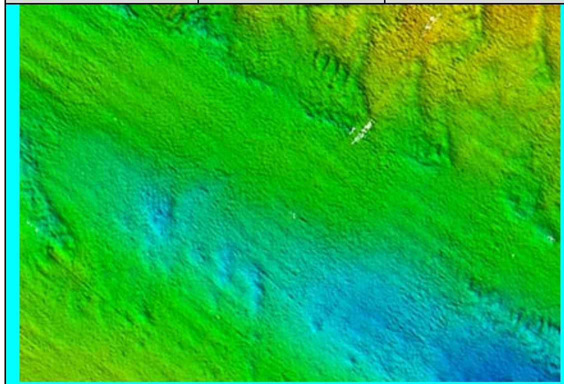
Coordinates given in Lat/Long, converted to ITM

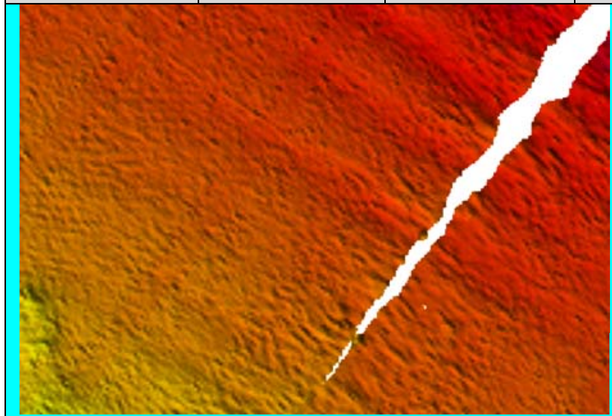
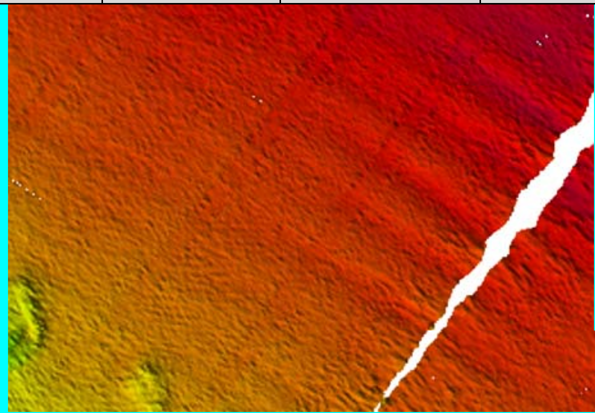
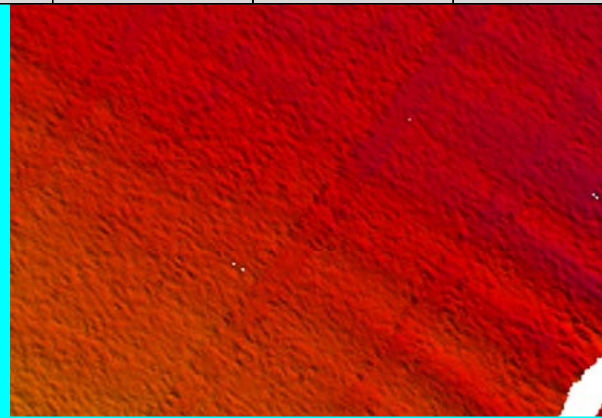
Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 20 51.72	006 07 12.18	725169.36	734700.649	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 20 47.22	006 07 11.28	725189.666	734562.018	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 20 43.02	006 06	725568.141	734442.112	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 20 41.82	006 06 58.5	725430.415	734401.365	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 20 53.28	006 04 48.	727828.81	734819.671	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 21 27.3	006 04 49.0	724459.282	735782.337	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 21 18	006 07 49.02	724466.81	735494.926	None
Dublin	Killkenny	Cargo ship	Container	21/11/1991	053 20 40.98	006 06 54	725514.324	734377.602	None
GSI 143	Dublin Privet	Fishing vessel		0/1988	053 19 46.27	006 08 09.71	724158.267	732650.062	None
W01110	Unknown	unknown	Bligh's map of Dublin Bay 1803	pre-1803	053 21 24.79	006 09 43.13	722351.536	735649.975	None
W01445	Unknown	unknown	Bligh's map of Dublin		053 21 9.995	006 10 12.38	721822.452	735178.847	None

Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
			Bay 1803						
GSI 162	Unknown	unknown	Geophysical anomaly. This is now buried under fill material introduced to Alexandra Basin West in 2008, beside the Lead-in jetty. The fill will be removed as part of the ABR project, potentially re-exposing this feature	Unknown	053 20 54.24	006 13 22.26	718323.519	734603.239	Archaeological monitoring of development works
			Surveyed by the GSI in in 2004, records have since been amended to be of "dead" status by UKHO, as it now lies in a reclaimed area. The description in 2004 described the site as 'Poor form, possible wreck, no identification'.						
W01126	Unknown	unknown	Bligh's map of Dublin Bay 1803		053 21 15.7	006 08 08.23	724113.478	735414.556	None
W01544	Unknown	Timber vessel	Timber wreck, measuring 15-feet wide with slate in ballast, tightly packed and	Unknown	053 19 32.70	006 10 04.6	722041.984	732175.642	None

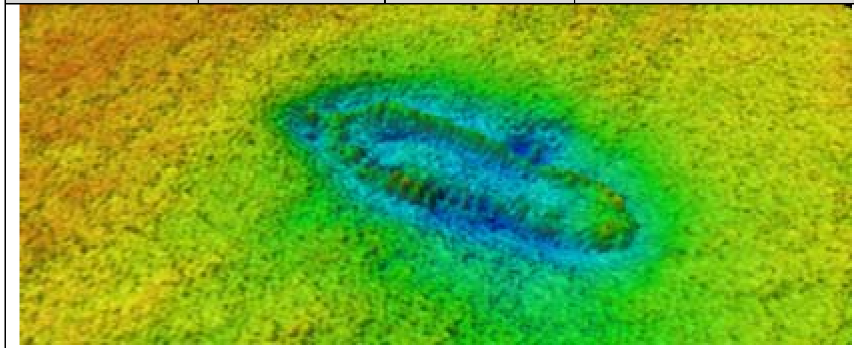
Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
			uncut, cut across by dredger for sewer pipe, and exposed in south face of trench.						
W01465	Unknown	Timber vessel	Frame of wooden vessel observed at Low Water on North Bank, Dublin Port. This site has been surveyed and is considered to be 18th/19th-century in date, see 08E497 below.	Unknown	053 20 53.029	006 10 56.67	721016.849	734633.318	None
W01540	Unknown	unknown	UKHO 009000069, surveyed in 1931 in a depth of 2m, listed as a 'dangerous wreck'		053 21 15	006 08 03	724210.746	735395.449	
W01135	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 36.93	006 08 55.16	723228.723	736048.075	None
W01136	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 39.2	006 08 57.57	723182.349	736117.073	None
W01137	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 27.44	006 09 20.03	722776.516	735742.888	None

Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
W01138	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 10.57	006 09 47.69	722278.534	735208.341	None
W01139	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 17.27	006 09 45.69	722310.186	735416.354	None
W01140	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 21.92	006 09 46.66	722288.552	735559.598	None
W01466	Unknown	Unknown	Marked on map entitled 'Map of Clontarf the Estate of John Vernon', 1790s	pre-1790s	053 21 01.59	006 10 38.6	721344.254	734906.69	None
W01731	Unknown	Sailing vessel	Bligh's map of Dublin Bay 1803, at the entrance to 'Cock Lake, in shallow water just off South Bull.	pre-1800	053 19 23.73	006 10 17.05	721820.206	731892.562	None
W01551	Unknown	unknown	INSS G160, possible wreck, measuring 3m long, 3m wide, 3m high off the seabed, in a general depth of 9m.	unknown	053 19 55.48	006 05 21.48	727263.029	733016.95	None

Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
			GSI INSS Multi-beam image of seabed at coordinates for W01551, revealing no distinctive indication of wreckage. The pale blue shading on the multi-beam image indicates a tongue of deeper water extending southeast.						
W01552	Unknown	Unknown	INSS G161a possible wreck, measuring 3m long, 3m wide, 3m high off the seabed, in a general depth of 8m.	unknown	053 20 01.572	006 05 21.984	727248.743	733204.908	
W01553	Unknown	Unknown	INSS G161b possible wreck, measuring 3m long, 3m wide, 3m high off the seabed, in a general depth of 8m.	unknown	053 20 02.436	006 05 22.524	727238.043	733231.219	
W01554	Unknown	Unknown	INSS G161c possible wreck, measuring 3m long, 3m wide, 3m high off the seabed, in a general depth of 8m.	unknown	053 20 03.552	006 05 22.02	727246.366	733266.079	

Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
									
GSI INSS Multi-beam image of seabed at coordinates for W01552, revealing no distinctive indication of wreckage.			GSI INSS Multi-beam image of seabed at coordinates for W01553, revealing no distinctive indication of wreckage.			GSI INSS Multi-beam image of seabed at coordinates for W01554, revealing no distinctive indication of wreckage.			
W01734	Unknown	Timber vessel	Timber vessel with timber and iron fastenings, and an iron knee with bronze fastenings, observed during dredging operations for the Dublin Bay pipeline in 2001, at Shellybanks, South Bull. Oriented E-W. Musket balls and bullets associated.	mid-1800s	053 20 10.50	006 10 42.39	721314.453	733325.985	None
Redeposited			Archaeological timbers from W01734 redeposited at known location		053 20 13.33	006 10 47.28	721221.769	733411.138	None

Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
Redeposited			Archaeological timbers from W01734 redeposited at known location		053 20 13.38	006 10 47.99	721208.596	733412.349	None
Redeposited			Archaeological timbers from W01734 redeposited at known location		053 20 13.33	006 10 48.56	721198.091	733410.535	None
Redeposited			Archaeological timbers from W01734 redeposited at known location		053 20 13.30	006 10 49.48	721181.097	733409.174	None
Redeposited			Archaeological timbers from W01734 redeposited at known location		053 20 11.26	006 10 40.84	721342.526	733350.204	None
W18522	Unknown	Unknown	Wrecksite identified during marine geophysical survey	Unknown			723444	733771	None

Reference	Name	Type	Detail	Date of Loss	Latitude N	Longitude W	ITMe	ITMn	Mitigation
				This wrecksite was found as part of a survey for the Ringsend WWTW effluent Outfall Extension. It lies 350m Southeast of Poolbeg lighthouse. It is clearly defined on a multi-beam data trace, defining a linear shape with both ends intact and perhaps the bow section facing Southeast. A series of short linear elements distinguishable on the side of the vessel may indicate timbering. It measures 16.4m long, 5.5m wide and is 0.2m in height above the surrounding seabed. Possible associated debris is indicated off-picture to the WSW of the stern section.					

Department of the Environment, Heritage and Local Government, Licensed archaeological intervention.

Source: *Excavations Bulletin*, annual publication edited by Isabel Bennett and published on behalf of the DAHG by Wordwell, Bray, and partially available online at www.excavations.ie

Note: the licensed work below refers only to work carried out within Dublin Port, on the Approach Channel, and in immediate proximity to the ABR project area.

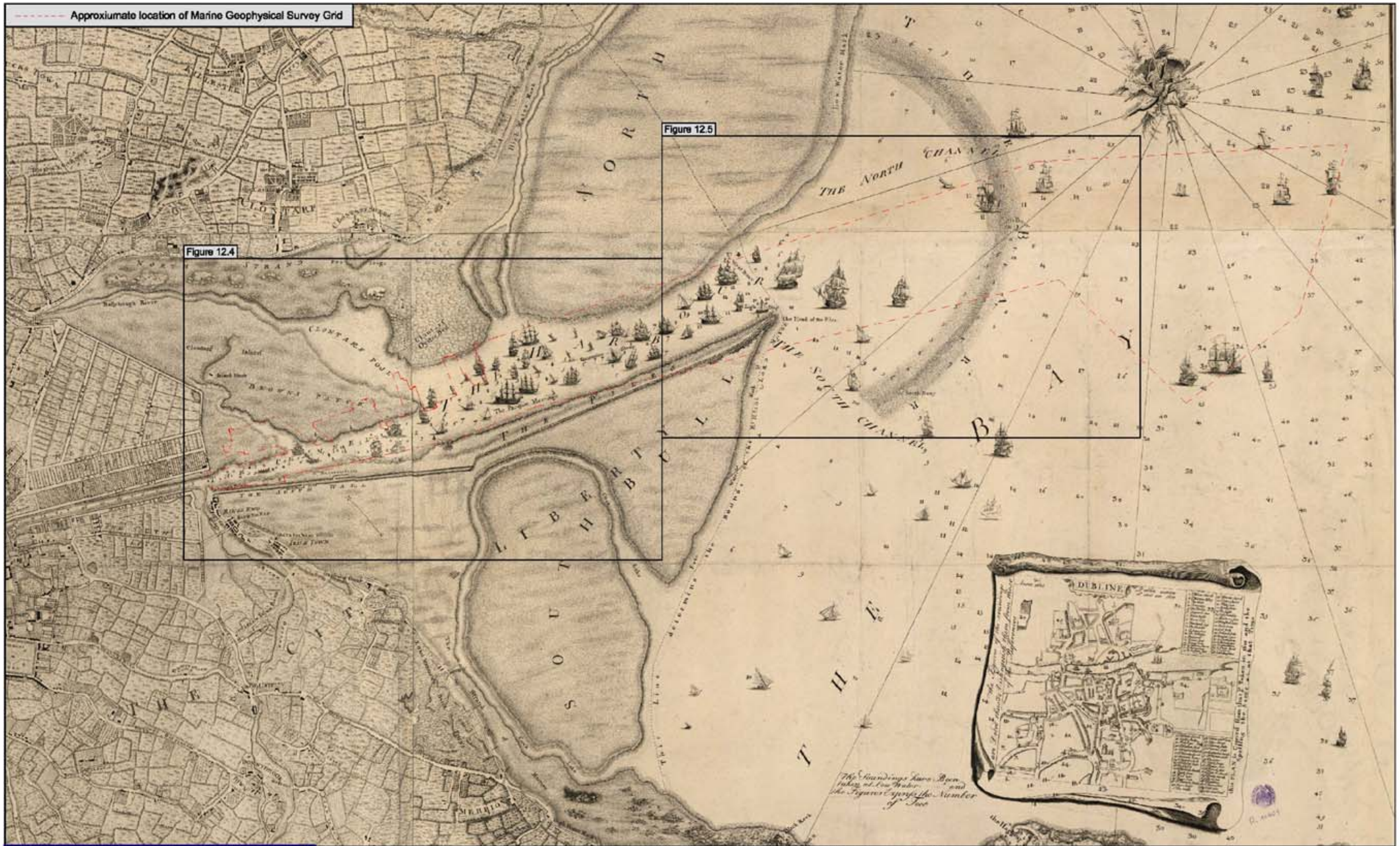
Licence No.	Name	Description	Easting	Northing	Distance to development	Mitigation
09E2000	Berth 51, Dublin Port	Removal of infill. The area of Berth 50 was reclaimed in the 1960s. New works included the construction of new piled quay walls and the removal of modern fill to create an enlarged Berth 50. Monitoring of the fill removal observed original seabed levels and did not observe material of archaeological significance (O'Connor 2013, 76).	719872	734619	Adjacent, off N side of Approach Channel	None
2008 no licence no.	Graving Dock No. 1, Dublin Port	Survey and recording was conducted during the dismantling and relocation of the coping stones of Graving Dock No. 1. The stones were labelled individually and placed in the base of the dock, which was then filled in (O'Connor 2013, 77).	718307	734794	Within	Archaeological supervision of reopening of Dock, for Heritage Gain
08E961	Berths 46-47, Pigeon House Road	Services relocation and construction of a link bridge for Berths 46-47 revealed some of the coping stones of the great Stone Wall at various locations along Pigeon House Road (O'Connor 2013, 76-7).	719795	733983	Adjacent, off S side of Approach Channel	None

08E497, 08D038, 08R109	Dublin Port	A timber wreck (W01465) lies partially exposed in the sandbank east of the North Point and terminal 5 and north of the Approach Channel, and is visible at Low Water. The location is thought to be on the former site of the Clontarf Oysterbeds. The wreck occupies an area measuring *c.* 18m x 6.9m in size and is orientated SE/NW, with its bow facing south. It is a timber vessel with iron fastenings, and is lying heeled over on its starboard side, surviving as three disarticulated sections. The hull is constructed using the carvel technique (edge-fastened timbers), and is supported internally by composite framing timbers. It is considered to be 18th/early 19th-century in date (Bangerter 2008).	721016	734633	450m E of North Point	None
08D085, 08R272	Harbour Quay, Poolbeg	Underwater assessment conducted within the footprint for a proposed intake/discharge facility at Poolbeg did not reveal material of archaeological significance (Bangerter 2008a).	719997 to 719965	739485 to 733807	Adjacent to S side of Approach Channel	None
04E560	Berth 50a, Dublin Port	Monitoring of dredging works for a new berth at the south end of Breakwater Road, and believed to be close to the former Brown's Patch sandbank and Clontarf deepwater pool. No material of archaeological significance was revealed. (Frazer 2004, 120).	719764	734256	Within	Archaeological monitoring of any dredging activity
04E740	Poolbeg Yacht and Boat Club	Dredging for a marina at Poolbeg Yacht Club revealed an upper layer of silt that contained modern mooring and related debris, over a lower layer of sterile grey silt. No material of archaeological significance was revealed (Kiely 2004, 134-5.:579).	718776	732936	Within, proposed site of breakwater	Archaeological monitoring of construction and dredging activities
02E1132	Poolbeg	Monitoring of dredging adjacent to a water intake at Poolbeg Power Station revealed modern debris and river sllts only (Gregory 2004, 182.646).	720654	733866	Adjacent to S side of Approach Channel	None
01E1004	Dublin Port, Docks and Approach Channel	Archaeological monitoring of marine dredging along the Approach Channel east of the East Link Bridge did not reveal material of archaeological significance (Ó Faoláin 2003b, 93).	Various	Various	Within	None

01E358	Dublin Bay	Dredging for the Cross-Bay wastewater pipeline, extending from Ringsend to Sutton, crossed the Approach Channel between Buoys 5 and 6. A timber wrecksite was identified near Sutton Creek, while the overall dredging recovered 124 objects, including 83 timbers, 25 ceramic sherds, 15 metal objects and 1 stone object (Ó Faoláin 2003a, 92-3).	721924 to 725123	733476 to 739075	Within	Archaeological inspection of seabed anomalies within the ABR area is ongoing. Archaeological monitoring of dredging operations.
01E288	Berth 51A, Dublin Port	Test trenching in advance of an extension to Berth 51A revealed a sequence of deposits whose upper level was made up of 1-2m deep building rubble used as backfill that was dumped onto the old estuary in 1970. The rubble lay above a fine estuarine silt 1-3.8m deep, which overlay glacial gravel at the base of the cuttings. One trench revealed the rubble used as a bund in the 1970s reclamation, and the depth of the rubble suggested an old dredging line associated with Port works in the 1960s. No material of archaeological significance was revealed (O'Donovan 2003, 101).	719924	734426	Adjacent to N side of Approach Channel	None
01E283	Dublin Bay	Dredging for the Cross-Bay wastewater pipeline, extending from Ringsend to Sutton, crossed the Approach Channel between Buoys 5 and 6. A first phase of dredging focussed on the diverted shipping channel to accommodate the larger project. 109 objects were recovered, including 105 timbers, 2 composite metal-and-timber objects, and 2 leather objects. Many of the timbers were damaged but were evidently former ships' timbers, including strakes, keel and false-keel fragments, futtocks and floor timbers. Many bore treenails and brass bolts (Ó Faoláin 2003, 92).	723923 to 726423	734526 to 734526	Within	Archaeological inspection of seabed anomalies within the ABR area is ongoing. Archaeological monitoring of dredging operations.

THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 086 4449236 email: info@adco-ie.com	Notes Source: National Maritime Museum, Greenwich, UK. A4	Job/Size No. ABR_EIS	Compiled by R.Bangerter	CAD reference Dublin Port	Client RPS/ Dublin Port Company
		Date 12.02.14	Scale N.T.S.	Drawing No. Figure 12.2	Project ABR Project, Dublin Port.

Title
Figure 12.2- Detail from Bernard de Gomme's Map of 1673, '*City and Suburbs of Dublin*', showing the river mouth area.



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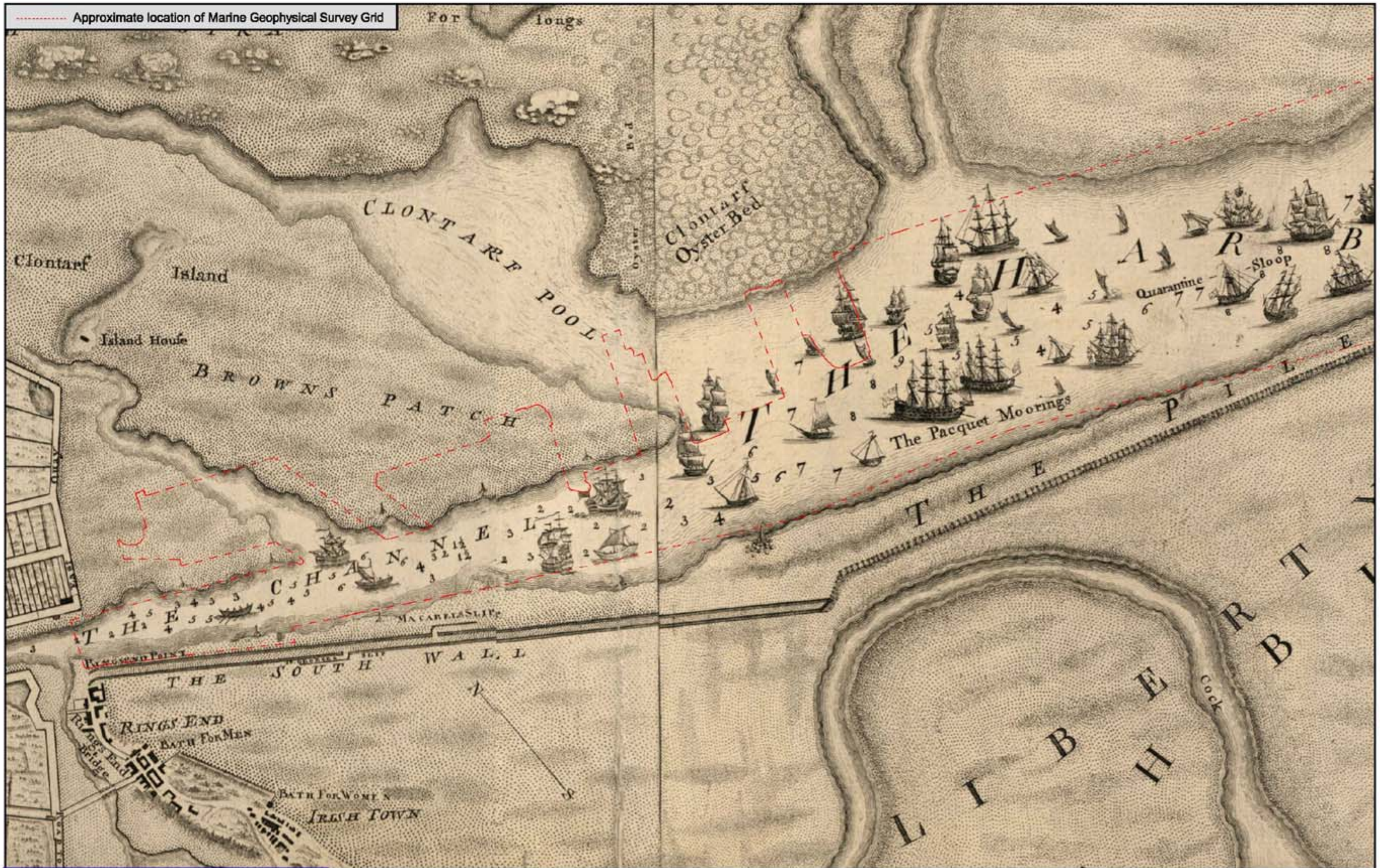
Notes
Source: bibliotecdigitalhispanica.bne.es
[see Figures 12.4-12.5 for detailed views of the map from within the EIS study area]

A3

Job/Exc No.	Compiled by	CAD reference	Client	Title
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Figure 12.3- John Roque's Map of 1756, '*A Survey of the City Harbour and Environs of Dublin*', with approximate extent of the Marine Geophysical Survey Grid superimposed.
Date	**Scale**	**Drawing No.**	**Project**	
12.02.2014	1:30,000	Figure 12.3	ABR Project, Dublin Port.	



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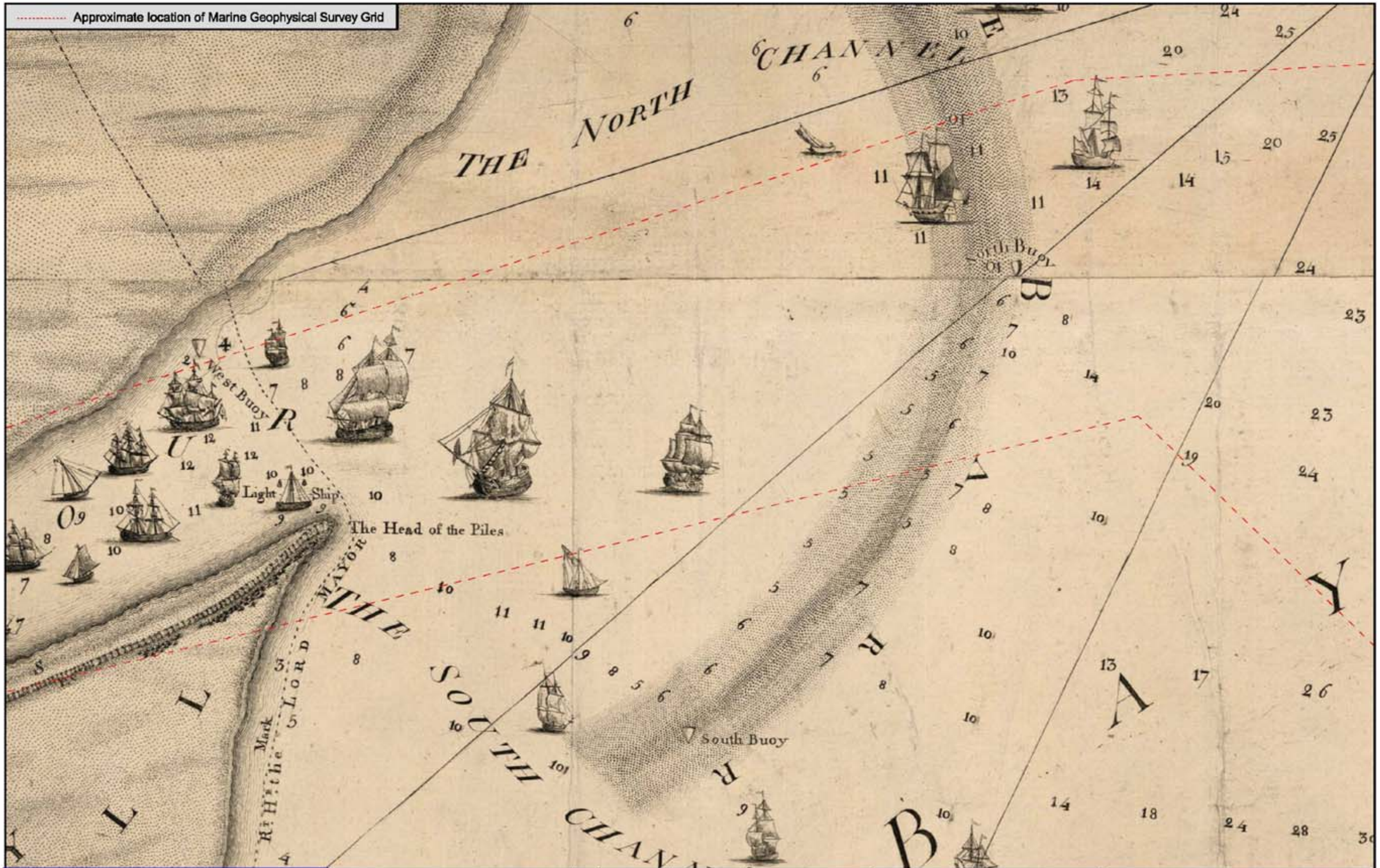
Notes
Source: bilioteodigitalhispanica.bne.es
[see Figure 12.5 for east side of EIS study area]
[see Figure 12.3 for overall area]

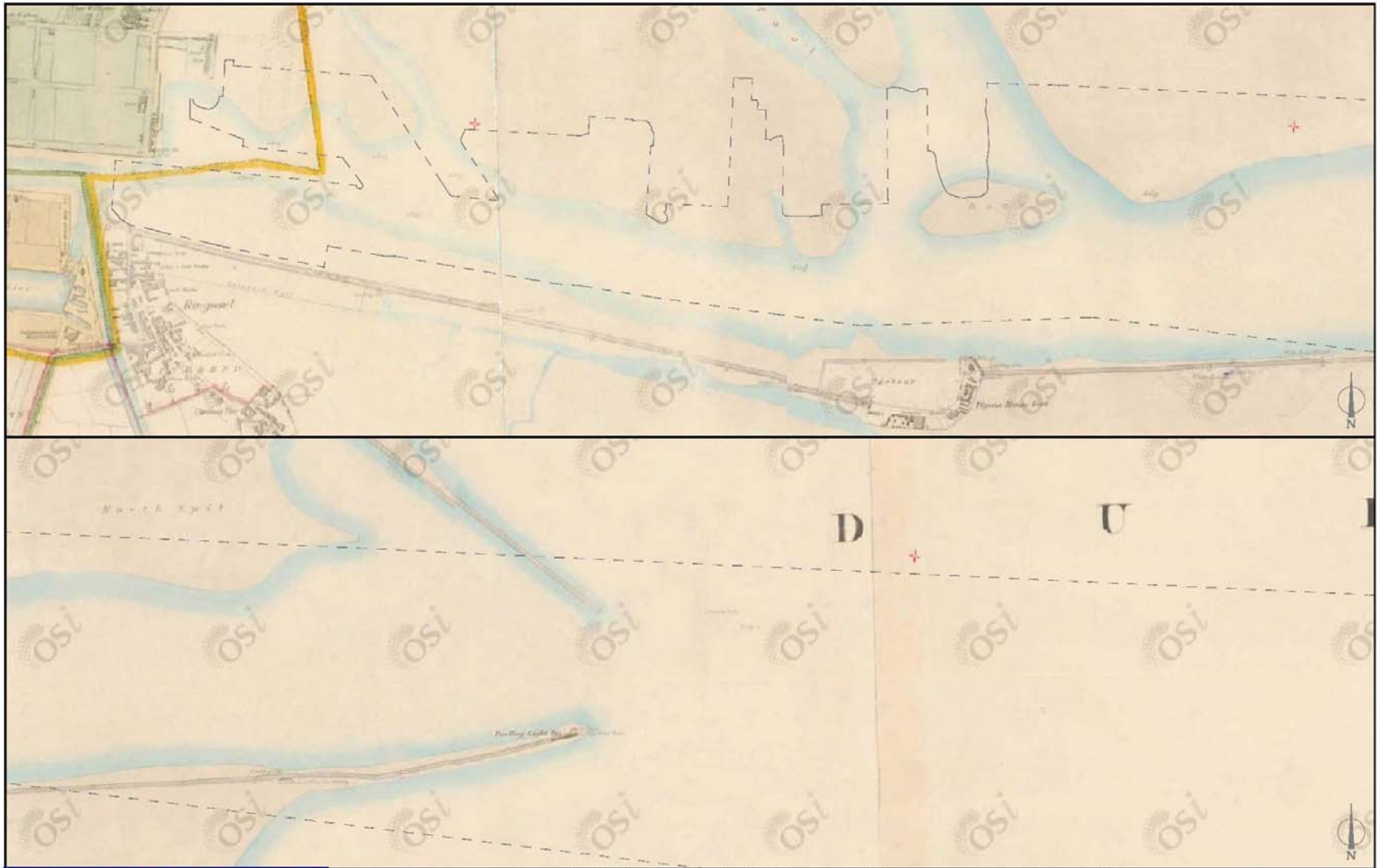
A4

Job/Exc No.	Compiled by	CAD reference	Client
ABR_EIS	R.Bangerter	Dublin Port	RPS/ Dublin Port Company
Date	**Scale**	**Drawing No.**	**Project**
12.02.14	1:15,000	Figure 12.4	ABR Project, Dublin Port.

Title
Figure 12.4- Detail from John Roque's Map of 1756, showing west side of EIS study area, with approximate location of the Marine Geophysical Survey Grid Superimposed.



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	Notes Source: bibliotecadigitalhispanica.bne.es [see Figure 12.4 for west side of EIS study area] [see Figure 12.3 for overall area]	A4	Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference Dublin Port	Client RPS/ Dublin Port Company	Title Figure 12.5- Detail from John Roque's Map of 1756, showing east side of EIS study area, with approximate location of the Marine Geophysical survey Area Superimposed.
			Date 12.02.14	Scale 1:15,000	Drawing No. Figure 12.5	Project ABR Project, Dublin Port.	



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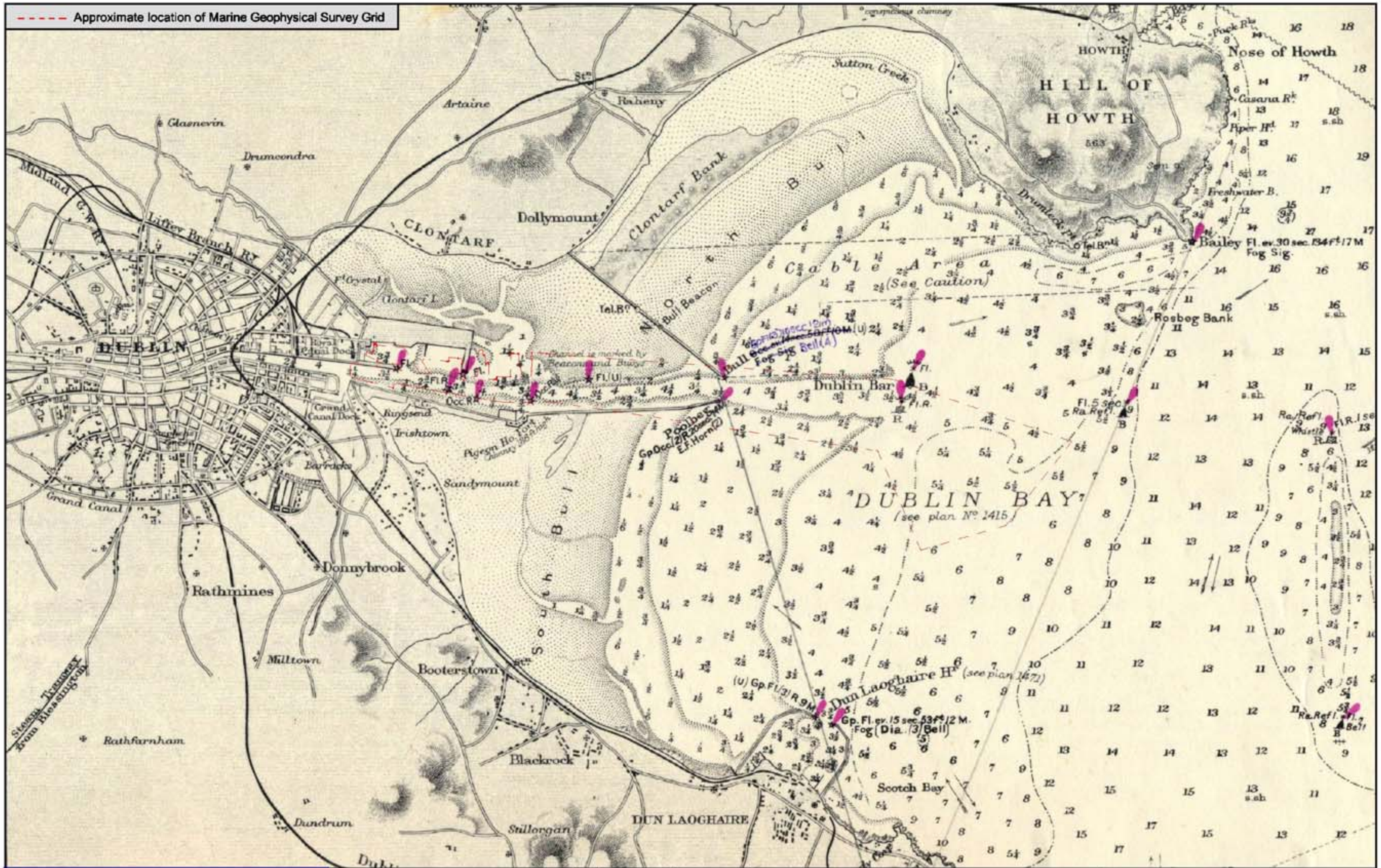
Tel. 056 4440236 email: info@adco-ie.com

Notes	A4	Job/Exc No.	Compiled by	CAD reference	Client	Title
Source: www.osi.ie ------ Approximate location of Marine Geophysical Survey Grid.		ABR_EIS	R.Bangerter	Dublin Port	RPS/ Dublin Port Company	Figure 12.6- Detail from Ordnance Survey First Edition Map of 1843 with approximate location of Marine Geophysical Surrey Grid Superimposed.
		Date 12.02.14	**Scale** 1:15,000	**Drawing No.** Figure 12.6	**Project** ABR Project, Dublin Port.	



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	Notes: Source: Admiralty Chart No.1468, Wicklow to Skerries Islands with Dublin Bay, 1883	A4	Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference Dublin Port	Client RPS/ Dublin Port Company	Title Figure 12.7- Detail from Admiralty Chart No.1468 (1883) with the approximate extent of the Marine Geophysical Survey Grid superimposed.
			Date 12.02.14	Scale 1:70,000	Drawing No. Figure 12.7	Project ABR Project, Dublin Port.	

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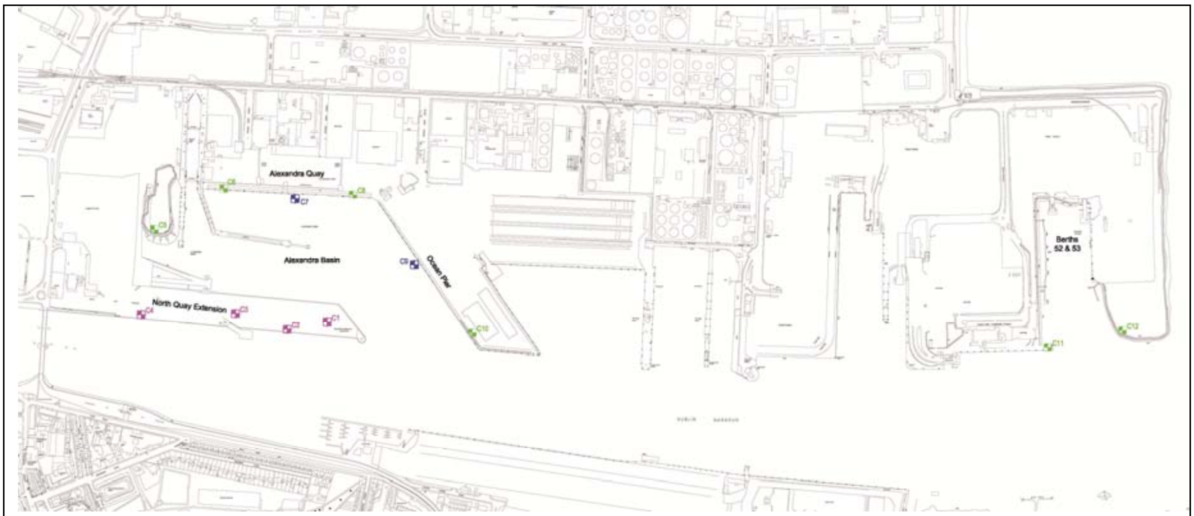
Notes	A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
Source: UKHO [Surveyed by Staff Commander C.H.C. Langdon, 1880, Chart No. 1447]		ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Figure 12.8- Detail from Commander Langdon's Chart of 1880, '*Dublin Bar & the River Liffey to Carlisle Bridge*'.
		Date	**Scale**	**Drawing No.**	**Project**	
		12.02.2014	1:60,000	Figure 12.8	ABR Project, Dublin Port.	

APPENDIX 12.2: SUMMARY OBSERVATIONS ARISING FROM ARCHAEOLOGICAL REVIEW OF SITE INVESTIGATIONS CONDUCTED FOR THE PORT OF DUBLIN'S ABR PROJECT.



Detail from Project Drawing IBM 498-SI-001, showing proposed locations of land-based cores

The following table summarizes data acquired by IGSL as Job Reference 17206 and provided by RPS to ADCO for archaeological review.

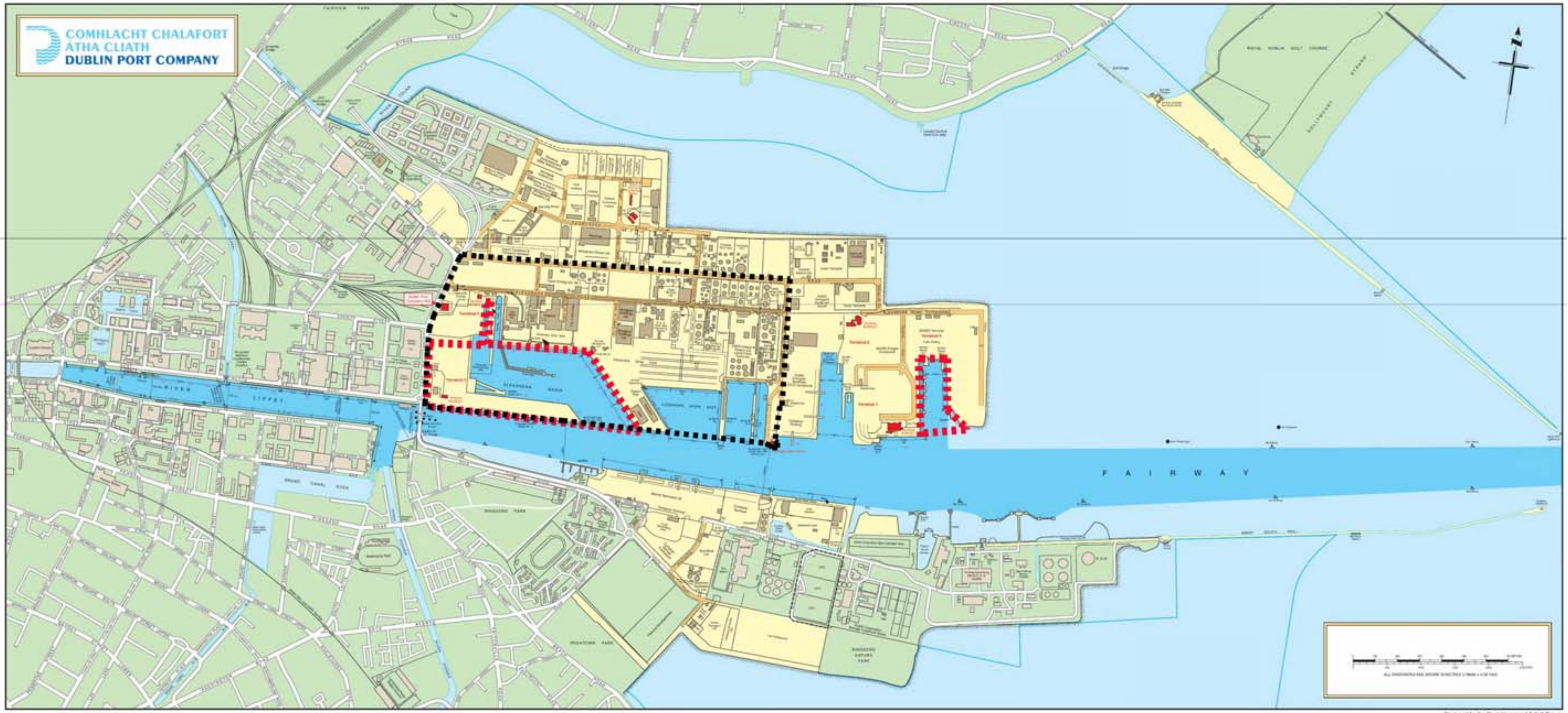
A combination of Shell and Auger Borehole (BH) and Rotary Coring (RC) was employed to achieve the desired depths of penetration where possible.

Reference	Location	Depth of Penetration	Observations	Archaeological issues
BH C1	North Quay Extension, close to terminus	7m	Below a surface level of concrete was 6.3m of MADE GROUND, consisting of grey sandy gravelly fill with steel/pipe pieces, coal, timber, cobbles, boulders, with a strong hydrocarbon odour. Coring terminated when reinforcing steel destroyed the core bit and barrel.	None
RC C1	Ditto above	7m	Rotary core assisted in coring, and abandoned at same depth.	None

<table>
<tr><th>Reference</th><th>Location</th><th>Depth of Penetration</th><th>Observations</th><th>Archaeological issues</th></tr>
<tr><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td colspan="3">View of coring operation, C1, 4/11/2013</td><td colspan="2">View inside sample bag from C1, showing nature of MADE GROUND material, which includes ceramic waste pipe sherds</td></tr>
<tr><td>BH C1A</td><td>Ditto above</td><td>11.50m</td><td>Below a surface level of concrete was 2.3m of MADE GROUND, consisting of sand, gravel, cobbles, boulders, and concrete, with a strong hydrocarbon odour. This overlay 50cm of MADE GROUND with black clayey fill with metal, timber, glass, which overlay 4.9m of SILT with grey black sand and some gravel, over dense grey fine-to-coarse GRAVEL with cobbles and boulders, which continued to base of core.</td><td>None</td></tr>
<tr><td>RC C1A</td><td>Ditto above</td><td>24m</td><td>Rotary Core was employed to continue depth of core to 25m. Symmetrix Drilling observed c. 1.5-2m thick layer of layers of silty clay with some gravel bands alternating with silty clay, extending to 18.5m, over grey clay to 22m over a c. 1m thick band of dark clay, over gravelly clay and occasional boulder, which continued to bottom of core.</td><td>The presence of dark clay at 22m may indicate an outwash clay layer.</td></tr>
<tr><td>BH C3</td><td>North Quay Extension, mid-section, within Stoney's construction footprint</td><td>24.8m</td><td>Below a surface level of concrete was 6.8m of MADE GROUND, consisting of gravelly fill with shell fragments, cobbles, and boulders. This overlay different layers SILT and SAND which continued to 17.2m, and overlay CLAY and clay and cobbles, which continued to base of core.</td><td>None</td></tr>
<tr><td>RC C3</td><td>Ditto above</td><td>3.4m</td><td>The rotary core was used to assist the shell and auger borehole, when obstructions were met.</td><td>None</td></tr>
<tr><td>BH C4</td><td>North Quay Extension, within Stoney's construction footprint, close to south side</td><td>14.2m</td><td>Below a surface level of concrete was 1.9m of MADE GROUND, consisting of clayey sandy gravelly fill. This overlay 90cm of sandy gravelly SILT, which overlay 3m of SAND and cobbles, over GRAVEL and cobbles and boulders, which continued to</td><td>Is the GRAVEL with cobbles and boulders the remnant of one of Stoney's caissons?</td></tr>
</table>

Reference	Location	Depth of Penetration	Observations	Archaeological issues
			base of core.	
BH C5	Alexandra Basin, on infill beside Lead-in Jetty	4.2m	A 50cm deep surface of CLAY over MADE GROUND of sand and cobbles and boulders with occasional red brick fragments extended to base of core.	None
RC C5	Ditto above	5m	The rotary core was used to assist the shell and auger borehole, and returned silt clay with some gravel bands between 4.20 and 5m depth.	None
BH C6	Alexandra Quay West, west side	14.9m	MADE GROUND of concrete over gravel, red brick, cobbles, and paving brick fragments, which extended to 8.8m, over 3.5m of loose to medium dense black slightly gravelly SAND with some organic traces and cobbles (considered possible fill/contamination), over SAND and COBBLES which extended to base of core.	None
BH C8	Alexandra Quay West, east side	12.5m	MADE GROUND of concrete over large cobbles, boulder and concrete, which extended to 2m, over 2.3m of SAND over 5.4m of dense GRAVEL with cobbles, over 1.7m of SAND over of dense GRAVEL with cobbles which extended to base of core	None
RC C8	Ditto above	25m	The rotary core was used to assist the shell and auger borehole, and returned 2m of dense silty clay below base of borehole, over 3m of silt, over 3.5m of stiff silty clay with occasional fine gravel, over clay, which continued to base of core	None
BH C10	Ocean Pier, close to the terminus on the west side	7m	Below a 15cm surface level of concrete was 395cm of MADE GROUND, comprising clay, gravel, sand, red brick fragments, steel bars and concrete, over a lower level of GRAVEL with cobbles. Coring terminated because of Port operations.	None
RC C10	Ditto above	7m	Rotary core assisted in coring, and abandoned at same depth.	None
BH C11	Berths 52/49, at terminus	13.50m	Below a 15cm surface of tarmacadam, was MADE GROUND, comprising clay, gravel, sand, large cobbles, red and yellow brick fragments, timber, steel, glass and plastic, which extended to the depth of 10.60m, at which point broken ROCK was encountered to 11.80m over dense GRAVEL.	None

APPENDIX 12.3: ARCHAEOLOGICAL OBSERVATIONS FROM WALKOVER SURVEY FOR THE PORT OF DUBLIN'S ABR PROJECT.



Plan showing Dublin Port Company estate highlighted in yellow, with outline of extent of Alexandra Basin highlighted in black dashed line and location of ABR terrestrial works highlighted in red dashed line.

Construction of Alexandra Basin in the second half of the 1800s absorbed the various developments of the port as it extended from East Wall Quay out onto the sandflats to the east. What became the basin was a ‘grand design’ that made the earlier works appear small in scale and piecemeal. Bindon Blood Stoney’s vision saw reclamation of an area that reached eastwards to what had been Brown’s Patch sandflat, enclosing a large site that later became defined by Tolka Quay Road in the north and Breakwater Road in the east, terminating at Breakwater Lighthouse, which is where the Port Operations Centre is located today. In the tradition of expansion, Alexandra Basin today forms but part of the modern Port, whose footprint has extended north and east, as well as along the south quays where related works have absorbed much of the footprint to the Great South Wall out to and including Pigeon House Fort, as well as extending into the river channel, where modern berths are located on extensive reclaimed areas along the south quays.

Terrestrial walkover survey for the ABR project included those areas where impacts are being proposed within Alexandra Basin and at Berths 52/53.

Berths 52/53

Berths 52/53 occupy a basin of newly reclaimed land at the east end of the Port area referred to as Terminal 5. RoRo ramps 7 and 8 are situated at the head of the inlet, to the N. Two stretches of mass concrete-constructed quay walls exist within the inlet; one forming the terminus on the southwest side, the other on the east side where it serves as Berth 53. Elsewhere, the sides of the inlet are represented by a rock-armour finish. A line of dolphin ramps supported on concrete pile-clusters extends into the basin from the rock armour on the west side, presenting a suitable platform for Berth 52. The southeast terminus of the inlet south of Berth 53 is defined by roughly-formed rock-armour.

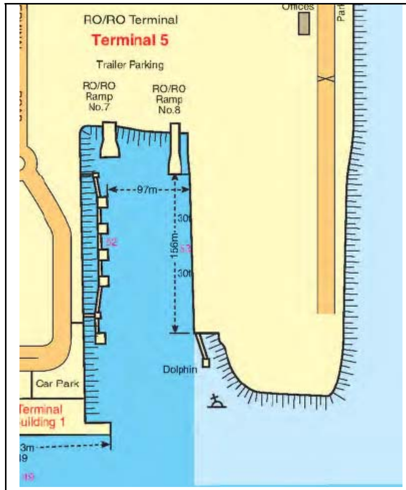
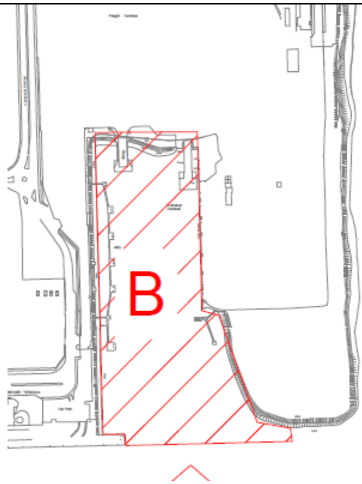
There are no archaeologically- or architecturally-relevant heritage issues associated with the standing remains.

<u>Impacts</u>

The proposed impacts will be to infill the open-water area, using material derived from the dredgings that will form part of the larger project.

<u>Mitigations</u>

It is not expected that there will be any archaeological requirement associated with this aspect of the project works.

		
Detail from Port of Dublin Company Estate map, showing location of Berths 52/53 and current usage	Detail from Project Drawing highlighting area proposed for infill works, highlighted in red hachuring	View looking S at the inside of quay at riverside terminus of Berth 52
		
View looking S along dolphin ramps in Berth 52	View looking N along mass-concrete quay at Berth 53	View looking E at the eastern terminus to the basin

Alexandra Basin

Many of the features associated with the early development of the port area adjacent to East Wall Road have been absorbed within port development works. These include the early patent slips and associated graving area to the south. They also include features associated with the North Basin development, predecessor to Alexandra Basin. Port development in the 1980s covered over the old shipbuilding yards and created a wide working area along the Port's west side, within the boundary wall along the East Wall Road. The area today accommodates the main Port offices building, and Terminals 3 and 4. In 2008, Graving Dock No. 1 was also filled in, and a lobe of sea area within the basin to the south beside the Lead-in jetty was filled with rubble.

The quays that form the working Basin today are a mixture of old and new elements, most of which remains in constant use.

Despite the 20th-century developments which have buried areas of the early port, there are elements that survive at ground level. In addition to the pump house used to accommodate the electrically-powered pump for dewatering Graving Dock No. 1, there are lesser features visible along and inside the East Wall Road boundary wall, where coping stones remain exposed on the surface and trace the lines of some of the early quays, while iron rings and related 'furniture' still attached to the boundary wall, reflect some of the former mooring arrangements. It is understood that none of these lesser elements will be impacted upon by the ABR works. A detailed record of their location, and a description of their form, would provide a useful gazetteer of heritage elements within the port area.

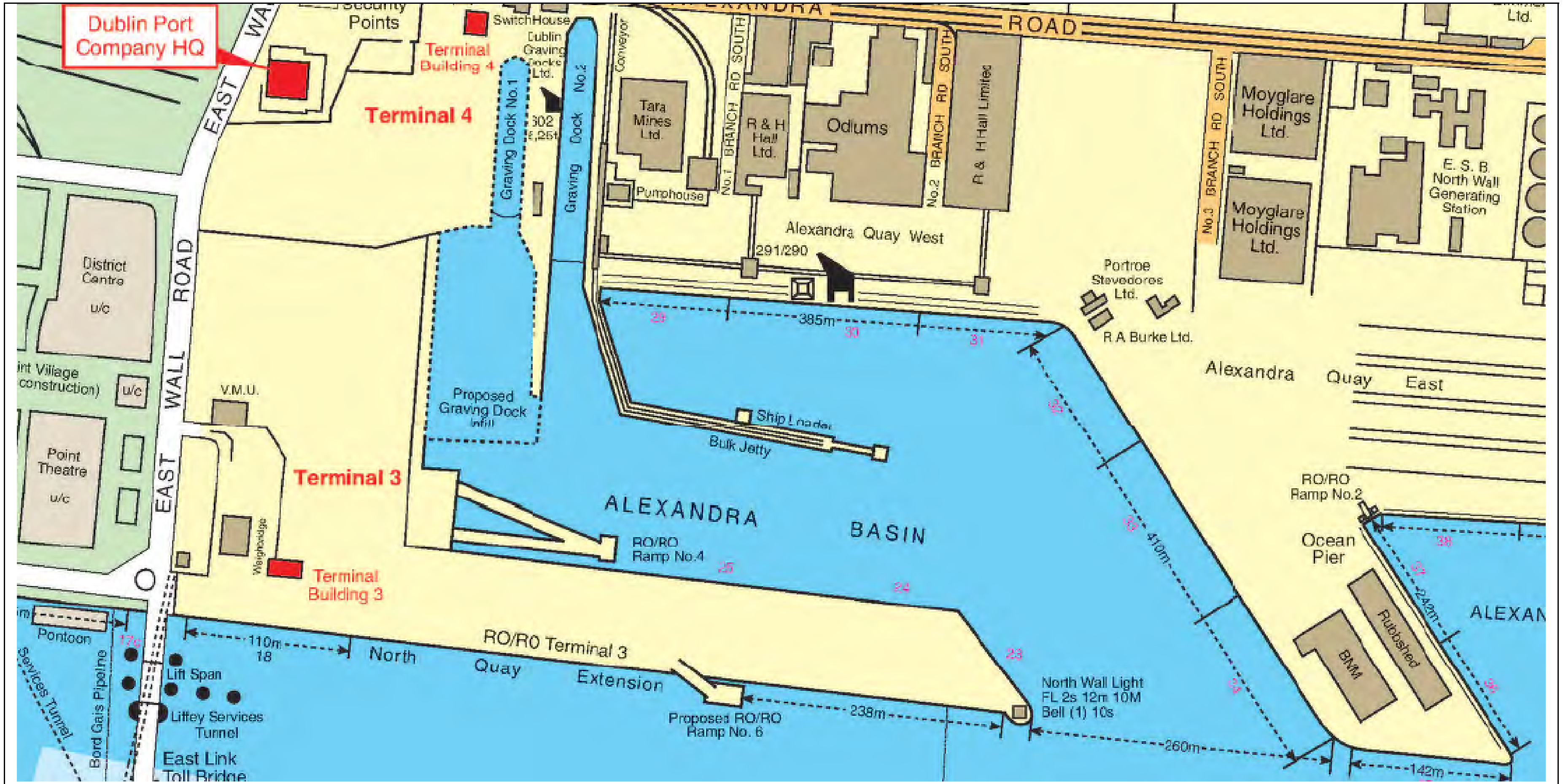
Impacts

As part of the redevelopment of Alexandra Basin West for the ABR project, it is proposed to fill in Graving Dock No. 2; demolish the Lead-in Jetty; remove the recent infill beside the Lead-in jetty; relocate the ore loading facility; demolish the Bulk Jetty; relocate Ramp No. 4; demolish portion of the North Quay Extension; and demolish Ramp No. 6. It is also proposed to reopen Graving Dock No. 1 as an initiative related to heritage gain.

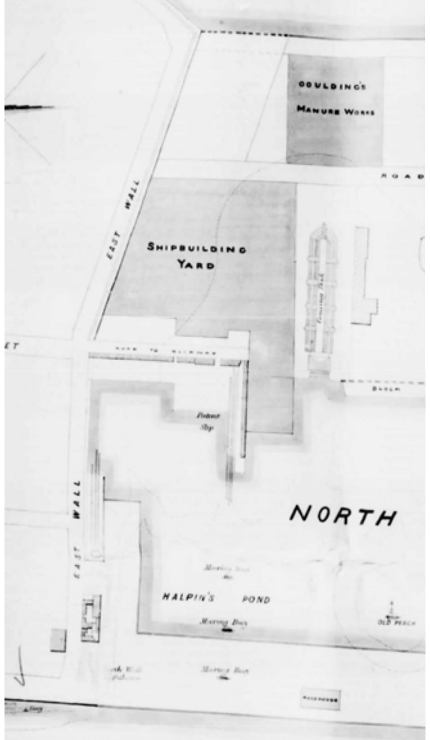
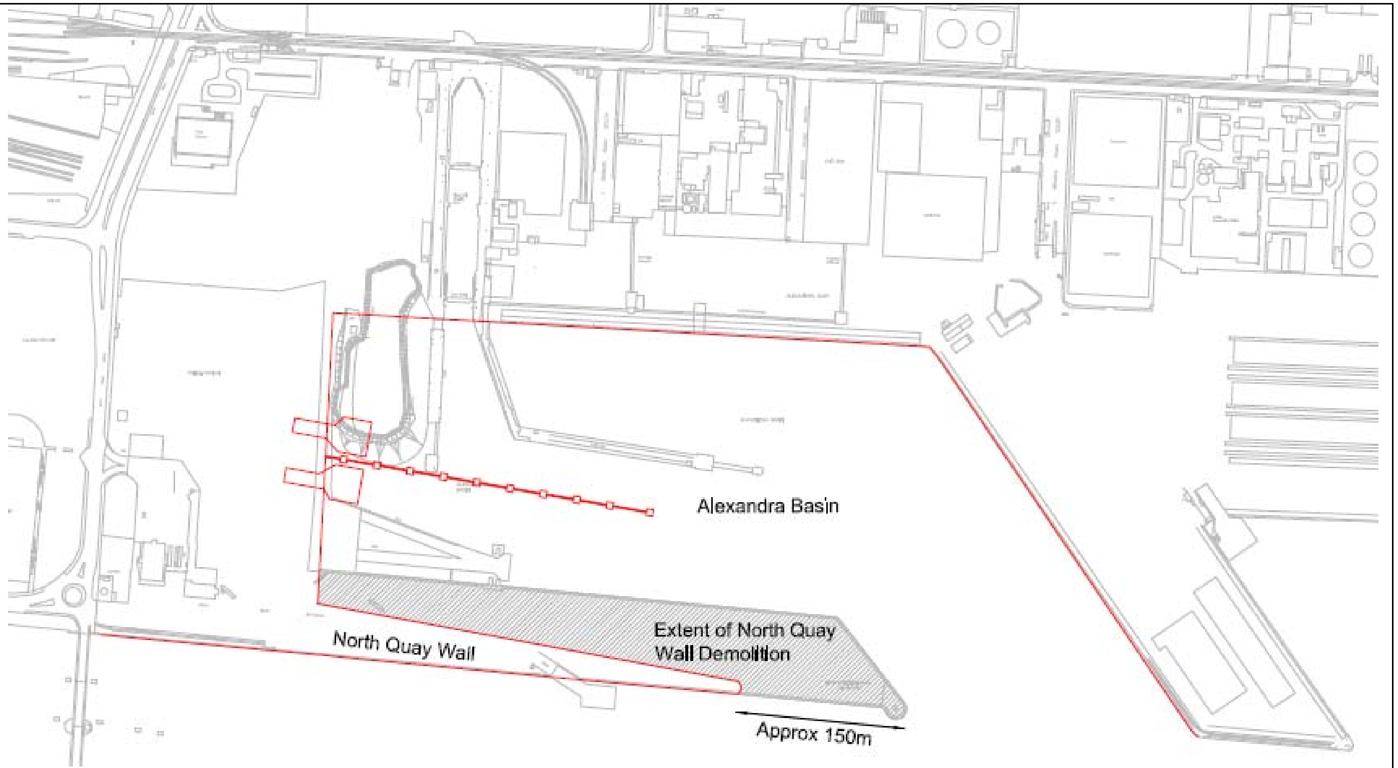
Removal of the recent infill beside the Lead-in jetty will serve to reinstate an element of the former footprint of Alexandra Basin. One of the historic shipwreck sites associated with the Port and the Approach Channel is located under this area of recent infill. Given that this location is close to the old shipbuilding and repair yards, it is possible that remains of a vessel were abandoned here.

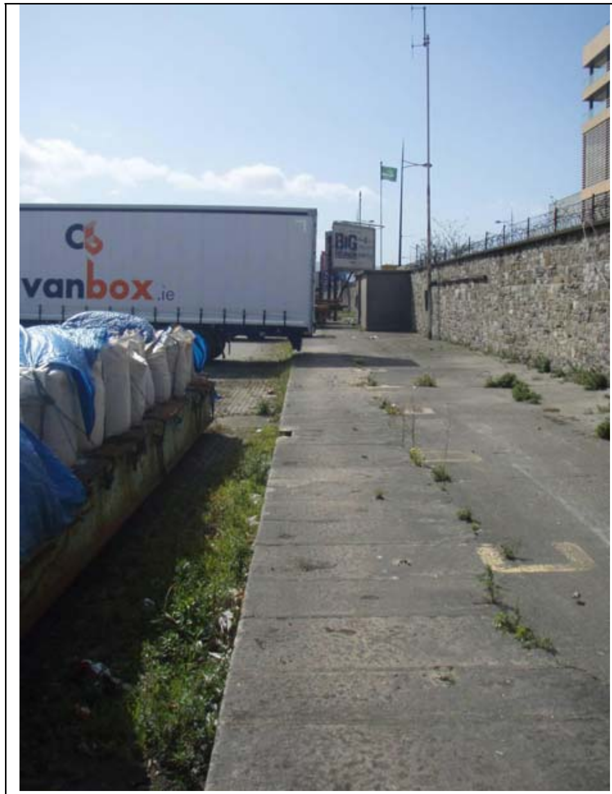
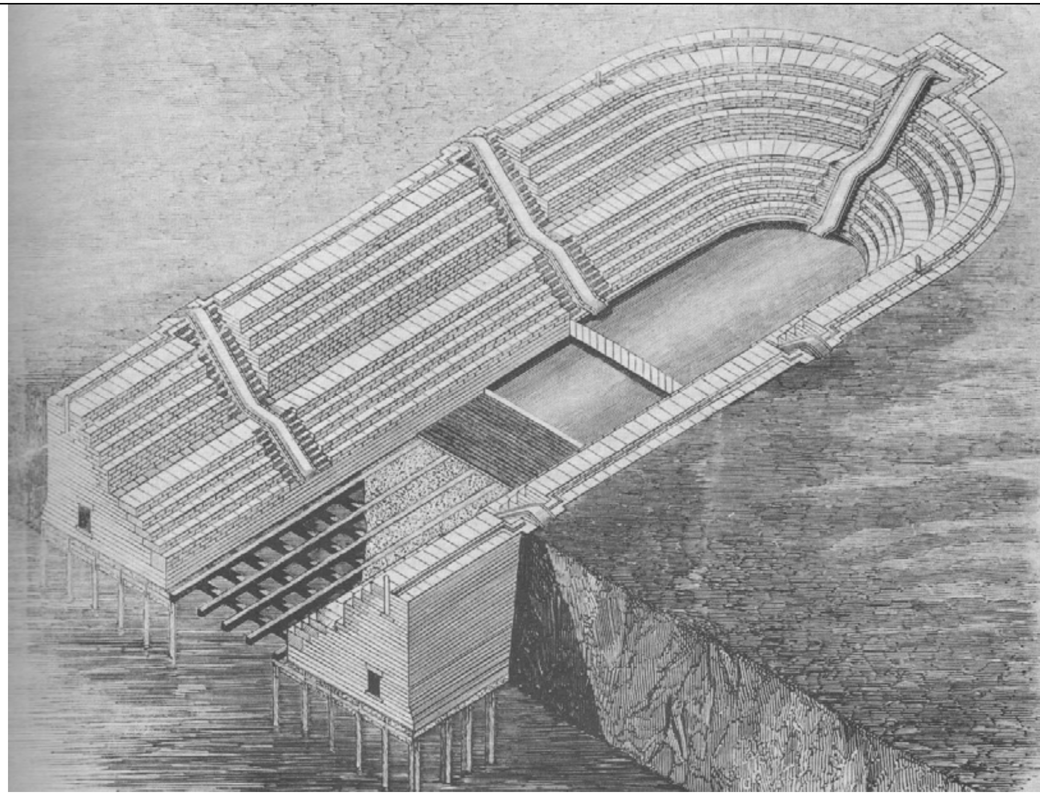
Mitigation

All activity associated with removing infill within the Basin will be archaeologically monitored, as will all demolition works and dredging works, to safeguard the possibility of uncovering material archaeological interest during construction. Particular archaeological requirements pertain to works at NQE.



Detail from Port of Dublin Company Estate map, showing current activity in Alexandra Basin West, pre-2008.

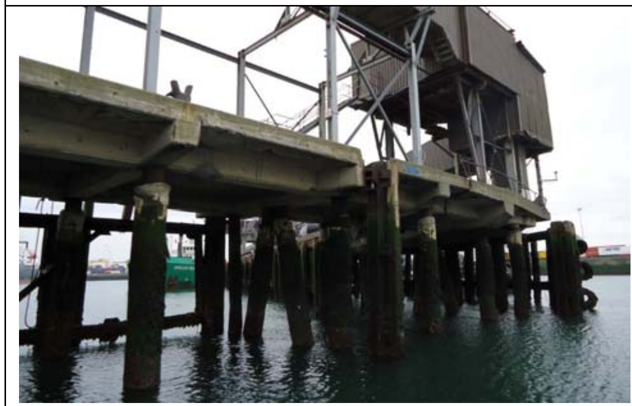
	
Extract from Port Archives Ms 48 'North Wall Basin 1883', showing principal features as built on the west side of the Port area by 1883	Detail from Project Drawing showing proposed works within Alexandra Basin West today, highlighted in red

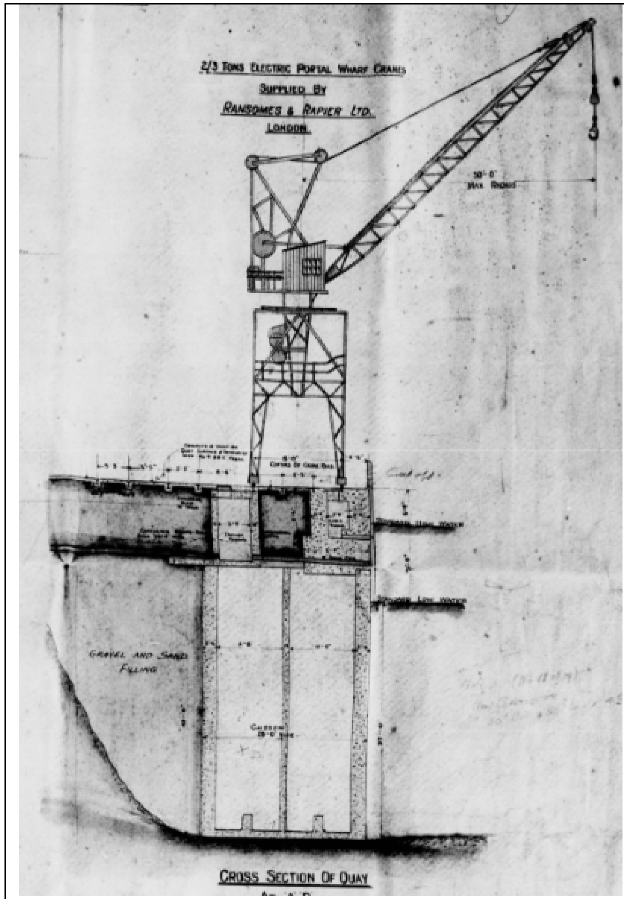
	
Original granite cope stones marking the edge of Alexandra Basin, looking south. Graving Slip No. 1 would have ended behind the truck, and the shipbuilding yards were located in the other direction. Most of the port's tugs, buoys and other pontoons, such as Bindon Blood Stoney's Shears Float, and Bell Float, would have been moored here. After O'Connor 2012, 216.	Cut-away plan of Graving Dock No.1, designed by George Halpin, overseen by Bindon Blood Stoney and built by William Dargan. It opened in 1860. (Image Dublin Port Archives). After O'Connor 2012, 163.

Site of Graving Dock No. 1 today, shown as a linear area of grassland. View looking W from Graving Dock 2.	

Views of quays within Alexandra Basin, moving clockwise from Terminal 3 to Breakwater Point at Port Operations Centre:

		
Concreted façade of Terminal 3 and Ramp No. 4. The ramp will be relocated to the N as part of ABR works	Looking W at infill from c. 2008, to be removed as part of ABR works	Concrete terminus of Lead-in jetty, the jetty will be demolished as part of ABR works

		
View looking W at Lead-in jetty	View looking NW at entrance to Graving Dock No. 2, built in late 1950s. The Dock will be filled in as part of the ABR works	View looking N at Graving Dock No. 2, with vessel inside the Dock
		
View looking SE at Ore Jetty, constructed on concrete piles. The ore/bulk jetty is to be demolished and relocated as part of ABR works.	View looking N at dolphin ramp associated with ore/bulk jetty. This feature is imaged on the side-scan sonar traces (ss79_1)	View looking N along Alexandra Quay, showing the mass concrete façade that defines its construction from the 1920s

	 	 
Detail from Port Archives MS 8581, Plan and Cross section at Alexandra Quay, 1926, showing nature of the quay's construction.	Views looking E (top) and NE (bottom) of Ocean Pier, showing its mass concrete construction of 20th-century date.	View looking W (top) and detail showing 19th-century granite stonework and mooring ring (bottom) at the former Breakwater Light house, now Port Operations Centre, marking the easternmost extent of Alexandra Basin as designed by Bindon Blood Stoney.

North Quay Extension

North Quay Extension was begun in 1871 as a progression of the North Quay upriver to the west and as an integral component of Alexandra Basin, separating the active river channel from the deepwater basin. Port Archives include a number of drawings that combine scaled elevations and sections of the as-built structure. The design was for a long wide structure that would accommodate shipping on both its riverside and its basin-side. Built in stages and working from West to East, the new quay would come on stream as each section was completed. Traditionally within the port, quays would be prepared using cofferdams and laying stonework manually within. Bindon Blood Stoney's innovative technique of pre-casting foundation blocks, preparing the seabed by working within a diving bell, and floating the blocks over the prepared bed to drop them into place, was aimed at achieving a result that was significantly less expensive, calculated in terms of materials and time. The design of the foundation blocks, using Portland cement to bond together stone fill, was not new, but the scale of each block was, weighing on average 350 tonnes. The blocks were prepared on the 'block wharf', located at the north side of the basin and left to cure.

Large cast iron girders were incorporated into the bottom of the blocks and wrought iron lifting bars attached. Large granite stones weighing up to two tonnes each were used in the construction to bulk out the cast concrete. The stones were edge-set side-by-side. Large rebates were cast into the blocks to take stone facing blocks for the new piers and in some instances, part of the stone facing work was completed on the blocks while they were still on dry land. Each foundation block measured 21'4" wide at its base, but there was variation is height, between 26' and 29' high. Each block had a stepped profile in cross-section that was recessed by 3'6" at the rear, and this could also be of varied height, between 9'6"and 13'. The variations reflect the bespoke nature of each block.

The blocks would be then floated over the prepared seabed, and dropped into place to form the foundation façades. Grooves cast into the blocks were subsequently filled with concrete to key them together. The space between the two lines of foundation blocks was filled with spoil from ongoing dredging operations aimed at deepening the basin. The Port Archives records indicate a bed of gravel underneath some of the caissons, suggesting that the divers may have purpose-laid gravel beds where necessary in advance of the caisson being dropped. The blocks extended in height so that their topmost level would be exposed at Low Water, allowing completion of the of quay structures 'in the dry', in the manner that the quays right along the Liffey were constructed. The Port Archives show the level of detail given to the granite facades, including the stone-cut recesses to accommodate mooring rings and the requirements to ensure that the mooring rings were adequately founded within the structure and fabric of the quay wall.

Work on North Quay Extension continued until 1885, when some 700m length of the quay was built. Necessities of the port demanded attention to other matters, leaving the quay unfinished until the 20th century when this work was done as part of preparations for the Eucharistic Congress of 1932. By this time, a new form of caisson design had been developed for works in the Port, and the then engineer Joseph Mallagh completed the quay. The caissons were somewhat simpler in design but effective. The caissons were cast in concrete and, floated into position before being filled up and sunk, to give a solid quay frontage. Ports works in the 1980s which resulted in the construction of Terminal 3 would have buried a substantial section of the basin side of North Quay Extension, and this remains concealed from view today.

The exposed facades of the quay survive largely untouched, with some sections of repair or adaptation clearly visible. The original granite blocks of the quay wall are in various states of deterioration. On the quay's working surface or deck area, the coping stones survive in place along most of the quay edge, and there are the tracks of former rail lines visible at the west end of the quay that formerly ran along the entire quay to assist in loading and unloading activities, but the interior surface today is otherwise masked in a cobble-lock brick that conceals indications of earlier features on the quay's working surface. Ordnance Survey and related historical sources reveal the changing nature of the quay over the years, and suggest the location of features that may survive beneath the cobbled brickwork, such as the Goods Sheds and the Revenue Watch House. The North Quay lighthouse is of steel construction, and was moved into its current position at the terminal of North Quay Extension in 1937.

Impacts

The works required on North Quay Extension as part of the ABR project will relocate Ramp No. 4, which is currently located next to the quay at its westernmost basin side; and demolish Ramp No. 6, which is located on the riverside of the quay. It will also demolish portion of the quay, by removing the basin-side of the quay and the easternmost c. 150m of the quay, the latter constituting most of Mallagh's completion works of 1931. It should be noted that the original western extent of the quay on the basin side will not be affected, as it lies concealed beneath Terminal 3. Associated dredging works will deepen the seabed along the riverside and within the basin so that the new bed level will lie below the base of the quay. The current bed level is -7.3m OD on the basin side and -8.5m on the channel side. The existing foundations on the basin side within the works area will be removed. The surviving section of the foundation on the channel side extends to *c.* -7.05m OD. The proposed new dredge depth within the basin and along the channel will be -12m OD, with the potential future dredge depth within the channel to -15m OD.

To ensure that the surviving element of the quay remains secure, a combi-wall will be inserted along the basin side, retaining the existing fill of the quay, and sheet-piling along the length of the channel side will extend to below the possible future dredge depth of -15m OD, to secure the footings of the quay. The quay itself will be retained within a composite casing structure that includes vertically-placed steel ties which extend from a reinforced concrete deck to the steel shutting below, and horizontally-placed steel ties that run through the quay wall at specified intervals. It is anticipated that the framework will leave sections of the quay's river façade fully exposed, and that the coping stones will be reused as coping stones on the new concrete deck, thereby retaining as much as possible of the 19th-century quay within the visible elements of the new work. The North Quay lighthouse will be relocated to the terminus of the rebuilt quay.

Mitigation

Archaeological and architectural heritage mitigation of these works will include a pre-construction stone-by-stone survey of North Quay Extension above and below the waterline, to create a permanent and metrically accurate record of the quay in its present state. That work will be able to prepare detailed scaled elevation drawings, long- and cross-sections, and plan views of the quay. Consideration will be given to achieving this work using digital scan technology that will generate a detailed model cloud.

Coping stones and façade stones to be reused in the new quay will be numbered and recorded in advance of demolition works, to ensure accurate replacement.

Demolition works will be archaeologically monitored under licence from the DAHG, and the opportunities will be taken to record more fully the nature of the quay's construction.

Attempts will be made to recover an exemplar of Bindon Blood Stoney's foundation blocks, both to examine the as-built block in terms of its construction method and materials, and to retain for public view as part of the Port's cultural heritage assets.

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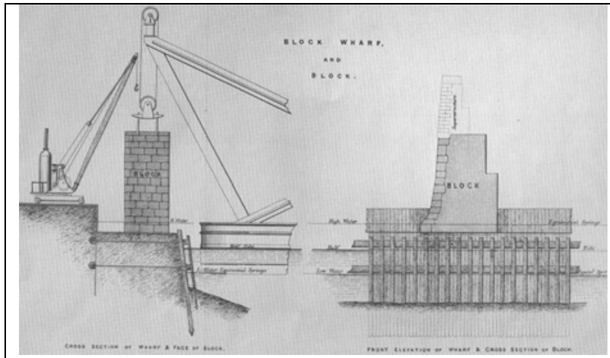
<td>
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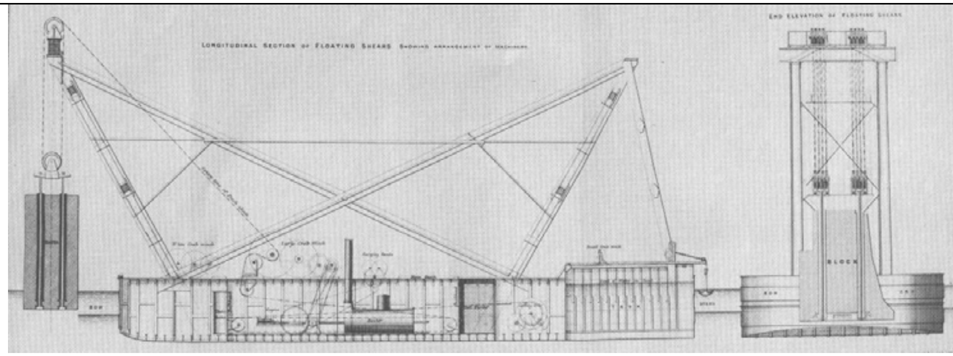
<td>
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<td>Bindon Blood Stoney's illustrations of the Block Wharf and Block (British Association 1878 after Cox 1990)</td>
<td>Bindon Blood Stoney's illustrations of the Shears Block Float (British Association 1878 after Cox 1990)</td>
<td>Stoney's Diving Bell, Sir Rogerson's Quay</td>
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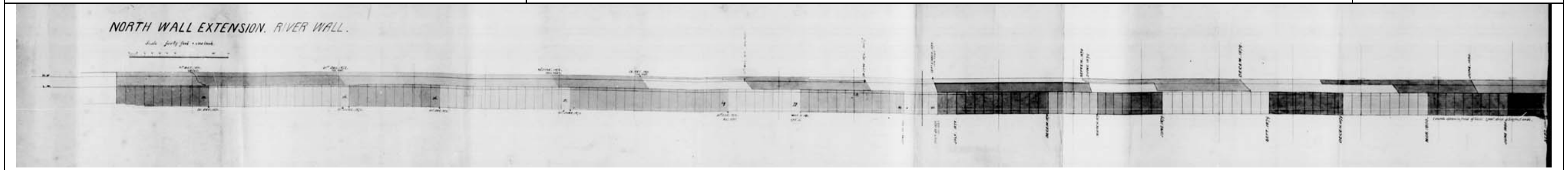
<td colspan="3">
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<td colspan="3">Port Archives Ms 8415 'North Wall Extension River Wall' provides an elevation drawing of NQE, showing the progress of building between December 1871 and September 1880.</td>
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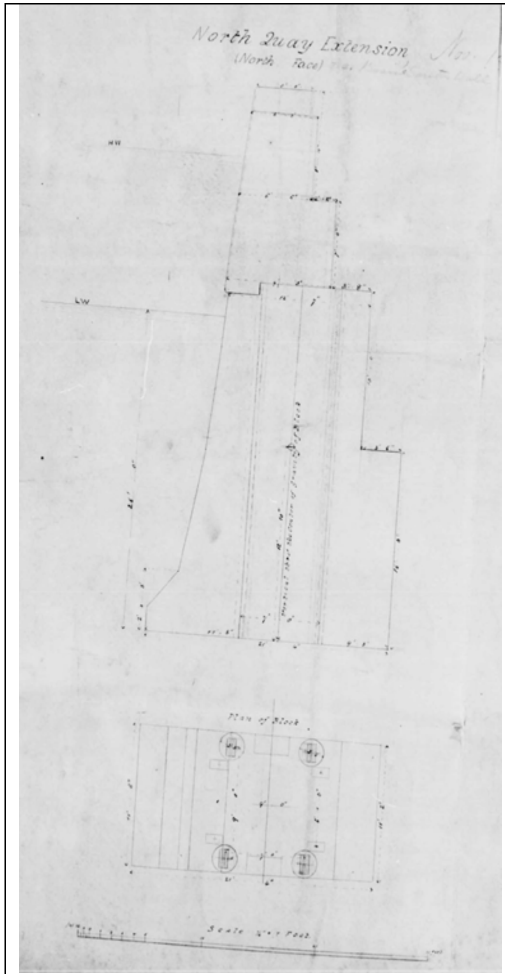
<td>
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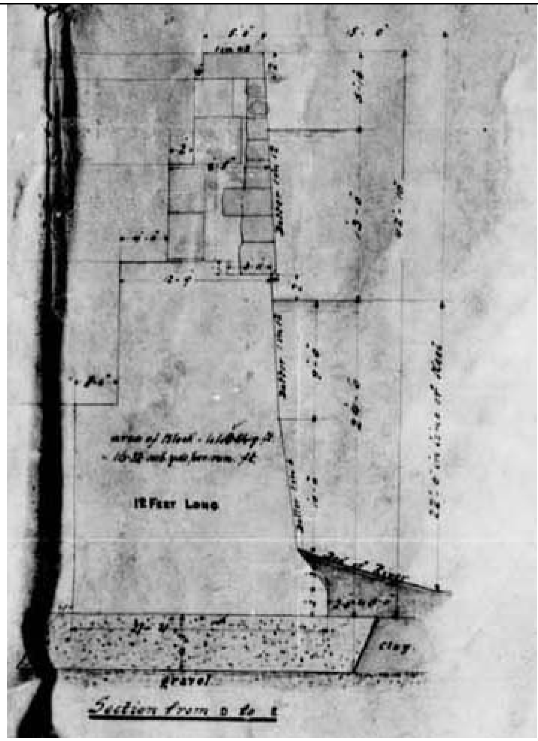
<td>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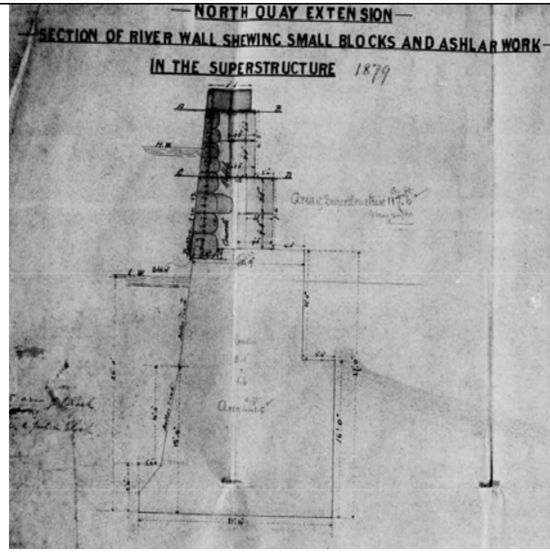
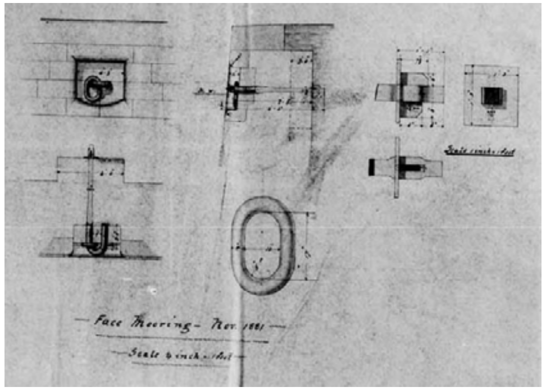
<td>

</td>
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<td>Port Archives Ms 7933 shows a caisson in cross section and plan view from the north face (basin side) of the quay, dated 1875.</td>
<td>Port Archives Ms K1047 ‘North Quay Extension, progress sections of wall’, detail showing section type at D-E, channel side, with key to location inserted below</td>
<td>Port Archives Ms 7929 ‘North Quay Extension, section of river wall shewing small blocks and ashlar work in the superstructure 1879’.</td>
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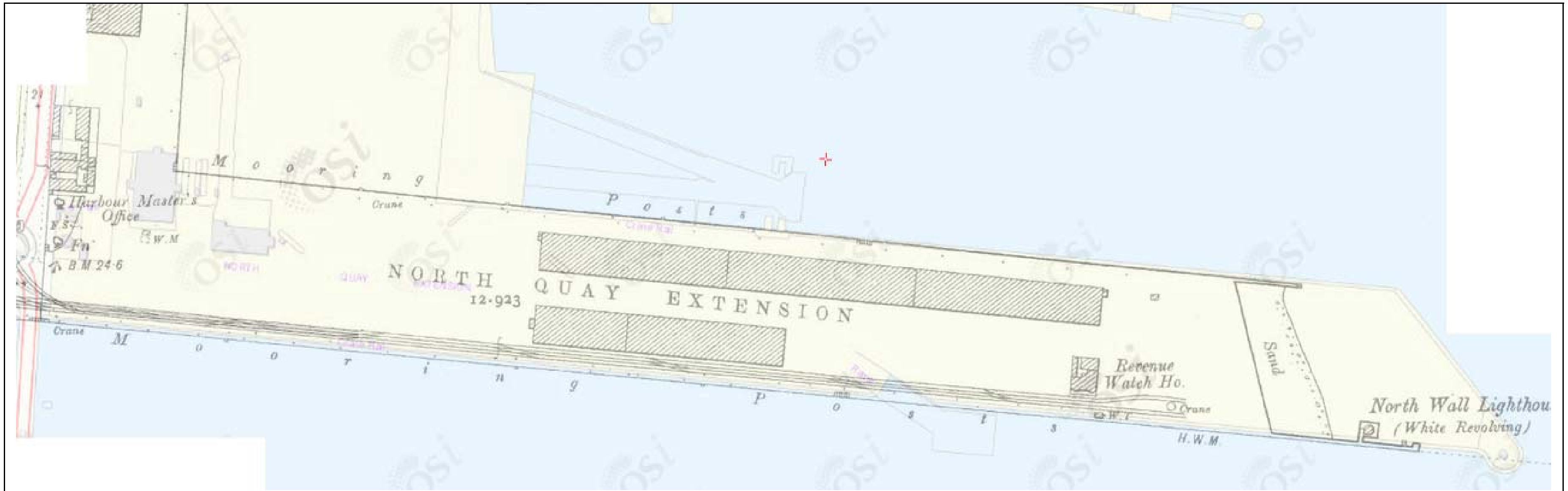


Overlay maps showing extent of NQE in c. 1912 based on 25" map and current extent, with No. 4 and No. 6 Ramps. Source: www.osi.ie

The following images represent views of NQE from the river, working east from the East Link Bridge to the terminus on the Channel side, and proceeding into and along the Basin side.

		
View of steps below East Link Bridge	View of stonework and access ladder	View showing construction line in stonework (a staggered line below the red rail. This represents a break in Stoney's work and would date to the early 1870s.

		
View of stonework showing top of Stoney's foundation block just above LWM. The next two images are close-up views of the façade to the right of the access ladder	Detail showing concrete of foundation block the granite façade stone. Note the deterioration in the stonework	Detail of granite façade stone up the height of the quay. Note the deterioration in the stonework
		
View of mooring ring and recessed framework	View of steps	View showing impact of No. 6 Ramp tie-in to NQE stonework

Use of steel shuttering, may mark the start Mallagh's tie-in to Stoney's work

Steel shuttering defines the foundations of NQE at its present terminus

Terminus of NQE completed for 1932 Eucharistic Congress

View of mass concrete finish representing Mallagh's work along the terminus width of NQE

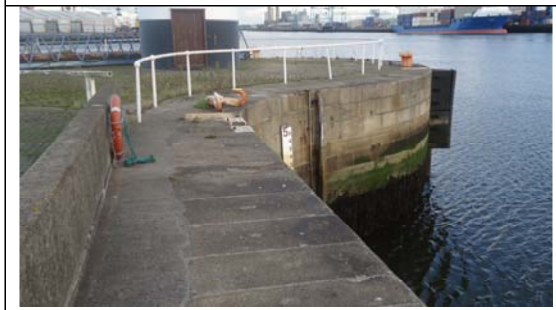
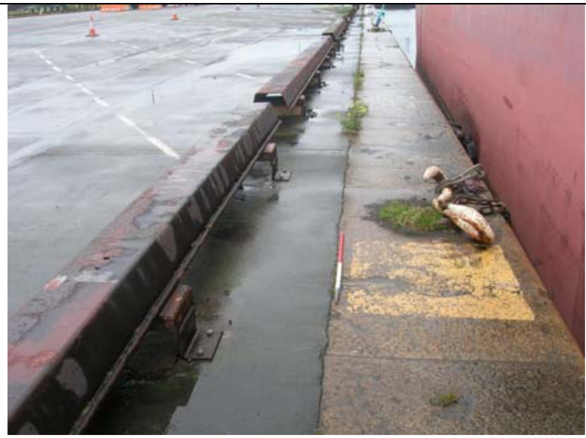
Possible tie-in between Mallagh's completion work (on left) and Stoney's original work on Basin side

View of recessed mooring ring dating to Stoney's work, Basin side

		
View of steps, Basin side	View showing impact of Ramp No. 4 at E end of NQE, Basin side	Underwater View of Bindon Blood Stoney foundation blocks abutting each other, on Basin side, at 718501E 734430N
		
Underwater view of Bindon Blood Stoney foundation blocks abutting each other, on Basin side, at 718501E 734430N	Underwater view of Bindon Blood Stoney foundation block where base of granite façade block extrudes from the top of the foundation as the quay's façade, at 718501E 734430N	

The following images represent views of the topside or working surface of NQE, showing marking on coping stones, general view of the deck area, and images of the North Quay lighthouse.

		
Individual coping stone 1.1m wide with mason's mark, 'M', Basin side by No. 4 Ramp, 718487E 734405N	Individual coping stone 85cm wide with mason's mark, '760', Channel side, 718351E 734387N	Individual coping stone 1m wide with mason's mark, '850', Channel side, 718392E 734335N
		
Individual coping stone 95cm wide with mason's mark, 'D', Channel side, 718418E 734331N	Individual coping stone 75cm wide with mason's mark, '1100', Channel side, 718472E 734326N	Individual coping stone with mark, '^', Channel side

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>Individual coping stone 92cm wide with mason’s mark, ‘H’, Channel side, 718685E 734302N. The coordinates, suggests that this location is more or less coequal with the location of the North Wall lighthouse before it was moved to its current position in 1937</td><td colspan="2">Sequence of three coping stones measuring 90cm, 90cm and 70cm wide x up to 1450cm long with mason’s marks ‘IX’, ‘X’, ‘XI’ respectively, Channel side and part of Mallagh’s extension, 92cm wide with mason’s mark, ‘H’, Channel side, 718787E 734303N</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>View of NQE coping stones close to Lighthouse terminus</td><td>View of NQE coping stones, Channel side</td><td>View of NQE coping stones, Basin side</td></tr>
</table>

		
View looking W at No. 4 Ramp	View looking E at NQE deck area beside No. 4 Ramp	View looking SE across NQE deck area towards Lighthouse
		
View of lighthouse from W	Detail should lighthouse ocular	Maker's plaque

		
View of Lighthouse interior	View of apparatus within Lighthouse	

Appendix 12.4 Archaeological observations of Marine Geophysical Survey Data acquired for the Port of Dublin's ABR project.

Side-scan Sonar Survey

Source: Vessel Track Plots, Data Record

Coordinates presented on data record in Lat/Long, and converted to ITM.

Notes:

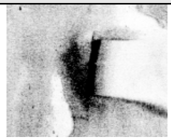
1. Under Ref/Reference, 1_1 refers to 'side-scan sonar survey line 1_target 1'.

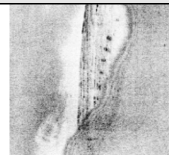
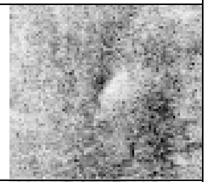
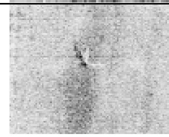
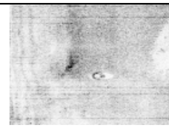
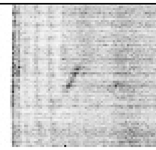
2. The descriptions reflect a discussion with Dublin Port (DPC) on the possible interpretation of individual anomalies.

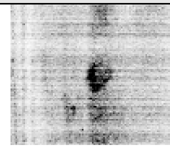
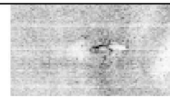
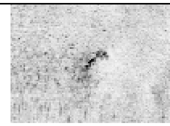
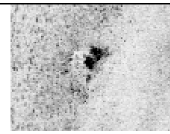
3. The descriptions absorb the results of dive inspection where completed (fuller descriptions of dive inspections are in Appendix 12.5)

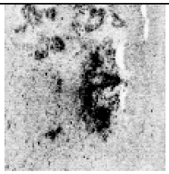
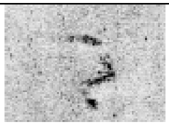
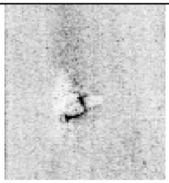
4. Archaeological Potential is gauged as L-low, M-medium, H-high

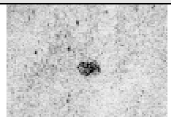
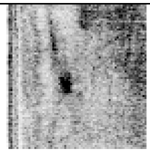
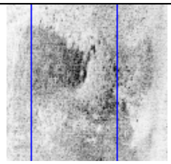
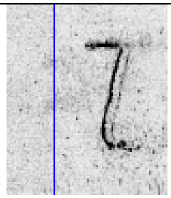
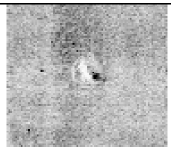
Refer to Figures 12.15-12.20 for the distribution of the anomalies

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
1_1	53°20.5769N	6°12.2026W	719635.21	734029.15	Jetty /berth extending from South Quay	12.16	N	None	n/a	

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
1_2	53°20.5731N	6°12.1325W	719713.17	734024.06	Easternmost of 5 piles	12.16	N	None	n/a	
1_3	53°20.6006N	6°12.1149W	719731.42	734075.55	Small anomaly with short linear shadow, possible spike	12.16	Dive 21	None	Area of hard gravel, diving identified a small natural ridge formed of sub-rounded stones	
1_4	53°20.5830N	6°12.0688W	719783.4	734044.2	Small feature, low potential	12.16	Dive 33	None	Small ridge of cobbles and gravel with modern debris in vicinity	
1_5	53°20.5800N	6°11.9585W	719905.94	734041.72	Circular object	12.16	Dive 31	L	Possible debris, but no target encountered during dive inspection	
1_6	53°20.5820N	6°11.9562W	719908.4	734045.5	Irregular small anomaly, possible mud	12.16	Dive 31	L		
1_7	53°20.5863N	6°11.4165W	720507.11	734068.61	Short linear feature, possible debris	12.17	Y	L		

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
1_8	53°20.5828N	6°11.3003W	720636.22	734065.39	Area of shadow, possible mud. Same as 7_1.	12.17	Y	L	Probable mud.	
1_9	53°20.6046N	6°11.1798W	720768.91	734109.21	Defined hard rectangular feature orientated E/W, with possible scour pocket. Nothing on project mapping to indicate navigational/port feature. Same as 7_2, 17_1, 100_2, 159_3, 170_3.	12.17	Dives 8, 10	L	Dive inspection identified hard gravel bed but no feature exposed on it	
1_10	53°20.5829N	6°11.1236W	720832.3	734070.56	Short small anomaly orientated N/S. Same as 7_3, 157_2, 170_4.	12.17	Y	L		
1_11	53°20.6127N	6°10.9998W	720968.27	734129.31	Short anomaly, mud	12.17	Y	L	Probable debris.	
1_12	53°20.6151N	6°10.9590W	721013.44	734134.91	Irregular anomaly, mud	12.17	Y	L	Probable debris.	

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
1_13	53°20.6141N	6°10.2407W	721810.57	734153.41	Long irregular anomaly, probably mud, in area of such features	12.17	Y	L	Probably base of nav channel	
1_14	53°20.6057N	6°10.2163W	721838.05	734138.53	Irregular anomaly, probably mud, in area of such features. Same as 100_4.	12.17	Y	L	Probably base of nav channel	
1_15	53°20.6126N	6°09.7992W	722300.57	734163.21	Area of irregularity, close to other such features, probably natural	12.18	Y	L		
1_16	53°20.5836N	6°09.7137W	722396.84	734111.88	Defined L-shaped shape. Same as 7_6, 100_7.	12.18	N	L	Nav Buoy	

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
1_17	53°20.6073N	6°09.6444W	722472.61	734157.8	Ill-defined circular feature, probable mud.	12.18	Y	L		
2_1	53°20.5765N	6°09.0675W	723114.27	734117.23	Small circular object on sandy bottom. Nav Buoy 10. Same as 8_2, 159_5.	12.18	N	L	Nav Buoy	
2_2	53°20.5845N	6°08.8988W	723301.09	734136.91	Series of short parallel linear features, possible mud features.	12.18	Y	L	Base of nav channel.	
2_3	53°20.5249N	6°08.5505W	723690.47	734036.44	Well-defined S-shaped linear feature on sandy bed. Cable. 18m long, curving to 3m wide. Nav Buoy 8. Same as 28_1, 101_1, 103_1, 114_3.	12.18	N	L	Nav Buoy 8	
2_4	53°20.5376N	6°08.5371W	723704.73	734060.38	Small anomaly. Stone/debris.	12.18	Y	L		

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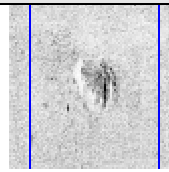
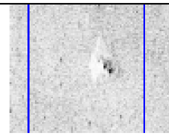
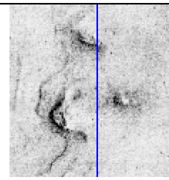
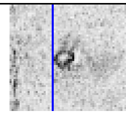
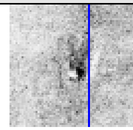
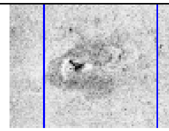
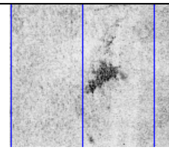
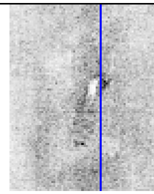
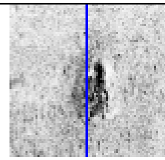
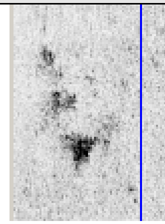
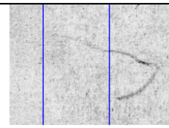
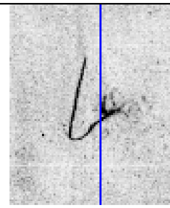
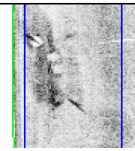
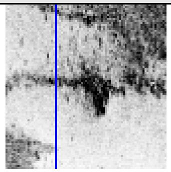
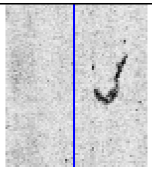
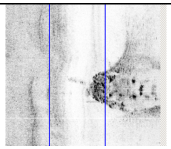
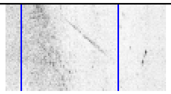
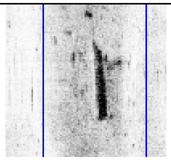
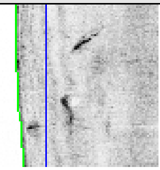
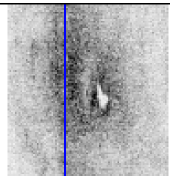
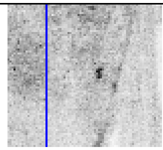
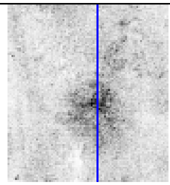
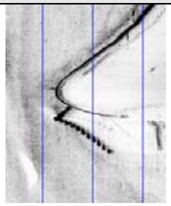
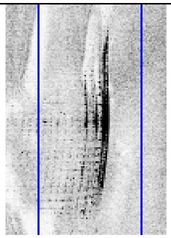
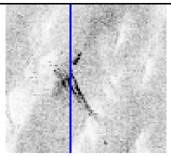
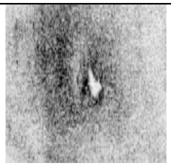
2_5	53°20.5297N	6°08.4658W	723784.23	734047.79	Irregular anomaly, sub-circular in shape. Mud. Same as 102_5, 114_2.	12.18	Dive 19	L	No target identified in dive inspection	
2_6	53°20.5282N	6°08.3269W	723938.44	734049.02	Localised small anomaly, mud/debris	12.18	Y	L		
2_7	53°20.5670N	6°08.1832W	724096.03	734125.13	Slight curvature of localized irregularities, mud/debris. Same as 8_3.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
2_8	53°20.5515N	6°07.6302W	724710.45	734112.44	V-shaped small scale feature, oriented N-S, possible chain and snag	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
2_10	53°20.5433N	6°07.3629W	725007.48	734105.03	Defined circular feature, possible tyre.	12.19	Y	L		

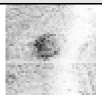
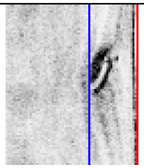
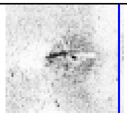
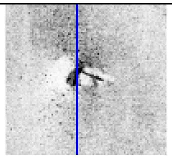
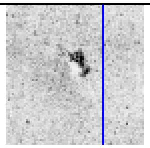
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
2_11	53°20.5311N	6°07.3208W	725054.79	734083.63	Irregular, small-scale anomaly, possible rock/debris. Same as 101_3.	12.19	Y	L		
2_12	53°20.4922N	6°06.8462W	725583.37	734025.39	Irregular small-scale anomaly with sand formation around it. Rock/debris. Same as 44_1, 46_1, 131_1.	12.19	Y	L		
3_1	53°20.5260N	6°07.0571W	725347.67	734081.88	Linear feature with sediment accumulated along both sides, partly buried.	12.19	Y	L		
3_2	53°20.5543N	6°07.3033W	725073.08	734127.16	Short irregular anomaly with low shadow. Rock/debris. Sam as 12_8.	12.19	Y	L		
3_3	53°20.5293N	6°07.3266W	725048.44	734080.13	Irregular linear feature 7m long with sedimentation around it. Possibily same as 2_11, 101_3.	12.19	Y	L		

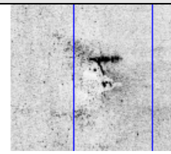
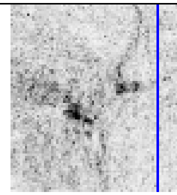
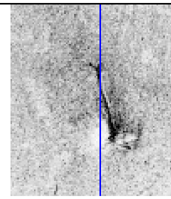
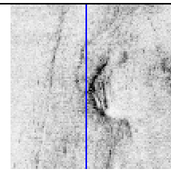
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
4_1	53°20.5827N	6°08.1630W	724117.69	734154.82	One of three irregular clumps close together forming a line. Rock/debris.	12.19	Dive 26	None	N-S oriented depression in seabed of compact clay, with frequent scarping	
4_2	53°20.6336N	6°08.2084W	724064.85	734247.89	Long length of possible cable/rope, forming V-shaped spread on seabed, and reaching 18m long in one arc and 16m in the other			L		
4_3	53°20.6252N	6°08.5377W	723699.84	734222.79	Length of probable cable forming 12m-long u-shape and possibly secured at one end. Should be a Nav Buoy but the plotted location is some distance E. Same as 12_5, 26_8, 117_1.	12.18	N	L	Nav Buoy 7	
4_4	53°20.6712N	6°09.3627W	722782.15	734284.36	Sequence of small contiguous anomalies over 12m-long area. Nav Buoy. Same as 12_4, 24_1, 26_7.	12.18	N	L	Nav Buoy	

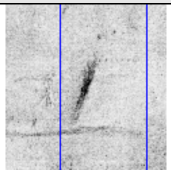
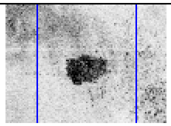
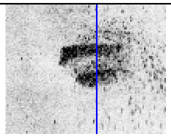
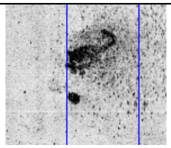
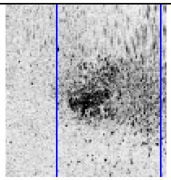
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
4_5	53°20.6447N	6°09.7242W	722382.27	734224.87	V-shaped irregularity that lies counter to a change in the seabed, and represents possible debris/feature.	12.18	Y	L	Debris	
4_6	53°20.6785N	6°09.9521W	722127.76	734281.04	Irregular u/v-shaped anomaly indicative of cable but possibly a natural variation in mud, 6m long	12.18	Y	L	Possible lost length of cable for lighthouse buoy.	
4_7	53°20.6894N	6°10.5875W	721422.17	734283.2	Localized shallowing showing structural foundation of light house. Same as 24_4, 26_2.	12.17	N	L	Outside impact area	
4_8	53°20.6867N	6°10.7218W	721273.27	734274.38	Short linear feature on seabed. Debris.	12.17	Dive 14	L	No object identified in dive inspection	
4_9	53°20.6494N	6°10.8185W	721167.73	734202.48	Linear feature on seabed.	12.17	Dive 36	L	No target identified, probably a natural feature	

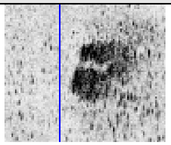
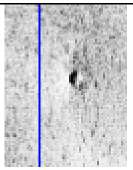
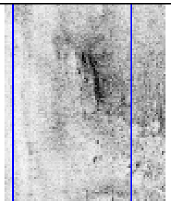
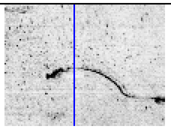
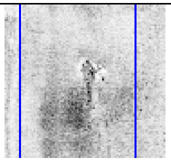
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
5_1	53°20.6715N	6°11.3925W	720529.73	734227.27	Short lirregularities x 3 in close proximity. Debris. Same as 11_4, 12_3, which show as a continuously joined piece.	12.17	N	L	Nav Buoy 15	
5_2	53°20.6754N	6°11.7305W	720155.05	734224.28	Localized hard point. Debris.	12.17	N	L		
5_3	53°20.6575N	6°11.8684W	720002.3	734187.95	Well defined small localized anomaly beside linear feature 11_5. Debris.	12.17	Y	L		
5_4	53°20.6750N	6°12.0104W	719843.91	734216.43	Localised small anomaly, mud/debris	12.16	N	L	At work area for Stena Line ferry, probable propwash feature.	

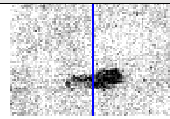
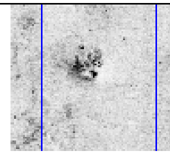
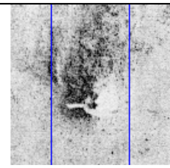
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
5_5	53°20.6798N	6°12.1860W	719648.82	734220.42	Defined composite pier/quay terminal, with V-shaped piling pattern associated. Coordinate taken at apex of piles.	12.16	N	None	Port Centre	
5_6	53°20.6559N	6°12.1854W	719650.61	734176.12	Linear irregularity defind by its strength, possible ship passing, see data log	12.16	N	None	passing ship	
5_7	53°20.6514N	6°12.2004W	719634.17	734167.36	Broad v-shaped feature in mid-channel. Possible passing vessel, see data log.	12.16	N	None	Moored vessel	
5_8	53°20.6755N	6°11.7301W	720154.92	734225.21	Irregular 1m long object in disturbed area.	12.17	N	L	Adjacent to RoRo ramp, in area of gravel. Probably gravel.	

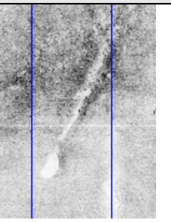
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
7_1	53°20.5832N	6°11.2980W	720638.75	734066.2	Circular-shaped anomlay, possible mud. Same as 1_8.	12.17	Y	L		
7_2	53°20.6046N	6°11.1779W	720771.02	734109.26	5m long defined linear feature. Same as 1_9, 17_1, 100_2, 159_3, 170_3.	12.17	Dives 8, 10	L	No object identified in dive inspection	
7_3	53°20.5831N	6°11.1250W	720830.74	734070.89	3m long linear anomaly. Debris. Same as 1_10, 157_2, 170_4.	12.17	Y	L		
7_4	53°20.5907N	6°10.7392W	721258.5	734095.88	Defined rectangular object, 3m long, possibly composite. Same as 157_4.	12.17	N	L	Outside impact area	
7_5	53°20.6139N	6°09.7309W	722376.3	734167.57	Defined object, 6m long, debris.	12.18	Y	L		

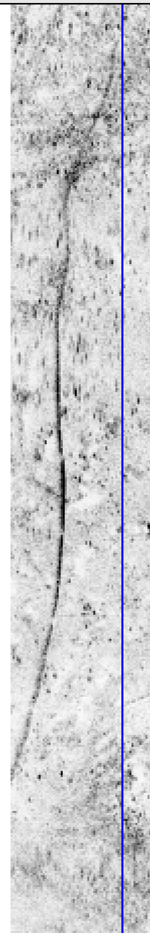
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
7_6	53°20.5842N	6°09.7076W	722403.58	734113.16	Irregularly-shaped defined object, 7m long. Same as 1_16, 100_7.	12.18	N	L	Nav Buoy	
8_1	53°20.5875N	6°09.1280W	723046.6	734135.89	Small irregular anomaly, debris/mud. Same as 159_4.	12.18	Y	L	Very hard ground here, only dredged recently for first time, Nothing shown then.	
8_2	53°20.5769N	6°09.0659W	723116.02	734118.02	Defined anomaly with anchored cable attached. Nav Buoy 10. Same as 2_1, 159_5.	12.18	N	L	Nav Buoy	
8_3	53°20.5675N	6°08.1847W	724094.34	734126.01	Broad defined curvature probably mud rivulet. Same as 2_7	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	

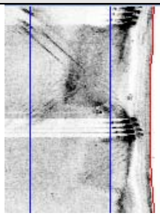
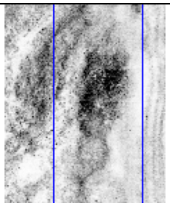
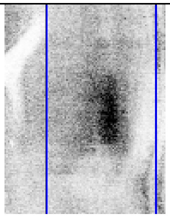
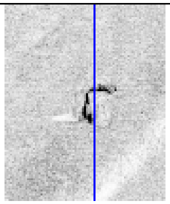
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
8_4	53°20.5678N	6°07.9679W	724334.91	734132.85	Short anomaly, defined. Debris?	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
8_5	53°20.5330N	6°07.8158W	724505.39	734072.74	Small 'soft' anomaly, possible mud hollow. Same as 17_5.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
8_6	53°20.5212N	6°07.6558W	724683.52	734055.51	Localized hard target showing as two discrete elements. Rock/debris.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
8_7	53°20.5210N	6°07.5332W	724819.58	734058.71	Localized hard target with possible 9m-long cable attached. Former buoy/navigation aid? Same as 135_1.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
8_8	53°20.5193N	6°07.4786W	724880.25	734057.15	Localised hard object, debris?	12.19	Y	L		

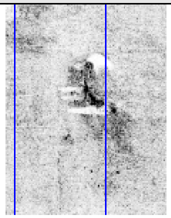
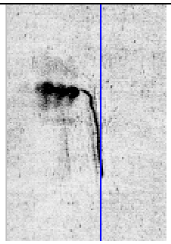
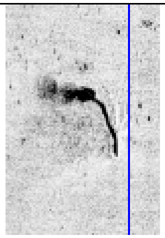
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
8_9	53°20.5115N	6°07.4210W	724944.55	734044.37	Localized hard object. Same as 116_1.	12.19	Y	L		
8_10	53°20.5174N	6°07.3488W	725024.39	734057.41	Small circular object, debris?	12.19	Y	L		
9_1	53°20.4357N	6°06.3806W	726102.84	733934.3	Rectangular-shaped anomaly on silty area. Possible rock, possible interest.	12.20	Y	L		
10_1	53°20.3056N	6°05.5635W	727016.06	733717.2	Length of probable cable, 10m long. Nav Buoy. Same as 13_1, 14_2, 51_1, 52-1, 126_1.	12.20	N	L	Nav Buoy 1	
10_2	53°20.3812N	6°05.9929W	726535.78	733844.67	Lightly defined localized anomaly. Debris? Same as 53_2.	12.20	Y	L		

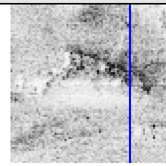
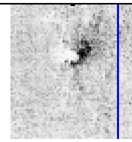
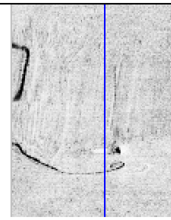
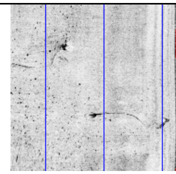
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
11_1	53°20.6074N	6°08.3871W	723867.81	734194.14	Localized 'soft target' anomaly, possible mud hollow.	12.18	Dive 20	L	No target identified on dive inspection	
11_2	53°20.6294N	6°10.7387W	721257.23	734167.66	Localised lightly defined anomaly. Debris?	12.17	Dive 35	None	Limestone block observed	
11_3	53°20.6254N	6°11.1831W	720764.27	734147.69	Localised lightly defined anomaly. Debris? Same as 15_2, 17_2, 159_2.	12.17	Dive 13	None	Mooring block	
11_4	53°20.6707N	6°11.3839W	720539.31	734226.03	Clearly defined 11m long linear anomaly. Same as 5_1, 12_3.	12.17	N	L	Nav Buoy 15	

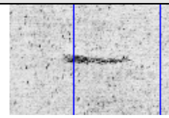
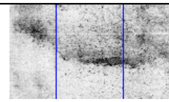
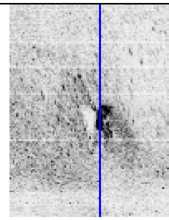
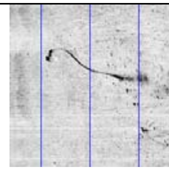
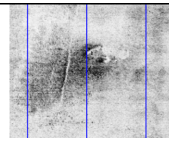
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
11_5	53°20.6607N	6°11.8759W	719993.83	734193.68	Straight alignment of sediment, possibly revealed a buried feature.	12.17	N	L	Probable prop wash feature as this is at the Stena Line berth	

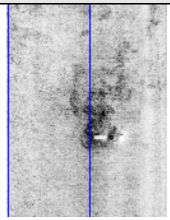
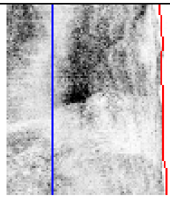
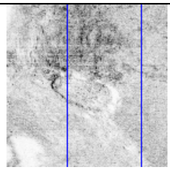
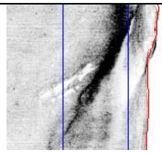
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
11_6	53°20.6648N	6°12.8207W	718945.21	734174.93	Possible length of cable, runs along the survey line, port edge.	12.16	N	L	Length of dumped cable.	

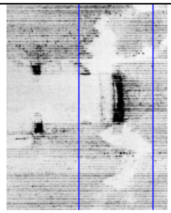
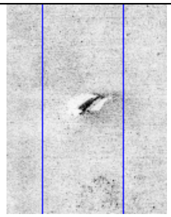
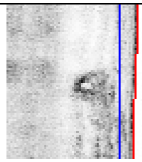
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
11_7	53°20.7428N	6°13.5802W	718098.82	734298.56	Two dolphin ramps/piers. Coordinate taken of eastern example.	12.16	N	n/a	Dolphins related to East Link Bridge.	
12_1	53°20.7248N	6°13.1186W	718611.87	734277.93	Poorly defined anomaly, probable localized irregularity in bed level due to shipping movements.	12.16	N	L	Probable propeller wash associated with P&O berth.	
12_2	53°20.6596N	6°12.1504W	719689.27	734183.96	Poorly defined anomaly, probable localized irregularity in bed level due to shipping movements.	12.16	Dive 32	L	No target identified during dive inspection. Probable propeller wash associated with P&O berth.	
12_3	53°20.6717N	6°11.3858W	720537.16	734227.83	Localized defined anomaly. Same as 5_1, 11_4.	12.17	N	L	Nav Buoy 15	

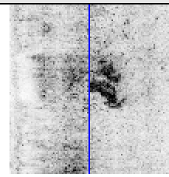
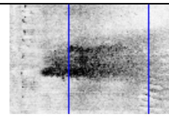
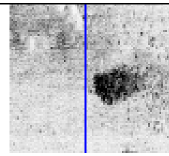
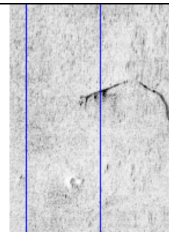
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
12_4	53°20.6713N	6°09.3625W	722782.36	734284.55	Localized collection of small anomalies over 9m-long area. Nav Buoy. Same as 4_4, 24_1, 26_7.	12.18	N	L	Nav Buoy	
12_5	53°20.6263N	6°08.5322W	723705.89	734224.99	Localized hard anomaly forming cluster of three circles, with 10m length of cable attached. Should be a Nav Buoy but the plotted location is some distance E. Same as 4_3, 26_8, 117_1.	12.18	N	L	Nav Buoy 7	
12_6	53°20.6100N	6°07.7355W	724590.76	734217.85	Localized hard anomaly forming cluster of two/three circles, with 10m length of cable attached. Nav Buoy. Same as 26_9, 117_2.	12.19	N	L	Nav Buoy 5	

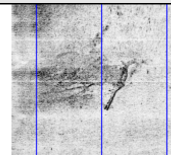
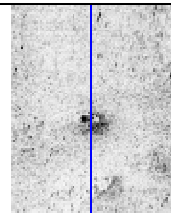
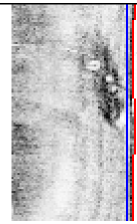
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
12_7	53°20.5611N	6°07.6162W	724725.52	734130.65	Rectangular-shaped anomaly.	12.19	N	L	On cross-Bay sewer line.	
12_8	53°20.5554N	6°07.2991W	725077.69	734129.33	Localized anomaly, rock/debris. Same as 3_2.	12.19	Y	L		
12_9	53°20.5837N	6°06.7783W	725654.23	734197.04	10m long length of probable cable on seabed, attached to /close to hard element. Nav Buoy. Same as 26_11, 27_1, 52_2, 53_1, 117_3.	12.19	N	L	Nav Buoy 3	
13_1	53°20.3070N	6°05.5652W	727014.11	733719.74	13m long length of probable cable. Nav Bouy. Same as 10_1, 14_2, 51_1, 52-1, 126_1.	12.20	N	L	Nav Buoy 1	
13_2	53°20.3105N	6°05.5386W	727043.45	733727.02	Localized hard point with cable attached, and close to 13_1. Nav Buoy.	12.20	N	L	Nav Buoy 1	

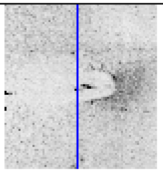
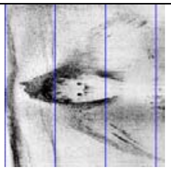
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
13_3	53°20.2697N	6°05.3101W	727299.07	733658.15	Linear anomaly, possibly a mud variation.	12.20	N	L	On a shipping turning point and so probably prop-wash.	
13_4	53°20.2010N	6°05.1751W	727452.31	733534.78	Linear anomaly, seems to be one end of a larger natural feature.	12.20	Y	L		
14_1	53°20.1470N	6°04.8148W	727854.88	733445.38	Localized hard object.	12.20	Y	L	On a shipping turning point for Dublin Bay Buoy, and so possibly prop-wash.	
14_2	53°20.3023N	6°05.5634W	727016.34	733711.08	18m long length of probable cable in wider area of cabling. Nav Buoy. Same as 10_1, 13_1, 51_1, 52-1, 126_1.	12.20	N	L	Nav Buoy 1	
15_1	53°20.5570N	6°07.9936W	724306.92	734112.08	Ovoid-shaped 5m long anomaly close to linear feature. Possibly mud shapes but possibly debris.	12.19	Dive 3	L	On cross-Bay sewer line. No target identified on dive inspection	

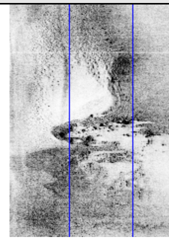
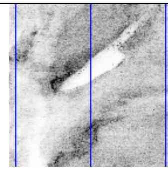
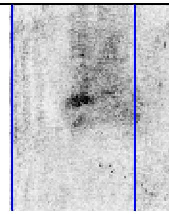
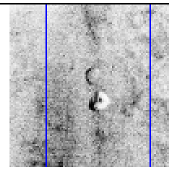
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
15_2	53°20.6247N	6°11.1830W	720764.41	734146.39	Localized hard point. Same as 11_3, 17_2, 159_2.	12.17	Dive 13	None	Mooring block	
15_3	53°20.6262N	6°12.0538W	719798.03	734124.72	Localized hard point.	12.16	Dive 34	None	Probably gravel from Stena Line prop wash. Dive inspection identified cobbles and gravel in a depression	
15_4	53°20.6411N	6°12.7373W	719038.86	734133.3	Broad oval-shaped anomaly, possible naturally formed, but curiously shaped.	12.16	Dive 30	L	Adjacent to S Quay. No target encountered in dive inspection	
15_5	53°20.6767N	6°13.0986W	718636.29	734189.29	Linear feature in area of scouring, probably natural mud formation.	12.16	N	L	Probable mud variation. Outside impact area.	

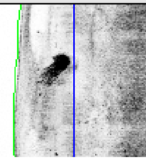
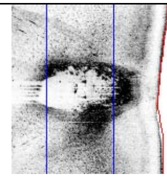
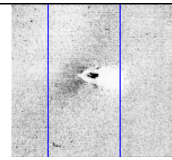
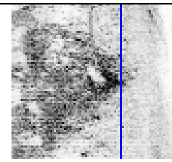
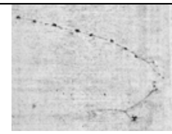
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
16_1	53°20.7046N	6°12.5963W	719192.38	734254.97	Two localized anomalies at entrance to Ocean Pier. Same as 25_2.	12.16	Y			
16_2	53°20.6997N	6°12.4096W	719399.78	734251.08	Ocean Pier Jetty head	12.16	N			
17_1	53°20.6037N	6°11.1804W	720768.29	734107.53	Well defined hard object, 5m long. Same as 1_9, 7_2, 100_2, 159_3, 170_3.	12.17	Dives 8, 10	L	No object identified in dive inspection	
17_2	53°20.6274N	6°11.1825W	720764.84	734151.41	Small anomaly. Stone/debris. Same as 11_3, 15_2, 159_2.	12.17	Dive 13	None	Mooring block	

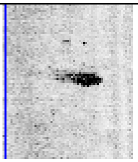
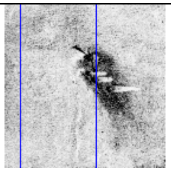
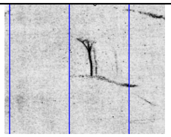
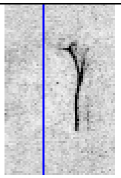
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
17_3	53°20.5598N	6°08.3830W	723874.66	734105.99	Localized anomaly, edges are unclear.	12.18	Y	L		
17_4	53°20.5469N	6°07.8495W	724467.32	734097.54	Localized hard area that is part of a sand/mud feature, perhaps creating a solid core.	12.19	N	L	On cross-Bay sewer line	
17_5	53°20.5327N	6°07.8179W	724503.07	734072.12	Localized hard area that is part of a sand/mud feature, perhaps creating a solid core. Same as 8_5.	12.19	N	L	On cross-Bay sewer line	
18_1	53°20.3935N	6°06.7876W	725653.24	733844.09	Probable length of cable 13m long, close to a small circular feature 18_2. Nav Buoy 4. Same as 18_2, 29_3, 109_1.	12.19	N	L	Nav Buoy 4	
18_2	53°20.3979N	6°06.7988W	725640.59	733851.92	Small circular feature, possible stone. Nav Buoy 4. Same as 18_1, 29_3, 109_1.	12.19	N	L	Nav Buoy 4	

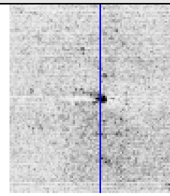
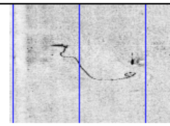
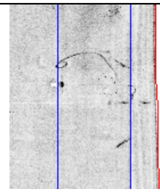
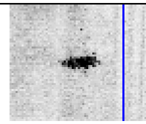
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
19_1	53°20.3241N	6°06.4535W	726027.42	733725.22	Linear feature over 15m long area on seabed indicating scoring underneath. Debris/other. Same as 30_1, 37_7.	12.20	Y	M		
19_2	53°20.1469N	6°05.6358W	726943.68	733420.78	Small localized anomaly.	12.20	Y	L		
20_1	53°20.2813N	6°05.9458W	726592.98	733660.82	Curious V-shaped disclouration of the sonar trace, suggesting defined change in bed level within the shaped area. Check surface plans. Coordinate taken at apex of V.	12.20	Y	L		
24_1	53°20.6699N	6°09.3583W	722787.09	734282.07	Irregular anomaly over 10m linear area, probable stone. Nav Buoy. Same as 4_4, 12_4, 26_7.	12.18	N	L	Nav Buoy	

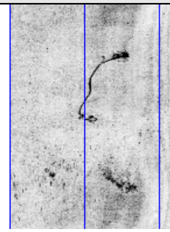
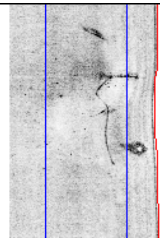
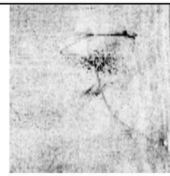
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
24_2	53°20.6922N	6°09.6505W	722461.78	734315.06	Well-defined V/U-shaped feature oriented N/S, consisting of uprights up to 5m apart, joined by possible cable. 6 uprights observed on E side, cluster of 3 at the apex on the W side. 33m long on one arc, 24m long on the other. Appears to have offset anchor/weight ties. DPC confirms it is abandoned cable Same as 26_5.	12.18	N	L	Outside impact area. Abandoned cable array for lighthouse buoy.	
24_3	53°20.6997N	6°10.3787W	721653.38	734308.22	Localized small-scale anomaly. Same as 26_3.	12.17	Dive 12	None	Metal top of modern navigation market	
24_4	53°20.6867N	6°10.5840W	721426.18	734278.29	Light house. Same as 4_7, 26_2.	12.17	N	L	Outside impact area	

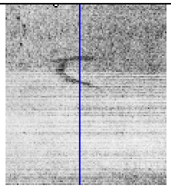
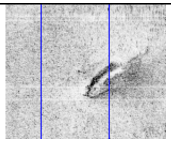
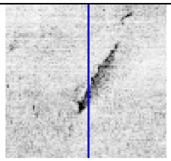
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
24_5	53°20.6893N	6°10.6556W	721346.61	734281.08	Possible shoals area on one side of lighthouse.	12.17	N	L	Outside impact area	
24_6	53°20.6854N	6°11.4122W	720507.22	734252.49	Localized hard area at what looks like the edge of the Channel.	12.17	N	L	'Dummy Buoy', used to lead ships into Berth.	
25_1	53°20.7245N	6°12.8109W	718953.32	734285.91	Small localized anomaly.	12.16	Dive 2	L	Poorly defined, possibly mud, at entrance to AB. No target identified in dive inspection	
25_2	53°20.7041N	6°12.5977W	719190.84	734254	Two small circular anomalies adjacent to each other, possibly tyres, same as 16_1.	12.16	Y	L	Probable airplane tyres used as fenders	

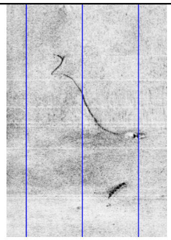
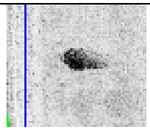
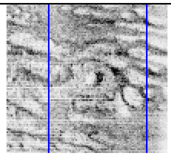
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
26_1	53°20.6837N	6°10.7133W	721282.84	734269.06	Small anomaly. Stone/debris.	12.17	Dive 14	L	No object identified in dive inspection	
26_2	53°20.6915N	6°10.5856W	721424.83	734287.46	Light house, same as 4_7, 24_4.	12.17	N	L		
26_3	53°20.7012N	6°10.3773W	721654.86	734311.04	Small anomaly. Stone/debris. Same as 24_3.	12.17	Dive 12	None	Metal top of modern navigation market	
26_4	53°20.6932N	6°10.1466W	721911.24	734302.76	Small anomaly. Stone/debris.	12.17	Y	L	Stoney bank	
26_5	53°20.6936N	6°09.6474W	722465.16	734317.74	Composite cable/post arrangement, same as anomaly 24_2. Coordinate taken at apex of feature. Long arc measures 51m on this	12.18	N	L	Outside impact area	

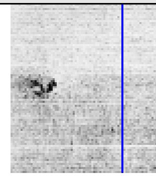
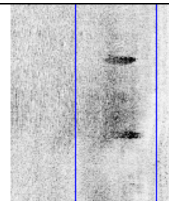
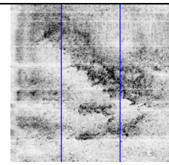
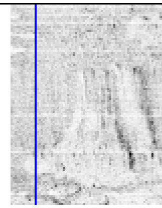
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
					trace. Abandoned cable.					
26_6	53°20.6934N	6°09.5251W	722600.88	734320.87	Localized small scale anomaly.	12.18	Dive 16	L	No object identified in dive inspection	
26_7	53°20.6720N	6°09.3625W	722782.33	734285.84	Substantial anomaly with possible rising elements. Nav Buoy. Same as 4_4, 12_4, 24_1.	12.18	N	L	Nav Buoy	
26_8	53°20.6254N	6°08.5381W	723699.38	734223.15	Possible length of cable. Should be a Nav Buoy but the plotted location is some distance E. Same as 4_3, 12_5, 117_1.	12.18	N	L	Nav Buoy 7	
26_9	53°20.6089N	6°07.7341W	724592.36	734215.85	Cable and anchor. Nav Buoy. Same as 12_6, 117_2.	12.19	N	L	Nav Buoy 5	

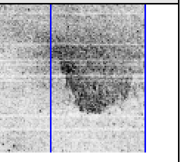
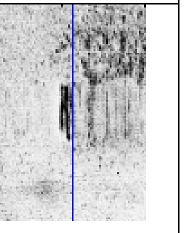
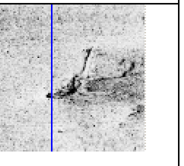
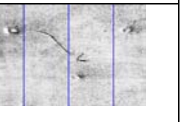
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
26_10	53°20.6185N	6°06.8466W	725576.74	734259.57	Small localized anomaly.			L		
26_11	53°20.5844N	6°06.7774W	725655.2	734198.37	Length of probable cable, 14m long. Nav Buoy. Same as 12_9, 27_1, 52_2, 53_1, 117_3.	12.19	N	L	Nav Buoy 3	
27_1	53°20.5779N	6°06.7833W	725648.97	734186.14	Length of probable cable, 14m long, with possible attachments at one end. Nav Buoy. Same as 12_9, 26_11, 52_2, 53_1, 117_3.	12.19	N	L	Nav Buoy 3	
27_2	53°20.5871N	6°07.1430W	725249.36	734192.67	Small localized anomaly.	12.19	Dive 22	L	No object identified in dive inspection	

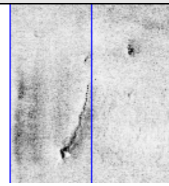
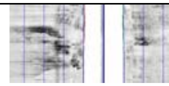
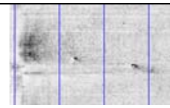
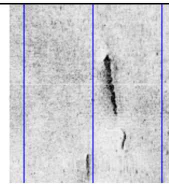
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
28_1	53°20.5232N	6°08.5473W	723694.1	734033.38	Length of probable cable 20m long, with attachment at one end. Nav Buoy 8. Same as 2_3, 101_1, 103_1, 114_3.	12.18	N	L	Nav Buoy 8	
29_1	53°20.4358N	6°07.7733W	724557.27	733893.74	Length of probable cable, 24m long. Nav Buoy 6. Same as 102_4, 103_2, 110_1, 111_1, 136_1.	12.19	N	L	Nav Buoy 6	
29_2	53°20.3862N	6°06.8343W	725601.77	733829.18	Partly buried linear feature, indicative of cable and attachment, 20 long. Nav Buoy 4. Same as 33_2, 37_9, 40_1, 41_1, 41_2, 43_3, 102_2.	12.19	N	L	Nav Buoy 4	
29_3	53°20.3909N	6°06.7938W	725646.48	733839.09	Partly buried linear feature, indicative of cable and attachment, 25 long. Nav Buoy 4. Same as 18_1, 18_2, 29_3, 109_1.	12.19	N	L	Nav Buoy 4	

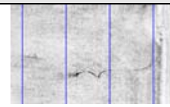
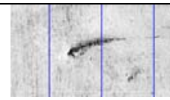
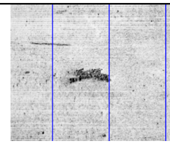
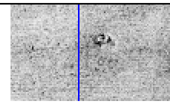
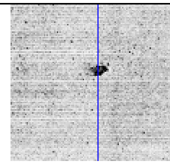
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
30_1	53°20.3240N	6°06.4550W	726025.76	733724.99	Curious linear anomaly, 16m long and 6m wide, in area of other similar but less substantive examples. Debris/other. Same as 19_1, 37_7.	12.20	Y	M		
31_1	53°19.9492N	6°06.0274W	726518.8	733042.62	Staple-shaped anomaly, 3m long.	12.20	N	L	Outside impact area, 33m SW.S	
33_1	53°20.3572N	6°06.5311W	725939.67	733784.31	Defined anomaly, slightly curving.	12.19	Y	L	At ship's turning point, Nav Buoy 4	
33_2	53°20.3846N	6°06.8329W	725603.4	733826.26	15m long anomaly, sharply defined. Nav Buoy 4. Same as 29_2, 37_9, 40_1, 41-2, 43_3, 102_2.	12.19	N	L	Nav Buoy 4	

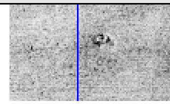
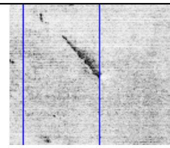
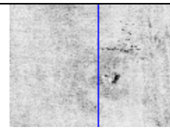
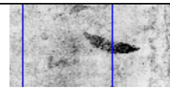
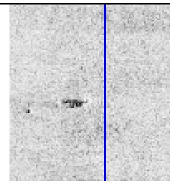
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
33_3	53°20.2630N	6°06.2637W	726241.07	733617.51	Irregular linear feature, 18m long with possible V-shape, lying on edge of disturbed seabed.	12.20	Y	L		
34_1	53°20.3856N	6°06.8100W	725628.76	733828.78	25m long cable and anchor, have seen this before, and separate element to W. Nav Buoy 4. Same as 37_8, 102_1.	12.19	N	L	Nav Buoy 4	
34_2	53°19.9598N	6°04.7316W	727956.56	733100.75	Small localized anomaly.	12.20	Y	L		
36_1	53°20.3733N	6°06.4336W	726047.09	733817.03	Small localized anomaly. Probable stone on larger roughened area.	12.20	Y	L		

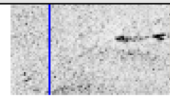
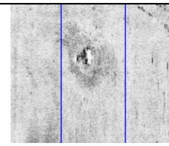
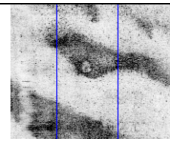
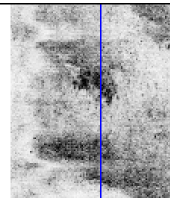
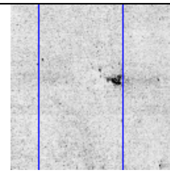
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
36_2	53°20.0841N	6°05.0138W	727637.15	733322.82	Small localized anomaly, irregular in shape. Debris? Same as 46_4.	12.20	Dive 29	M	Series of exposed sections of iron that appears to be modern. Follow-up inspection required	
37_1	53°19.9554N	6°04.8516W	727823.59	733089.01	Small defined anomaly with shadow.	12.20	Y	L		
37_2	53°19.9587N	6°04.8610W	727812.99	733094.85	Small defined anomaly with shadow.	12.20	Y	L		
37_3	53°20.1467N	6°05.6870W	726886.86	733418.9	Linear elements on stony patch of seabed, possibly natural feature but worth inspection.	12.20	Y	I		
37_4	53°20.2215N	6°05.9823W	726555.42	733548.86	Parallel-sided linear on sand, poorly defined, suggesting it may be partly buried.	12.20	Y	L		

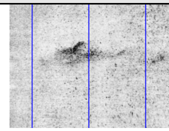
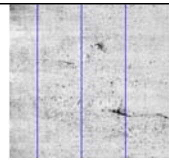
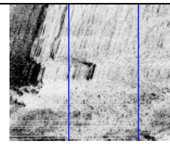
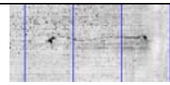
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
37_5	53°20.2252N	6°06.0393W	726491.98	733554.04	Linear feature on sand, partially buried.	12.20	Y	L		
37_6	53°20.3106N	6°06.4162W	726069.48	733701.28	Linear feature that may be natural as it seems to define one side of a patc hof gravel/stone.	12.20	Y	L		
37_7	53°20.3229N	6°06.4544W	726026.48	733722.97	Irregular u-shaped feature. Debris/other. Same as 19_1, 30_1.	12.20	Y	M		
37_8	53°20.3841N	6°06.8046W	725634.83	733826.16	Composite feature consisting of block, 24m-long cable and anchor, with outlying possible blocks x 2. Coordinate taken at block. Nav Buoy 4. Same as 34_1, 102_1.	12.19	N	L	Nav Buoy 4	

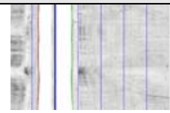
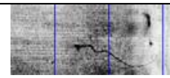
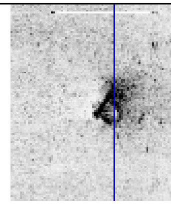
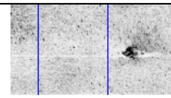
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
37_9	53°20.3843N	6°06.8319W	725604.52	733825.73	Composite feature consisting of 16m-long cable and anchor, possibly with associated block close by. Coordinate taken at anchor. Nav Buoy 4. Same as 29_2, 33_2, 40-1, 41_2, 43_3, 102_2.	12.19	N	L	Nav Buoy 4	
38_1	53°20.2830N	6°06.0688W	726456.39	733660.34	Irregular anomaly extending either side of survey centreline, Linear elements but may be natural in origin. Worth inspecting. Coordinate at starboard limit.	12.20	Y	L		
39_1	53°20.0972N	6°05.0199W	727629.72	733346.93	Isolated point anomaly.	12.20	Dive 28	None	Large boulder	
39_2	53°20.1042N	6°05.0137W	727636.26	733360.09	3m long	12.20	Dive 27	None	Ridge of stones and cobbles	
40_1	53°20.3867N	6°06.8361W	725599.11	733829.98	15m long anomaly, sharply defined. Nav Buoy 4. Same as 29_2, 37_9, 41_1, 41_2, 43_3, 102_2.	12.19	N	L	Nav Buoy 4	

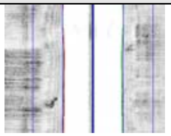
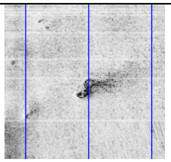
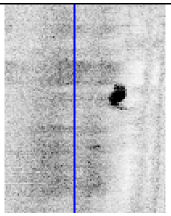
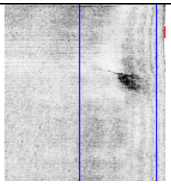
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
41_1	53°20.3920N	6°06.7886W	725652.51	733840.66	15m long anomaly, sharply defined. Nav Buoy 4. Same as 29_2, 37_9, 40_1, 41_2, 43_3, 102_2.	12.19	N	L	Nav Buoy 4	
41_2	53°20.3910N	6°06.8298W	725606.27	733839.44	15m long anomaly, sharply defined. Nav Buoy 4. Same as 29_2, 37_9, 40_1, 41_1, 43_3, 102_2.	12.19	N	L	Nav Buoy 4	
42_1	53°20.2572N	6°06.5363W	725938.82	733598.73	Poorly defined anomaly, irregular shape. 7.2m long. Mud?	12.19	Y	L	At turning point for ships by Nav Buoy 4, possible prop wash	
42_2	53°19.9455N	6°05.9321W	726624.76	733038.57	Small circular feature, lightly defined. 1m size. Debris?	12.20	Y	L		
43_1	53°20.1085N	6°06.3036W	726204.39	733329.85	Defined isolated anomaly. 1.9m long. Boulder/debris?	12.20	Y	L		

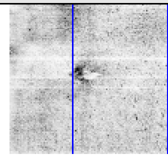
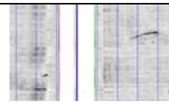
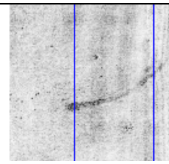
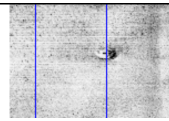
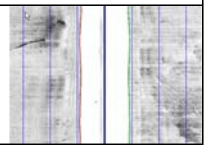
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
43_2	53°20.1747N	6°06.3305W	726171.28	733451.81	Length of probable cable. 22m long. Same as 43_2, 62_2, 63_1, 64_3, 67_1. Old Nav Buoy?	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
43_3	53°20.3865N	6°06.8389W	725596.65	733829.61	Linear anomaly, 13.4m long. Nav Buoy 4. Same as 29_2, 33_2, 37_9, 40_1, 41_1, 41_2, 102_2.	12.19	N	L	Nav Buoy 4	
44_1	53°20.4921N	6°06.8518W	725577.16	734025.04	Small anomaly 2m size, in wider area 12m across of sand shift. Same as 2_12, 46_1, 131_1.	12.19	Y	L		
44_2	53°20.4688N	6°06.7386W	725703.92	733985.15	Anomaly, arc-shaped, 7m long, possibly cable.	12.19	Y	L	At ships' turning point	
44_3	53°20.0453N	6°04.6612W	728030.44	733261.39	Isolated small anomaly. 2m size. Debris?	12.20	Y	L		

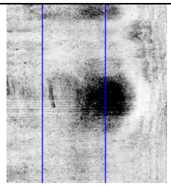
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
44_4	53°20.0136N	6°04.5819W	728120.04	733204.98	5m long anomaly in sandy area. Debris?	12.20	Y	L	6m outside and E of impact area	
46_1	53°20.4917N	6°06.8515W	725577.51	734024.3	Defined rectangular object 5m long 1m wide in area of scour. Worth investigating. Same as 2_12, 46_1, 131_1.	12.19	Y	L		
46_2	53°20.3789N	6°06.3594W	726129.16	733829.6	1m diameter circular feature within area of mud/soft sediment.	12.20	Y	L		
46_3	53°20.2547N	6°05.7535W	726807.71	733617.19	Clutch of what appears to be rock/stone 5m long in sandy area.	12.20	Y	L		
46_4	53°20.0839N	6°05.0144W	727636.49	733322.43	Isolated hard object, 2m long. Rock/debris? Same as 36_2.	12.20	Dive 29	M	Series of exposed sections of iron that appears to be modern. Follow-up inspection required	

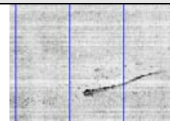
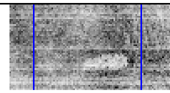
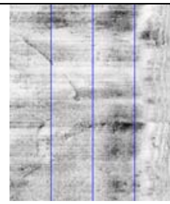
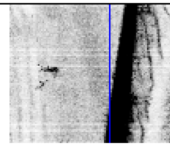
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
49_1	53°20.3370N	6°05.9175W	726621.64	733764.94	Indication of 5m long hard object, rock/debris?	12.20	Y	L		
51_1	53°20.3131N	6°05.5612W	727018.24	733731.17	Composite piece consisting of attachment and cable 14m long, with outlying elements. Coordinate taken at attachment. Nav Buoy. Same as 10_1, 13_1, 14_2, 52-1, 126_1.	12.20	N	L	Nav Buoy 1	
51_2	53°20.1635N	6°04.6585W	728027.53	733480.64	Small linear feature close to and parallel with indication of natural features. 1.8m long	12.20	Y	L		
52_1	53°20.3045N	6°05.5725W	727006.13	733714.89	Composite piece consisting of attachment and cable 23m long, with block. Coordinate taken at attachment. Nav Buoy. Same as 10_1, 13_1, 14_2, 51_1, 126_1.	12.20	N	L	Nav Buoy 1	

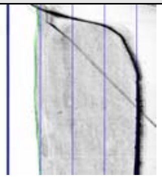
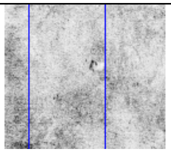
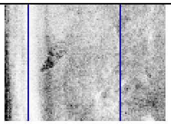
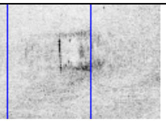
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
52_2	53°20.5769N	6°06.7798W	725652.9	734184.39	Composite piece consisting of block and 50m+ of cable. Coordinate taken at block. Nav Buoy. Same as 12_9, 26_11, 27_1, 53_1, 117_3.	12.19	N	L	Nav Buoy 3	
53_1	53°20.5858N	6°06.7753W	725657.46	734201.02	Composite piece consisting of attachment and 17m long cable. Coordinate taken at attachment. Nav Buoy. Same as 12_9, 26_11, 27_1, 52_2, 117_3.	12.19	N	L	Nav Buoy 3	
53_2	53°20.3822N	6°05.9927W	726535.95	733846.53	Irregular anomaly, well defined. 6m in size. Same as 10_2.	12.20	Y	L		
54_1	53°20.0131N	6°05.5766W	726997.68	733857.85	Hard anomaly, 2m in size.	12.20	N	L	Outside and N of impact area	

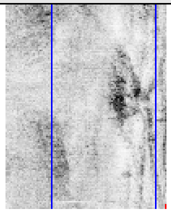
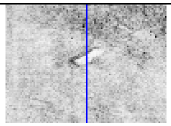
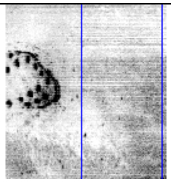
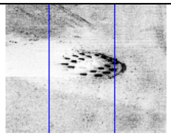
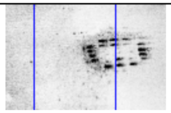
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
55_1	53°19.9841N	6°05.6135W	726976.49	733119.57	Linear stretch of stone, probably natural, seen either side of towfish. 10-15m long. Same as 56_1.	12.20	N	L	On edge of channel, debris from maintenance dredging	
56_1	53°19.9821N	6°05.6116W	726978.7	733115.92	Irregularly-shaped hard anomaly 6m in size. Same as 55_1.	12.20	Y	L		
60_1	53°19.9812N	6°05.9161W	726640.76	733105.24	Defined sub-circular feature, 4m in size.	12.20	Y	L		
61_1	53°20.0106N	6°06.0300W	726512.89	733156.39	Ill-defined anomaly possibly with linear element, 9m long.	12.20	Y	L		

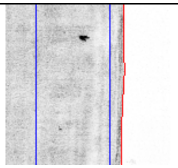
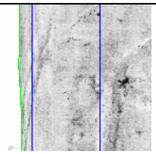
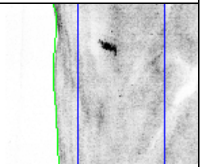
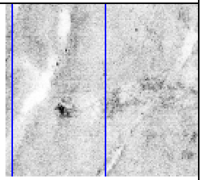
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
62_1	53°20.0145N	6°05.5800W	727012.17	733176.94	Hard object 2m in size with shadow. Same as 64.1, 126_2.	12.20	Y	L		
62_2	53°20.1767N	6°06.3280W	726173	733455	Linear feature that appears to be partly buried, and resurfaces 20m distant. Exposed parts are 16m and 4m long. 43_2, 63_1, 67_1.	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
63_1	53°20.1813N	6°06.3344W	726166.62	733463.94	Linear element that appears to be a partly buried 16m long cable and attachment. Coordinate taken at attachment. Same as 43_2, 62_2, 63_1, 67_1. Old Nav Buoy?	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
64_1	53°20.0144N	6°05.5859W	727004.74	733177.66	3m in size hard object on sandy bed. Same as 62_1, 64.1, 126_2.	12.20	Y	L		
64_2	53°20.1968N	6°06.2622W	726245.99	733494.8	Long snaking linear feature, probably cable, 80m or so, and possibly attached to 64_3, but the possible junction is under	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of	

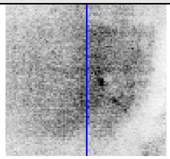
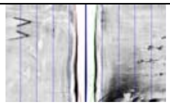
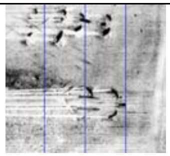
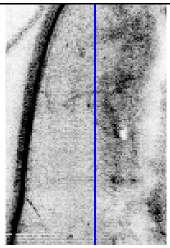
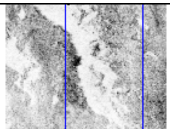
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
					the towfish.				dumped cable	
64_3	53°20.1804N	6°06.3348W	726166.22	733462.25	Composite piece consisting of attachment and 16m long cable. Coordinate taken at attachment. May be associated with 64_2, which reaches in another direction. Same as 43_2, 63_1, 67_1. Old Nav Buoy?	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
65_1	53°20.1977N	6°06.2980W	726206.22	733495.42	Linear feature crossing over gravel area, probably cable, more than 24m long. Same as 119_2.	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
66_1	53°20.1802N	6°06.2022W	726313.4	733465.79	Large circular feature that is possibly a hollow 9m in diameter.	12.20	Y	L		

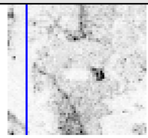
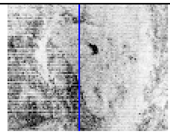
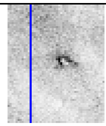
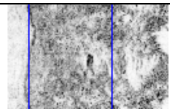
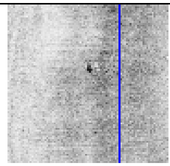
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
67_1	53°20.1810N	6°06.3301W	726171.41	733463.51	Composite piece with attachment and 19m long cable. Coordinate taken at attachment. Same as 43_2, 62_2, 63_1, 64_3. Old Nav Buoy?	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
68_1	53°20.1374N	6°05.7977W	726764.46	733398.38	Small target 1m in size with shadow suggesitng it standing 1.4m proud of the bed, in a cavity of soft mud.	12.20	Y	L		
68_2	53°20.1991N	6°06.2390W	726271.63	733499.75	Long linear feature snaking about, probably abandoned cable, extending c. 50m in one direction and 20m in another. Possibility f an attachment at one end. Coordinate taken at attachment.	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
69_1	53°20.9036N	6°12.9519W	718788.56	734614.1	Small anomaly off E Qy Alex Basin. 2m in size. Debris.	12.16	Y	L	possible mooring-related	

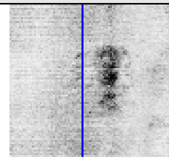
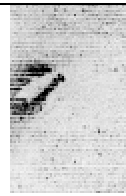
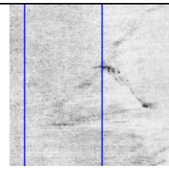
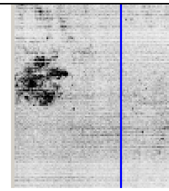
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
72_1	53°20.9111N	6°12.9659W	718772.68	734627.61	What appears to be a submarine cable extending across the elbow of the Ocean Pier and Alex Qy. 53m long. Alternatively it is a mooring line for berthed US vessel. Coordinate taken half-way along cable feature.	12.16	N	L	Steel frame below waterline for ESB intake	
73_1	53°20.8269N	6°12.9704W	718771.59	734471.36	Small circular anomaly, possibly tyre. 1.7m diameter.	12.16	Dive 7	L	No object identified in dive inspection	
73_2	53°20.9009N	6°13.0283W	718703.91	734606.97	Small linear anomaly 3m long, off Alex Qy.	12.16	Y	L	possible mooring-related	
74_1	53°20.9158N	6°13.0887W	718636.21	734632.93	Rectangular-shaped anomaly that may be extended in size because captured in turn.	12.16	Y	L	Steel piles	

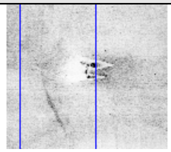
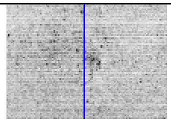
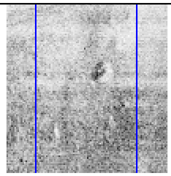
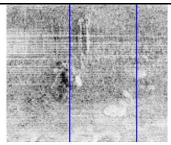
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
75_1	53°20.8408N	6°12.9918W	718747.2	734496.54	Irregularly-shaped anomaly over 5m area. Debris.	12.16	N	L	Probable mud variation. A modern anchor was lost in this location	
75_2	53°20.8240N	6°13.0054W	718732.88	734465.01	3m long linear anomaly. Debris.	12.16	Dive 6	L	Modern iron object	
76_1	53°20.8603N	6°13.0952W	718631.79	734529.28	Dolphin pier 79_1, showing clearly the arrangement of supporting piles.	12.16	N	n/a		
78_1	53°20.8627N	6°13.0971W	718629.34	734534.23	Dolphin pier 79_1, showing clearly the arrangement of supporting piles.	12.16	N	n/a		
79_1	53°20.8612N	6°13.0936W	718633.3	734531.55	Dolphin pier 79_1, showing clearly the arrangement of supporting piles. 9 x 7m (ie measuring from ss traces is indicative only	12.16	N	n/a		

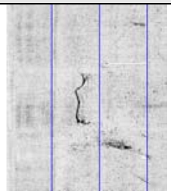
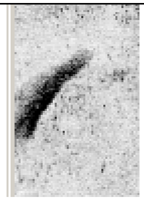
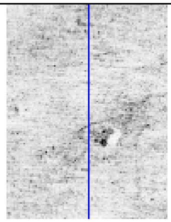
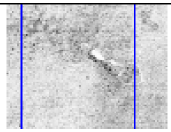
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
					and is not accurate)					
80_1	53°20.9105N	6°13.1686W	718547.8	734620.89	Small hard object. 1m in size. Debris.	12.16	N	L	Modern rubbish	
80_2	53°20.8935N	6°13.1829W	718532.72	734588.97	Small hard object. 1m in size. Debris.	12.16	N	L	Modern rubbish	
80_3	53°20.9138N	6°13.2105W	718501.15	734625.85	Small hard object. 1m in size. Debris.	12.16	N	L	Modern rubbish	
80_4	53°20.9070N	6°13.2195W	718491.48	734612.99	Small hard object. 1m in size. Debris.	12.16	N	L	Modern rubbish	

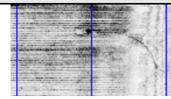
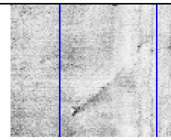
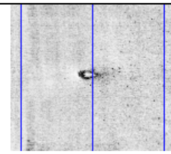
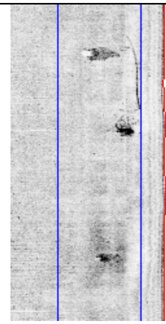
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
83_1	53°20.9052N	6°13.0151W	718718.48	734614.94	Small object. 1m in size. Debris.	12.16	N	L		
86_1	53°20.8281N	6°13.3327W	718369.52	734463.56	Pile sequence on seabed Alex Basin, under ramp	12.16	N	n/a	Ro Ro ramp features	
87_2	53°20.8256N	6°13.3356W	718366.42	734458.84	Foundations for ramp off Alex Basin NQWE north side. Forms two rows of up to four lines of supports.	12.16	N	n/a	Ro Ro ramp features	
89_1	53°20.8084N	6°13.2148W	718501.25	734430.29	Small anomaly off NQE north side. 1m in size.	12.16	Dive 5	None	Probable chain from Yokahama fender. Dive inspection identified length of double-banded cable-rope	
90_1	53°20.7399N	6°11.5148W	720390.81	734350.67	Pair of 1m objects 5m apart.	12.17	N	L	Berths 52/53, Probably tyres	

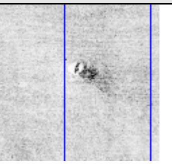
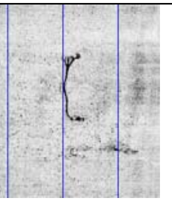
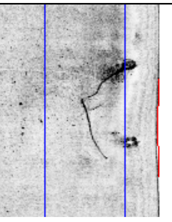
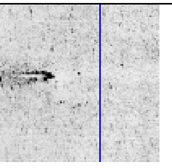
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
90_2	53°20.7903N	6°11.5243W	720377.9	734443.86	Pair of small objects 1m in size. Debris. Same as 92_1.	12.17	N	L	Berths 52/53	
92_1	53°20.7900N	6°11.5242W	720378.03	734443.3	Pair of objects, one of which is a 3m long linear. Debris? Same as 90_2.	12.17	N	L	Berths 52/53	
92_2	53°20.7317N	6°11.4865W	720422.6	734336.26	4m long irregular object. Debris?	12.17	N	L	Berths 52/53. Probably tyres	
93_1	53°20.8430N	6°11.5162W	720384.41	734541.8	3m long linear object. Debris?	12.17	N	L		
94_1	53°20.8187N	6°11.5479W	720350.38	734495.85	1m size anomaly. Debris?	12.17	N	L	Berths 52/53	

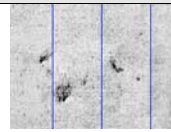
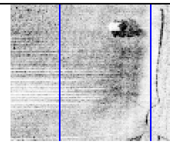
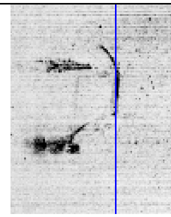
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
100_1	53°20.5897N	6°11.3044W	720631.34	734078.07	Irregular linear/rectangular feature 15m long.	12.17	Y	L	Mud	
100_2	53°20.6041N	6°11.1812W	720767.38	734108.24	Linear object at side of sonar trace 5m long. Same as 1_9, 7_2, 17_1, 159_3, 170_3.	12.17	Dives 8, 10	L	No object identified in dive inspection	
100_3	53°20.5552N	6°10.9418W	721035.35	734024.33	Poorly defined linear feature 14m long, with two hard end points. Nav buoy. Same as 157_3.	12.17	N	L		
100_4	53°20.6059N	6°10.2184W	721835.71	734138.84	Irregularly defined anomaly, unclear. C. 6m in diameter. Same as 1_14.	12.17	Y	L	probably base of nav channel	

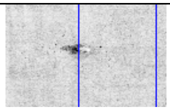
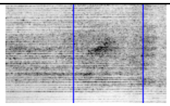
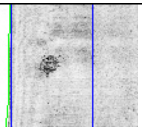
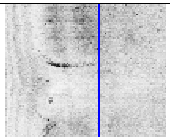
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
100_5	53°20.5674N	6°10.1260W	721940.08	734070.08	Clearly defined features suggestive of v-shaped features. 3-5m in size.	12.17	Dive 11	None	Two pieces of metal, probably navigation marker	
100_7	53°20.5843N	6°09.7178W	722392.25	734113.06	Defined hard point. 3m in size. Same as 1_16, 7_6.	12.18	N	L	Nav Buoy 12	
100_8	53°20.6007N	6°09.2570W	722902.82	734156.66	Localized focus point, possibly a buried feature.	12.18	Y	?		cannot see the sss thumbnail
100_9	53°20.5848N	6°09.0109W	723176.68	734134.25	Anomaly, 4m long, probable rock.	12.18	Y	L		
100_10	53°20.5963N	6°09.0670W	723113.87	734153.96	Anomaly, sub-rectangular/ovoid in shape 6m long, possibly image of Buoy 10.	12.18	Y	L		

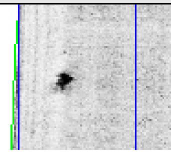
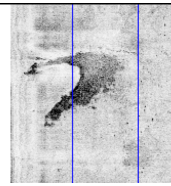
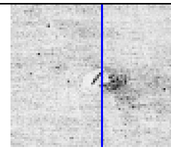
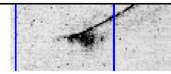
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
101_1	53°20.5262N	6°08.5664W	723672.76	734038.39	Composite piece consisiting of attachment, 19m long cable and possible anchor. Coordinate taken at attachment. Nav Buoy 8. Same as 2_3, 28_1, 103_1, 114_3.	12.18	N	L	Nav Buoy	
101_2	53°20.5394N	6°07.4922W	724864.18	734094.03	Linear feature, slight curvature 12m long, possibly natural.	12.19	Y	L		
101_3	53°20.5306N	6°07.3197W	725056.04	734082.74	Short linear anomaly, 3m long. Same as 2_11.	12.19	Y	L		
101_4	53°20.5201N	6°07.2566W	725126.57	734065.11	Short linear anomaly, 4m long.	12.19	Y	L		

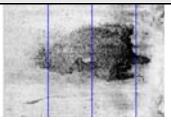
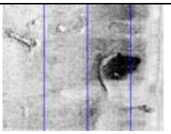
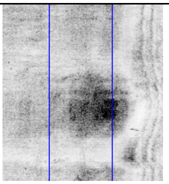
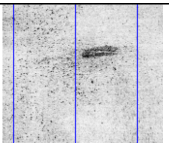
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
102_1	53°20.3842N	6°06.8061W	725633.16	733826.3	Length of cable, 15m long, apparently with attachments on either end. Nav Buoy 4. Same as 34_1, 37_8, 40_1, 41_1, 41_2, 102_1.	12.19	N	L	Nav Buoy 4	
102_2	53°20.3844N	6°06.8340W	725602.19	733825.86	Hard point with possible cable extending from it. Nav Buoy 4. Same as 29_2, 33_2, 37_9, 43_3.	12.19	N	L	Nav Buoy 4	
102_3	53°20.4286N	6°07.4633W	724901.65	733889.42	Hard point, 2m in size, boulder/debris? Same as 103_3, 112_1.	12.19	Dive 23	None	Mooring block and chain	
102_4	53°20.4334N	6°07.7710W	724559.94	733889.36	Composite piece, poorly define dbut with two attachments and 17m length of cable. Coordinate taken at one attachement. Outlying hard element c. 28m distant. Nav Buoy 6. Same as 29_1, 103_2, 110_1, 111_1, 136_1.	12.19	N	L	Nav Buoy 6	

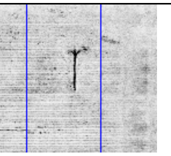
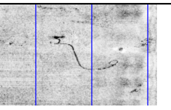
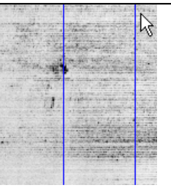
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
102_5	53°20.5301N	6°08.4739W	723775.22	734048.29	Small localized anomaly. 5m in size. Boulder/debris? Same as 2_5, 114_2.	12.18	Dive 19	L	No target identified in dive inspection	
103_1	53°20.5256N	6°08.5644W	723675.01	734037.34	Composite piece, consisting of attachment, 20m long cable and possible anchor. Coordinate taken at attachment. Nav Buoy 8. Same as 2_3, 28_1, 101_1, 114_3.	12.18	N	L	Nav Buoy	
103_2	53°20.4324N	6°07.7704W	724560.66	733887.52	Composite piece consisting of attachment, 22m long cable and outlying element close by. Coordinate taken at attachment. Nav Buoy 6. Same as 29_1, 102_4, 110_1, 111_1, 136_	12.19	N	L	Nav Buoy 6	
103_3	53°20.4292N	6°07.4571W	724908.5	733890.71	Small hard point, 1m in size, debris? Same as 102_3, 111_2.	12.19	Dive 23	None	Mooring block and chain	

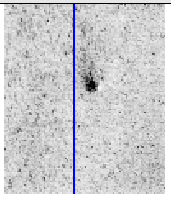
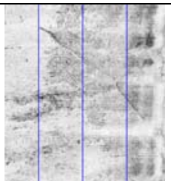
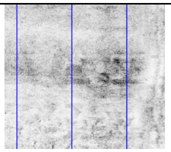
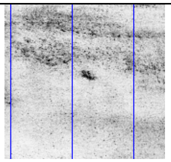
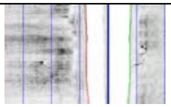
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
105_1	53°20.3932N	6°07.2716W	725116.12	733829.37	Cluster of three probable rock features within 10m of each other. Coordinate taken on the middle feature.	12.19	Dive 24	L	Hollow in seabed with angular boulders	
106_1	53°20.4320N	6°07.7884W	724540.7	733886.26	4 x 2m rectangular object.	12.19	Y	L	possibly associated with Nav Buoy 6	
109_1	53°20.3926N	6°06.7988W	725640.85	733842.09	Composite piece observed at edge of sonar trace, consisting of a possible attachment and 12m+ length of cable. Coordinate taken at attachment. Nav Buoy 4. Same as 18_1, 18_2, 29_3.	12.19	N	L	Nav Buoy 4	
110_1	53°20.4323N	6°07.7710W	724560	733887.32	Hard point consisting of 3 contiguous circular features and a length of cable attached. Nav Buoy 6. Same as 29_1, 102_4, 103_2, 111_1, 136_1.	12.19	N	L	Nav Buoy 6	

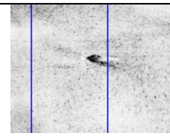
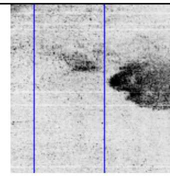
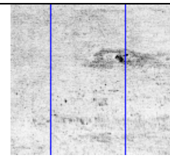
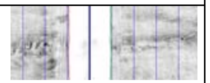
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
111_1	53°20.4345N	6°07.7718W	724559	733891.37	Composite piece with attachment, cable and possible block, and one outlier. Coordinate taken attachment.	12.19	N	L	Nav Buoy 6	
111_2	53°20.4295N	6°07.4622W	724902.83	733891.12	Isolated anomaly with possible shadow. Same as 102_3, 103_3.	12.19	Dive 23	None	Mooring block and chain	
112_1	53°20.4487N	6°07.5263W	724830.76	733924.85	Isolated anomaly with possible shadow.	12.19	Y	L		
112_2	53°20.4783N	6°07.8969W	724418.05	733968.96	Circular-shaped 'soft' anomaly.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
112_3	53°20.4814N	6°07.9466W	724362.74	733973.26	Slight linear anomaly.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	

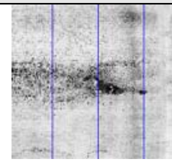
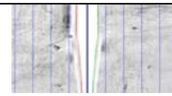
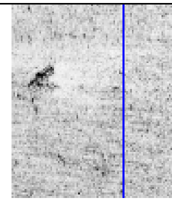
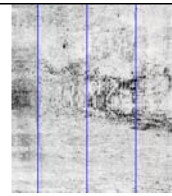
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
113_1	53°20.4776N	6°07.9674W	724339.84	733965.61	Hard object, irregular but clearly defined.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
114_1	53°20.4964N	6°07.5936W	724753.75	734011.34	Sharply-defined U-shaped feature with hard elements showing onits perimeter, and gravel/stone on outer side. Posssilbly a natural feature but worth investigation.	12.19	N	L	On cross-Bay sewer line	
114_2	53°20.5297N	6°08.4747W	723774.36	734047.53	Small circular anomaly. Same as 2-5, 102_5.	12.18	Dive 19	L	No target identified in dive inspection	
114_3	53°20.5234N	6°08.5469W	723694.54	734033.76	Composite feature consisting of attachment and cable. Coordinate taken at attachment. Nav Buoy 8. Same as 2_3, 28_1, 101_1, 103_1.	12.18	N	L	Nav Buoy	

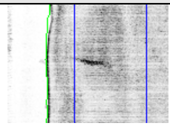
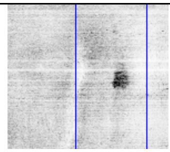
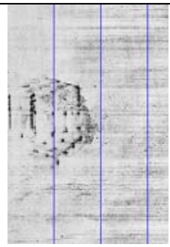
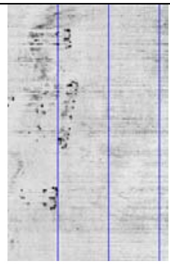
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
115_1	53°20.5247N	6°07.6907W	724644.62	734060.99	V-shaped object within shadow area of mud exposure.	12.19	N	L	On footprint of Sewer pipe so it cannot be relevant	
115_2	53°20.5106N	6°07.2697W	725112.5	734047.11	Curving strongly-defined element that may simply be one side of a mud-defined feature. But worth investigating.	12.19	Y	L		
115_3	53°20.4921N	6°06.7921W	725643.41	734026.79	Large circular-shaped anomaly. Possibly mud.	12.19	Y	L	At a turning point for shipping.	
116_1	53°20.5091N	6°07.4250W	724940.23	734039.8	Vaguely defined linear feature in wider area of such features associated with natural mud/silt elements. Probably natural. Low potential. Sam as 8_9.	12.19	Y	L		

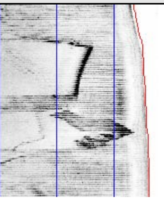
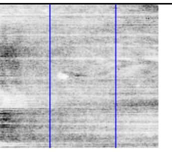
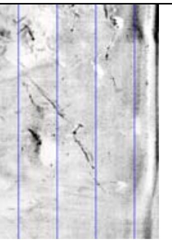
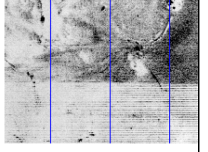
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
117_1	53°20.6257N	6°08.5271W	723711.57	734224.03	Composite element, consisting of attachment and cable. Coordinate taken at attachment. Should be a Nav Buoy but the plotted location is some distance E. Same as 4_3, 12_5, 26_8.	12.18	N	L	Nav Buoy 7	
117_2	53°20.6086N	6°07.7330W	724593.6	734215.33	Composite element, consisting of attachment and cable. Coordinate taken at attachment. Nav Buoy. Same as 12_6, 26_9.	12.19	N	L	Nav Buoy 5	
117_3	53°20.5842N	6°06.7758W	725656.98	734198.04	Composite element, consisting of attachment, cable and possible block, with an outlying block feature. Coordinate taken at attachment. Nav Buoy. Same as 12_9, 26_11, 27_1, 52_2, 53_1.	12.19	N	L	Nav Buoy 3	
118_1	53°20.3312N	6°06.6312W	725829.86	733733.16	Small hard object, with lesser outlier.	12.19	Dive 25	None	Two boulders and section of possible bedrock close by	

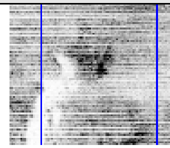
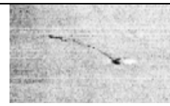
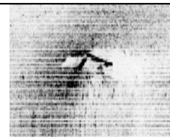
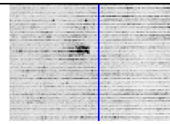
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
119_1	53°20.0315N	6°05.4990W	727101.96	733211.18	Defined small circular anomaly.	12.20	Y	L	125m W of W01552-W01554	
119_2	53°20.1970N	6°06.2912W	726213.8	733494.32	Probable length of cable. Coordinate taken in centre. Same as 65_1.	12.20	Y	L	Doesn't concur with any Nav Buoys, most likely a mass of dumped cable	
120_1	53°20.4735N	6°06.6840W	725764.28	733995.47	Ill-defined area of anomaly close to sand ripples.	12.19	Y	L	At turning point for shipping	
125_1	53°20.1623N	6°05.7411W	726826.05	733446.22	Small defined anomaly on border between sand and gravel area.	12.20	Y	L	Probably gravel	
126_1	53°20.3034N	6°05.5641W	727015.5	733713.1	Composite piece consisting of attachment, cable and possible block/s, under centreline of tow-fish. Coordinate	12.20	N	L	Nav Buoy 1	

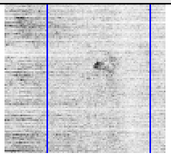
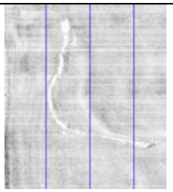
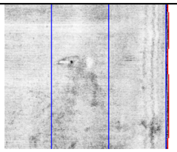
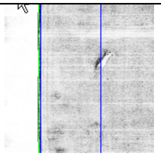
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
					taken at starboard attachment point. Nav Buoy. Same as 10_1, 13_1, 14_2, 51_1, 52-1.					
126_2	53°20.0147N	6°05.5807W	727011.38	733177.29	Small defined anomaly on sandy bed. Same as 62_1, 64_1.	12.20	Y	L		
129_1	53°20.1577N	6°04.8340W	727833.04	733464.65	Circular-shaped anomaly, possibly mud.	12.20	Y	L	On a shipping turning point for Dublin Bay Buoy, and so possibly prop-wash.	
131_1	53°20.4917N	6°06.8519W	725577.07	734024.29	Slight hard anomaly within rectangular-shaped area of hard material. Same as 2_12, 44_1, 46_1.	12.19	Y	L		
133_1	53°20.5021N	6°07.1508W	725244.86	734034.83	Localized hard point at end of long narrow feature probably natural in origin.	12.19	Y	L		

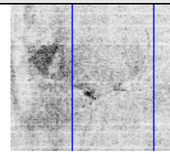
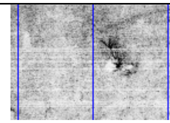
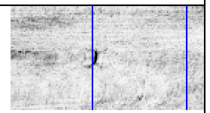
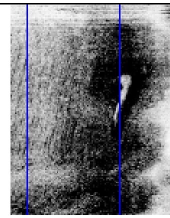
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
135_1	53°20.5197N	6°07.5334W	724819.42	734056.3	Irregular area of hard features in gravel exposure. Rock? Same as 8_7.	12.19	N	L	On cross-Bay sewer line	
136_1	53°20.4337N	6°07.7757W	724554.71	733889.78	Composite piece,with attachment, cable and possible associated block. Coordinate taken at attachment.	12.19	N	L	Nav Buoy 6	
138_1	53°20.4222N	6°07.9735W	724335.76	733862.71	Small anomaly, poorly defined in sandy area.	12.19	N	L	Outside impact area	
141_1	53°20.5831N	6°08.6585W	723567.82	734141.24	Variations indicated but possibly a feature of sea conditions.	12.18	Y	L		

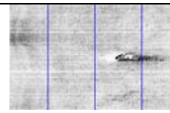
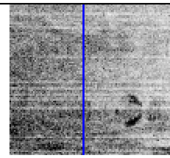
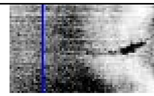
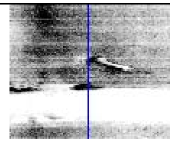
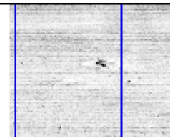
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
143_1	53°20.5656N	6°10.8885W	721094.01	734045.12	Localized short linear anomaly.	12.17	N	L	Outside impact area	
143_2	53°20.5765N	6°11.0737W	720887.98	734060.1	Localized anomaly, rock/debris.	12.17	Y	L		
143_3	53°20.5287N	6°11.4724W	720447.78	733960.23	Hexagonal-shaped feature with array of internal piles; a dolphin ramp/jetty off the S Quay.	12.17	N	L	Outside impact area	
143_4	53°20.5275N	6°11.6097W	720295.47	733954.15	Sequence of one main and two lesser piled features, presumably relating to known quays in the Port's south quay. Coordinate taken at centre.	12.17	N	L	Outside impact area	

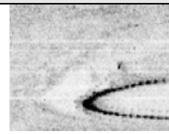
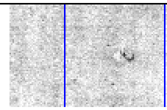
Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
143_5	53°20.5381N	6°11.8191W	720062.6	733967.93	Series of jetty/pier features along the S quay area.	12.17	N	L	Outside impact area	
147_1	53°20.6694N	6°11.8526W	720019.27	734210.46	Small anomaly in sandy area. Debris?	12.17	Y	L	Area of hard seabed	
148_1	53°20.6579N	6°13.1213W	718611.97	734153.8	Linear feature that may be a length of cable, amidst a much larger spread fo hard contacts off the sailing club, indicative of debris from the loading/unloading activities.	12.16	N	L	Probably modern mooring but worth seeing if it include anchors. Outside impact area	
152_1	53°20.6687N	6°13.1555W	718573.51	734172.88	Curving linear feature amidst larger area of hard targets associated with debris off Sailing Club.	12.16	Dive 4	None	Modern mooring	

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
157_1	53°20.5723N	6°11.5741W	720332.87	734038.22	Linear object. 5m long	12.17	Y	L		
157_2	53°20.5818N	6°11.1248W	720831.02	734068.48	Defined object with two possible outliers. 5m long principal element. Same as 1_10, 7_3, 170_4.	12.17	Y	L		
157_3	53°20.5548N	6°10.9387W	721038.81	734023.67	Composite piece consisting of attachment and lengt of probable cable 10m long. Nav buoy. Same as 100_3.	12.17	N	L	Nav Buoy	
157_4	53°20.5910N	6°10.7397W	721257.93	734096.42	Defined target representing three interlocking 3m long elements. Same as 7_4, 168_1.	12.17	N	L	Outside impact area	
158_1	53°20.6453N	6°09.5213W	722607.39	734231.79	Isolated anomaly on sandy bed.	12.18	Y	L		

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
158_2	53°20.6792N	6°10.7446W	721248.32	734259.83	Central anomaly within circular shape.	12.17	Dive 15	L	Car tyre, Steel pipe observed close by. The pipe is sticking out of dredge slope at depth of 3m from top of slope. Appears to be previously grabbed and buckled.	
159_1	53°20.5943N	6°12.2357W	719598.40	734061.80	Hard object that has given rise to drag feature.	12.16	Y	L		
159_2	53°20.6263N	6°11.1821W	720765.34	734149.38	Narrow object casting shadow. Same as 11_3, 15_2, 17_2.	12.17	Dive 13	None	Mooring block	
159_3	53°20.6037N	6°11.1833W	720765.07	734107.44	Linear object on seabed. Same as 1_9, 7_2, 17_1, 100_2, 170_3.	12.17	Dives 8, 10	L	No object identified in dive inspection	

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
159_4	53°20.5886N	6°09.1323W	723041.78	734137.8	Possible composite object, not clearly distinguished. Same as 8_1.	12.18	Dive 18	L	No object identified in dive inspection	
159_5	53°20.5773N	6°09.0717W	723109.57	734118.59	Composite object consisting of core block and possible anchor. Nav Buoy 10. Same as 2_1, 8_2.	12.18	N	L	Nav Buoy	
160_1	53°20.6915N	6°09.1139W	723057.26	734329.14	Line of shingle meets linear disturbance. Worth seeing if there is a snag on the seabed.	12.18	N	L	Outside impact area	
161_1	53°20.6776N	6°09.3207W	722828.45	734297.43	Small rectangular object.	12.18	Dive 17	L	Mooring block beside isolated timber	
161_1	53°20.6773N	6°09.3209W	722828.24	734296.86	same as 161_1	12.18	Dive 17	L		
164_1	53°20.6490N	6°09.7916W	722307.27	734230.92	Anomalous feature in area of shadow close to band of sand ripples.	12.18	Y	L		

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
165_1	53°20.6416N	6°10.0787W	721989.04	734209.02	10m long linear in area where natural variations appear at right angles to it.	12.18	Y	L		
168_1	53°20.5866N	6°10.7425W	721255.03	734088.19	Hard feature in sandy area. Same as 7_4, 157_4.	12.17	N	L	Outside impact area	
170_1	53°20.6734N	6°11.1887W	720755.79	734236.53	Two hard features on sandy bed.	12.17	Dive 9	None	Car tyre	
170_2	53°20.6448N	6°11.1477W	720802.64	734184.66	Short linear object.	12.17	Y	L		
170_3	53°20.6024N	6°11.1804W	720768.35	734105.11	Linear object. Same as 1_9, 7_2, 17_1, 100_2, 159_3.	12.17	Dives 8, 10	L	No object identified in dive inspection	
170_4	53°20.5805N	6°11.1271W	720828.53	734066.01	Irregular shaped small object. Same as 1_10, 7_3, 157_2.	12.17	Y	L		

Ref.	Latitude	Longitude	ITMe	ITMn	Description	Fig.	To Dive Y/N/ Dived	Arch. Potential	Further Interpretation/ Diver-truthing	Image
174_1	53°20.7412N	6°12.9834W	718761.13	734312.09	North Wall Quay lighthouse perch.	12.16	N	n/a	NWQE terminal	
176_1	53°20.7072N	6°13.4451W	718250.38	734236.27	Two contiguous circular features, with indication of cabling about them. At edge of sonar trace.	12.16	N	L	Mooring	
177_1	53°20.7197N	6°12.7601W	719009.91	734278.42	Small feature at entrance to Alexander basin, seen on other sonar traces.	12.16	Dive 1	None	Tractor tyre	

MAGNETOMETER SURVEY

Source: Vessel Track Plots, Data Record

Coordinates presented on data record in Lat/Long, and converted to ITM.

Notes:

1. Under Ref/Reference, mg1_1 refers to 'magnetometer survey line 1_target 1'.

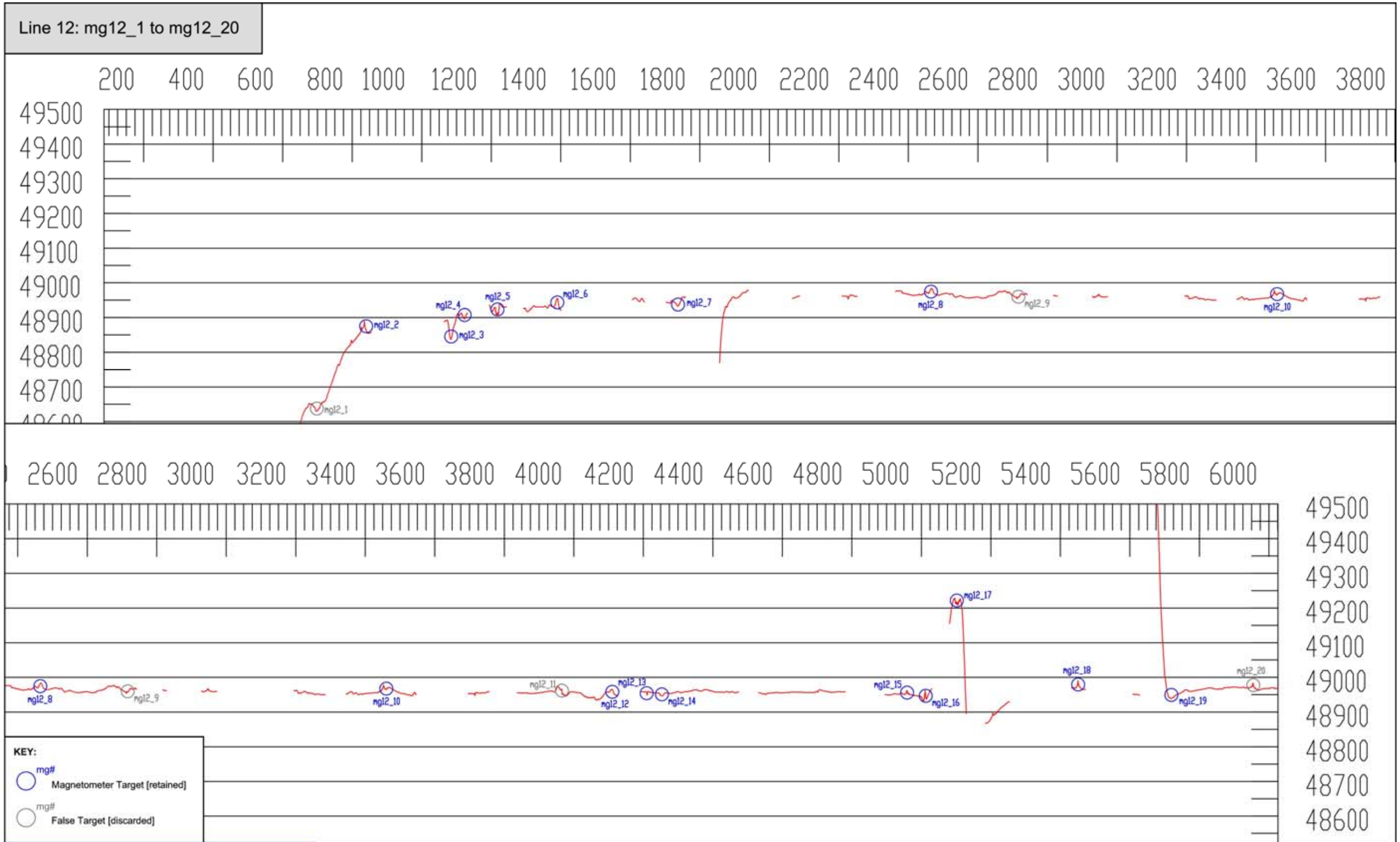
2. The highlighted values reflect a discussion with Hydrographic Surveys Ltd (HSL) on the possible interpretation of individual anomalies.

3. The profiles included below show those survey lines where magnetic anomalies are recorded in the data. The survey line number refers to the survey lines as plotted on the distribution maps.

4. The magnetic anomaly reference shown on the profiles corresponds with the anomaly reference as mapped. The horizontal scale on the profiles records the straight-line distance along the survey line. The vertical scale records the register of magnetic variation, shown in nanotesla (nT).

5. HSL processing procedures coupled the East-West lines with the North-South lines and created spikes in the profiles that are not indicative of actual anomalies. These have been distinguished in the profiles as 'False Targets (discarded)', and are highlighted in grey. The spikes and dips that are indicative of anomalies have been distinguished in the profiles as 'Magnetometer Target (retained)', and are highlighted in blue.

Refer to Figures 12.21-12.26 for the distribution of the anomalies. Realtime survey tracklines are produced on project drawings (HS 72-1/13 – HS 72-7/13).



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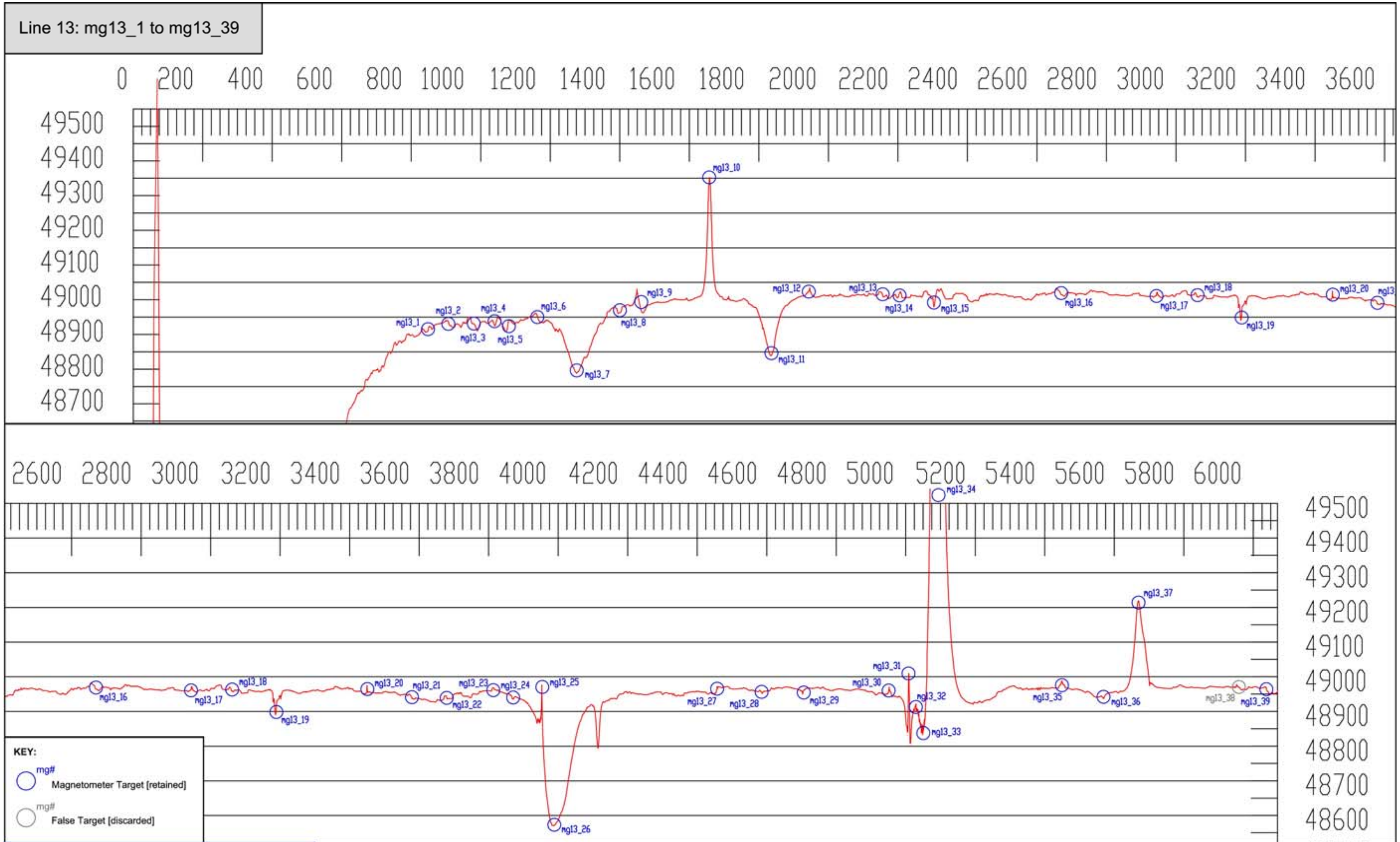
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 12 [mg12_1 to mg12_20], EBWLT to Buoy 3 XS12-136 [West-East].
	Date 18.02.2014	**Scale** 1:100	**Drawing No.** -----	**Project** ABR Project, Dublin Port	



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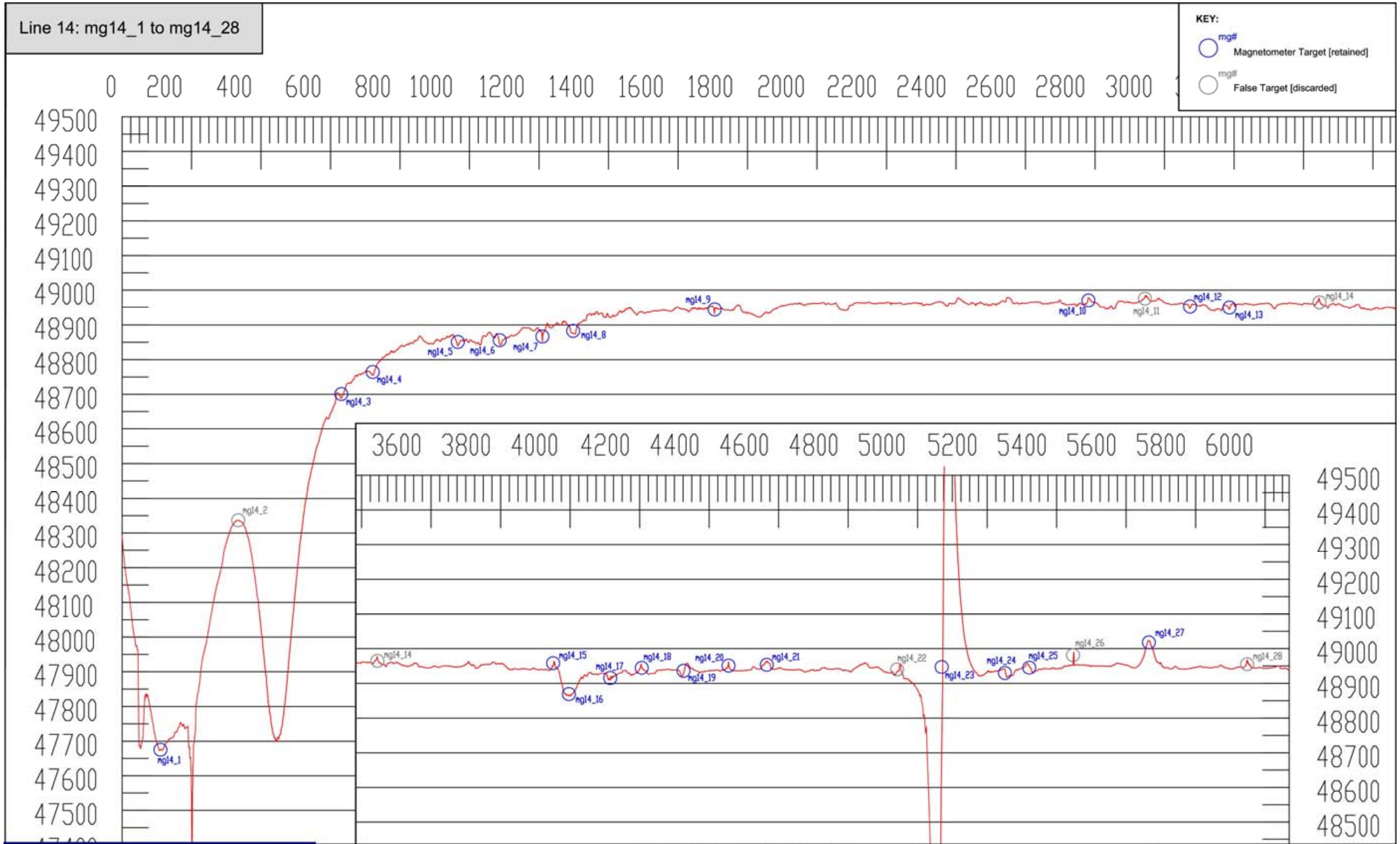
A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 13 [mg13_1 to mg13_29], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	



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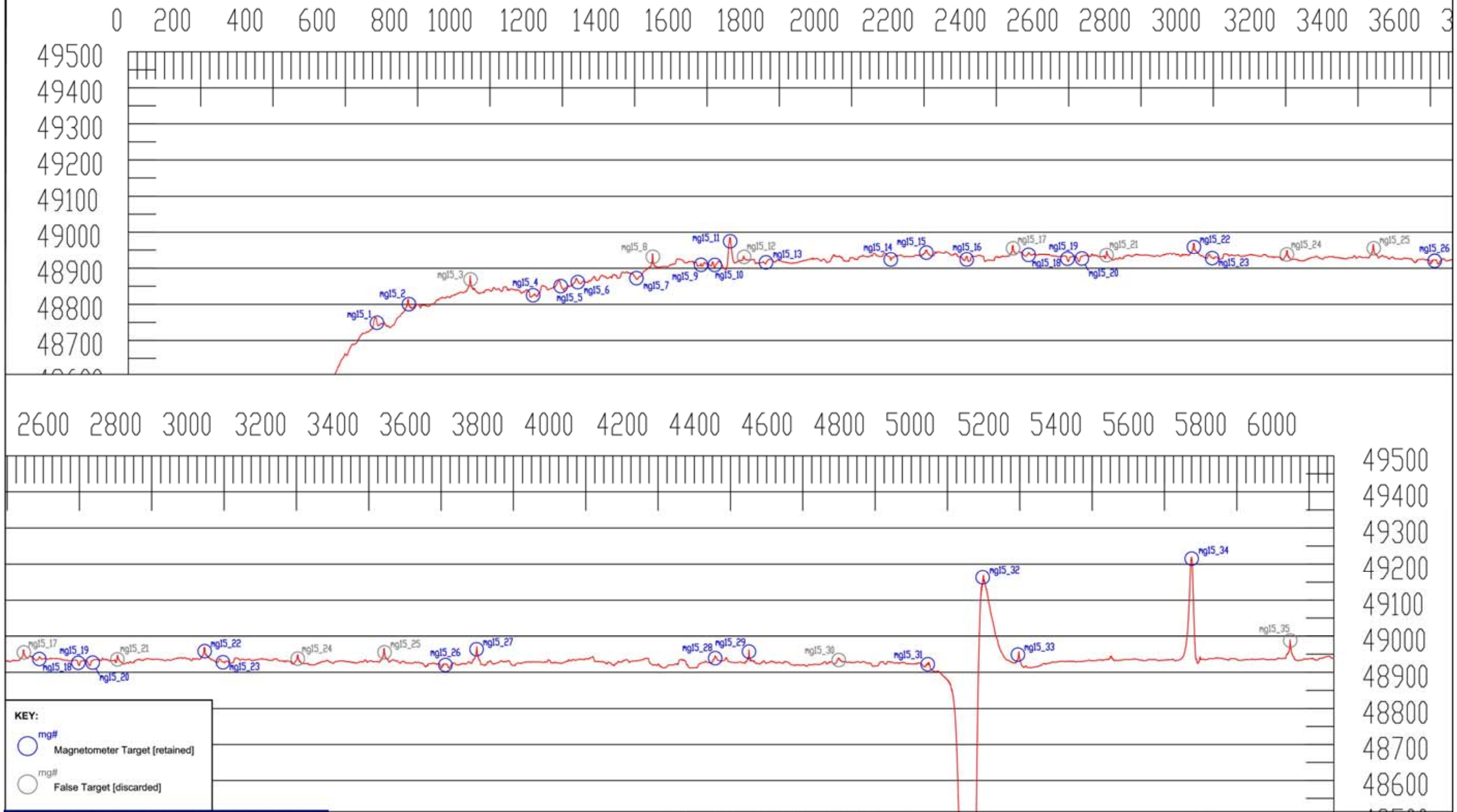
A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 14 [mg14_1 to mg14_28], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line 15: mg15_1 to mg15_35



KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

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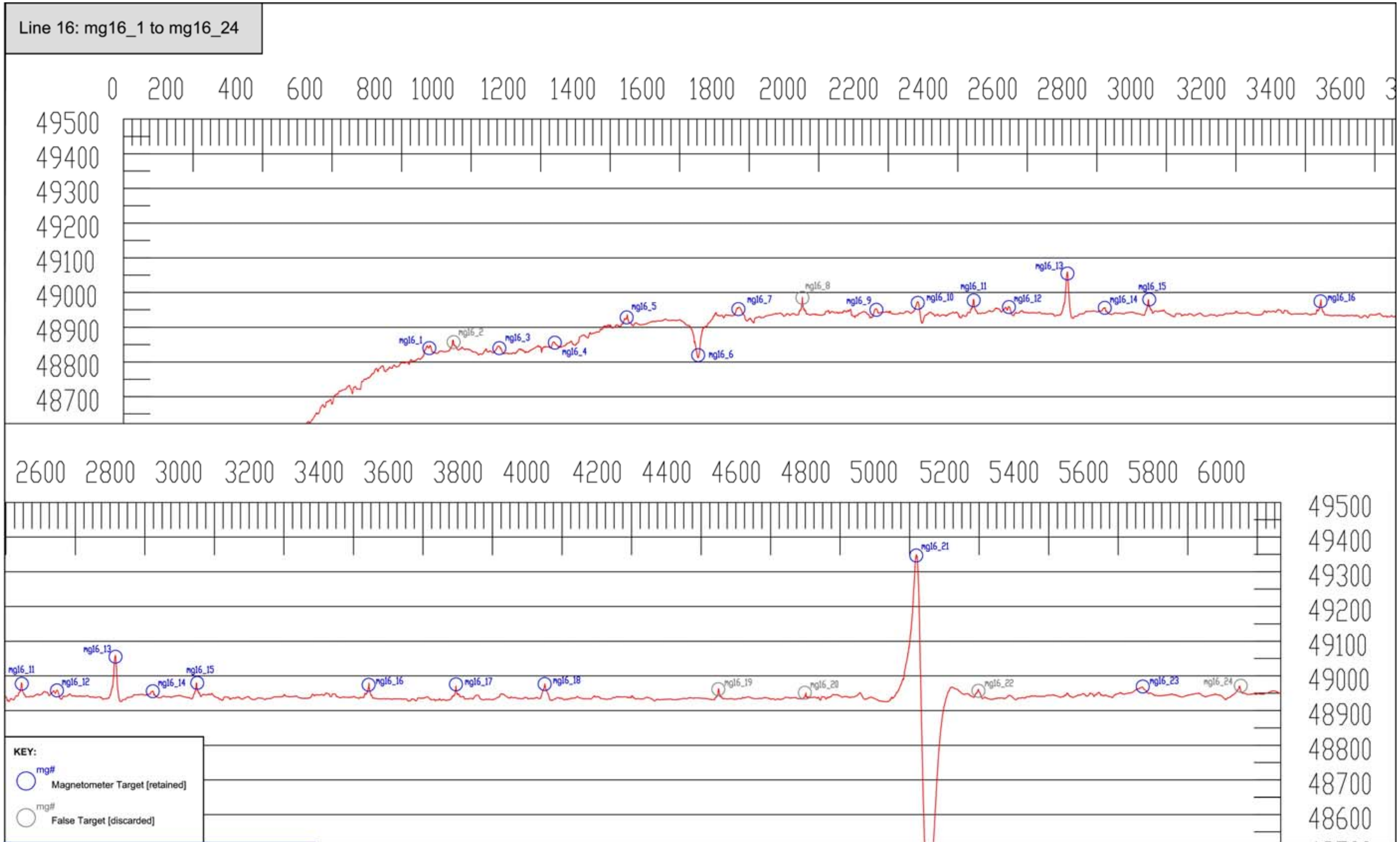
A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 15 [mg15_1 to mg15_35], EBWLT to Buoy 3 XS12-136 [West-East].
	Date 18.02.2014	**Scale** 1:100	**Drawing No.** -----	**Project** ABR Project, Dublin Port	



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Notes
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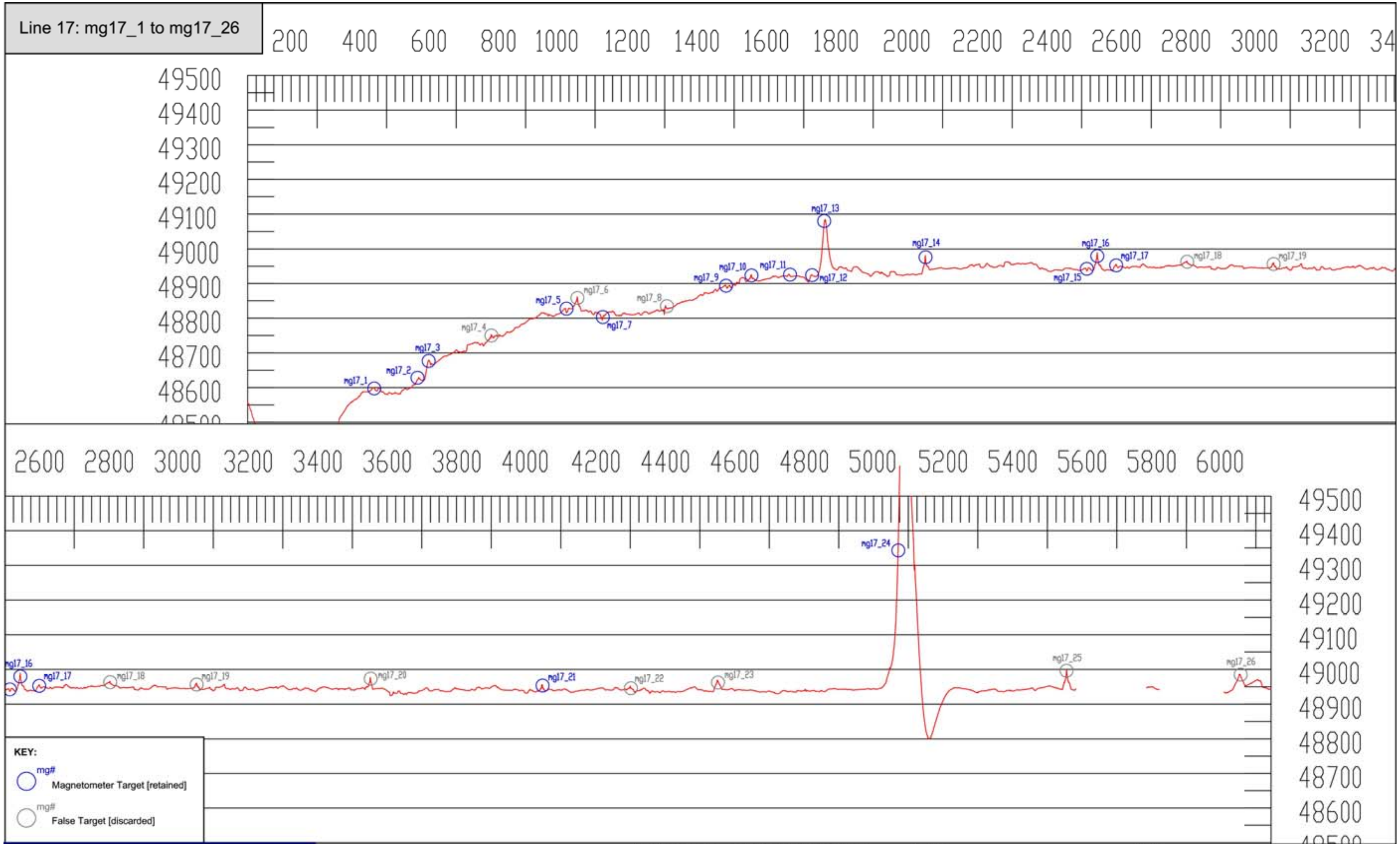
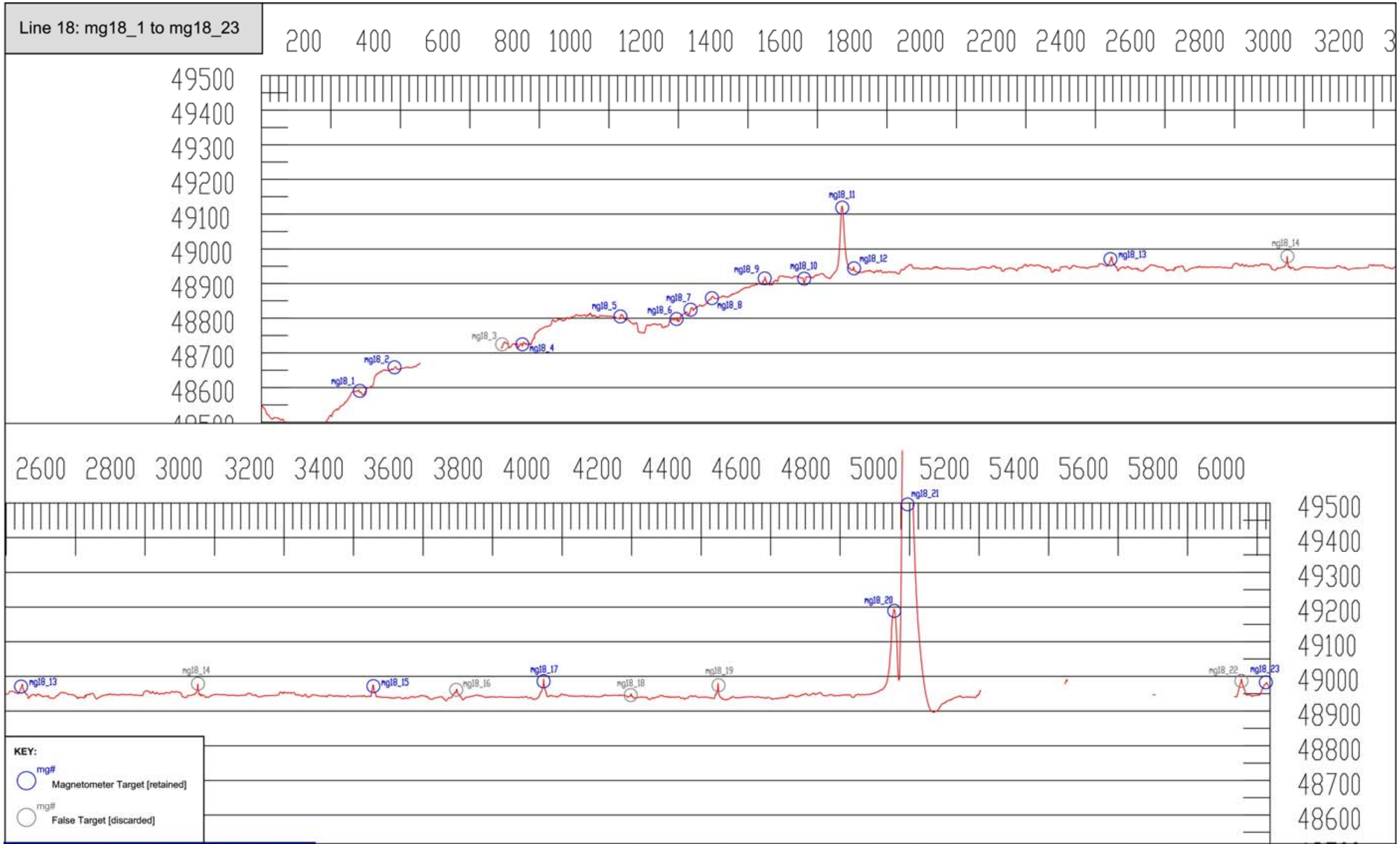
A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 16 [mg16_1 to mg16_24], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	Notes -- Magnetometer Survey undertaken by Hydrographic Surveys Ltd. -- Archaeological interpretation of data undertaken by ADCO Ltd. -- Vertical range= Magnetic Intensity (nT) -- Horizontal range= distance (m)	A3	Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference DublinPort_2014	Client RPS/ Dublin Port Company.	Title Magnetometer Survey Line No. 17 [mg17_1 to mg17_26], EBWLT to Buoy 3 XS12-136 [West-East].
			Date 18.02.2014	Scale 1:100	Drawing No. -----	Project ABR Project, Dublin Port	



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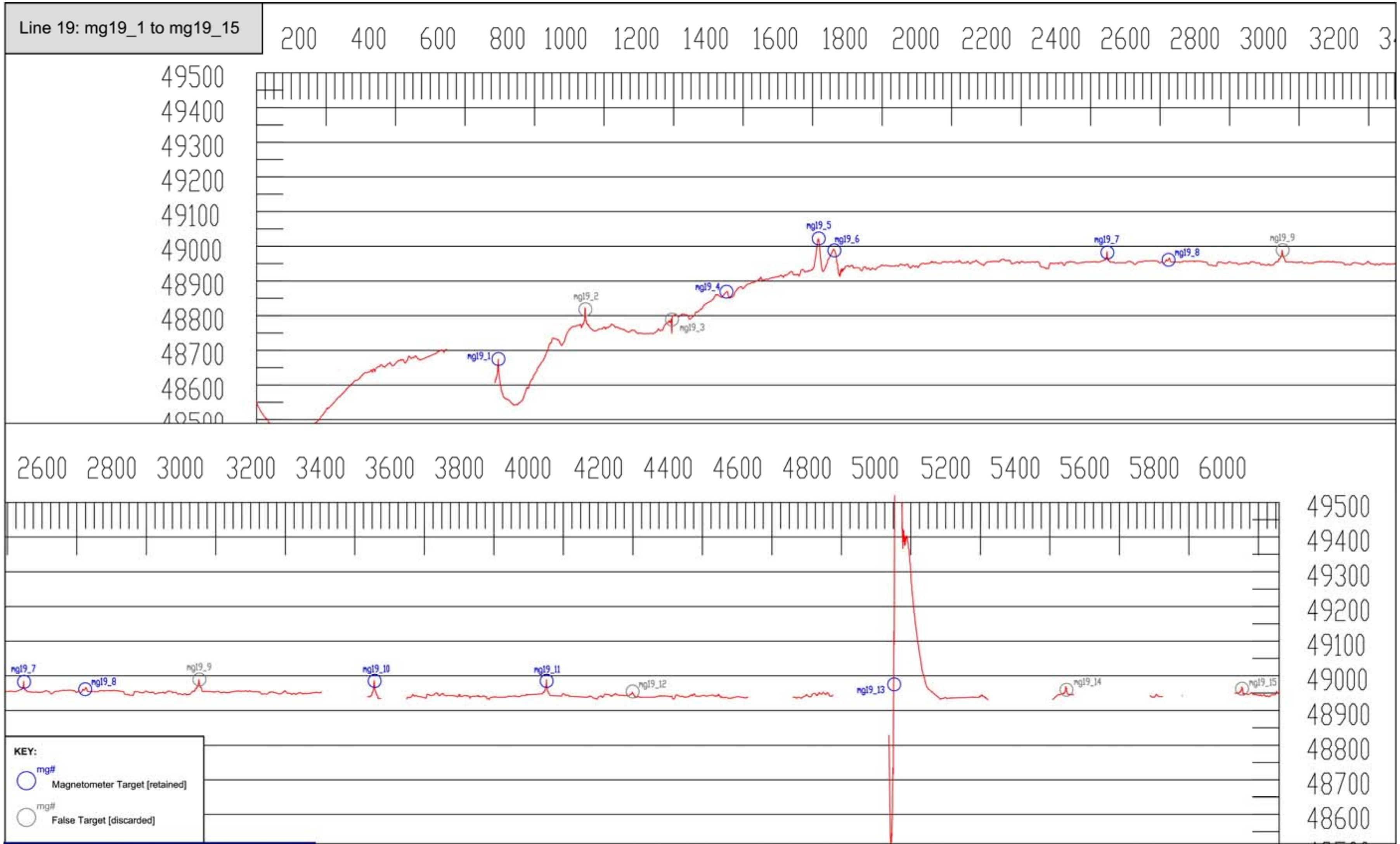
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 18 [mg18_1 to mg18_23], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	



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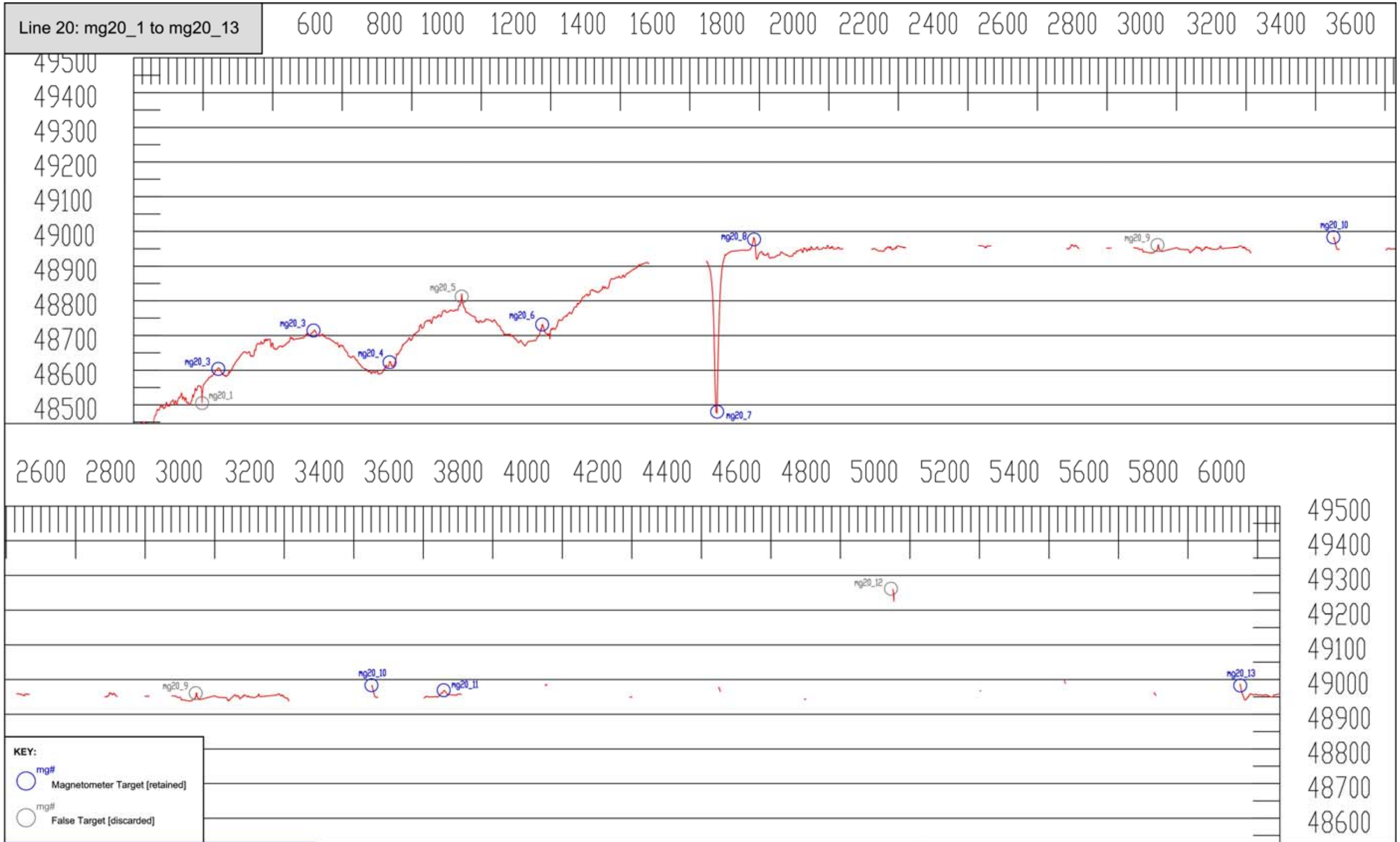
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 19 [mg19_1 to mg19_15], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	



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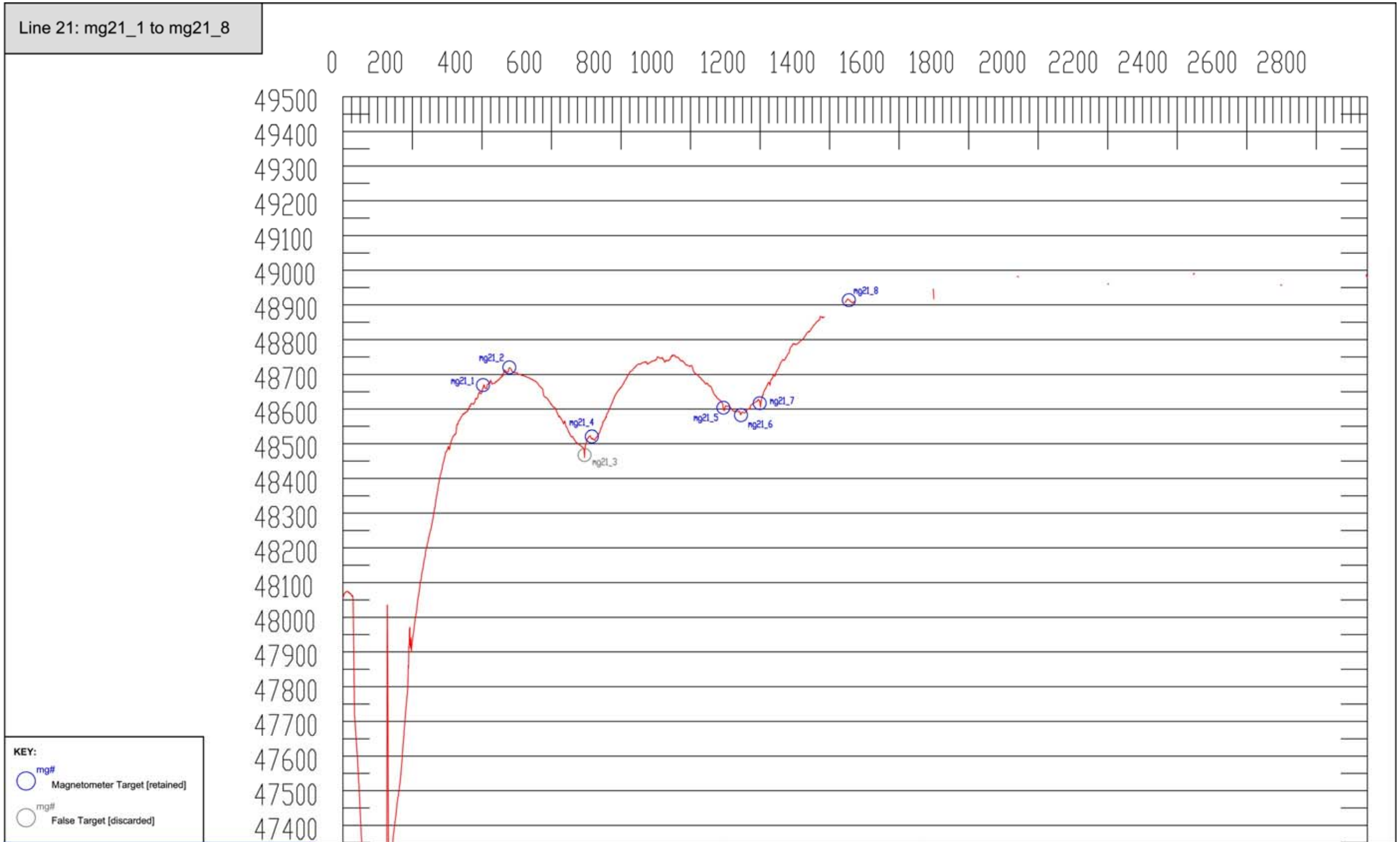
Notes	A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd. -- Archaeological interpretation of data undertaken by ADCO Ltd. -- Vertical range= Magnetic Intensity (nT) -- Horizontal range= distance (m)		ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 20 [mg20_1 to mg20_13], EBWLT to Buoy 3 XS12-136 [West-East].
		Date	**Scale**	**Drawing No.**	**Project**	
		18.02.2014	1:100	-----	ABR Project, Dublin Port	



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Notes
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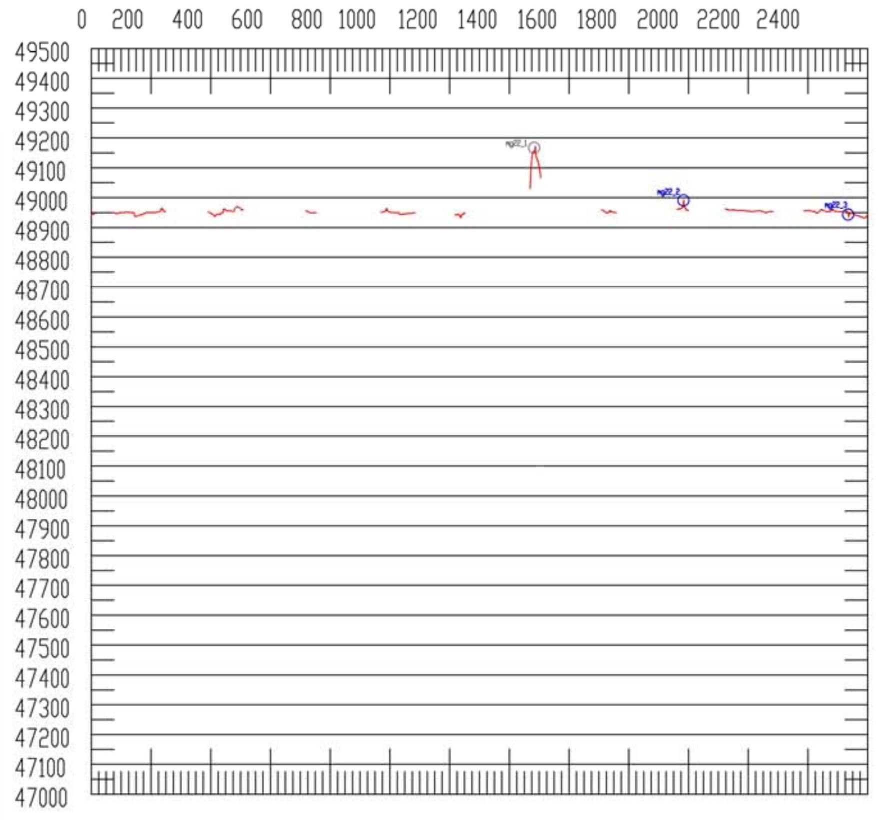
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

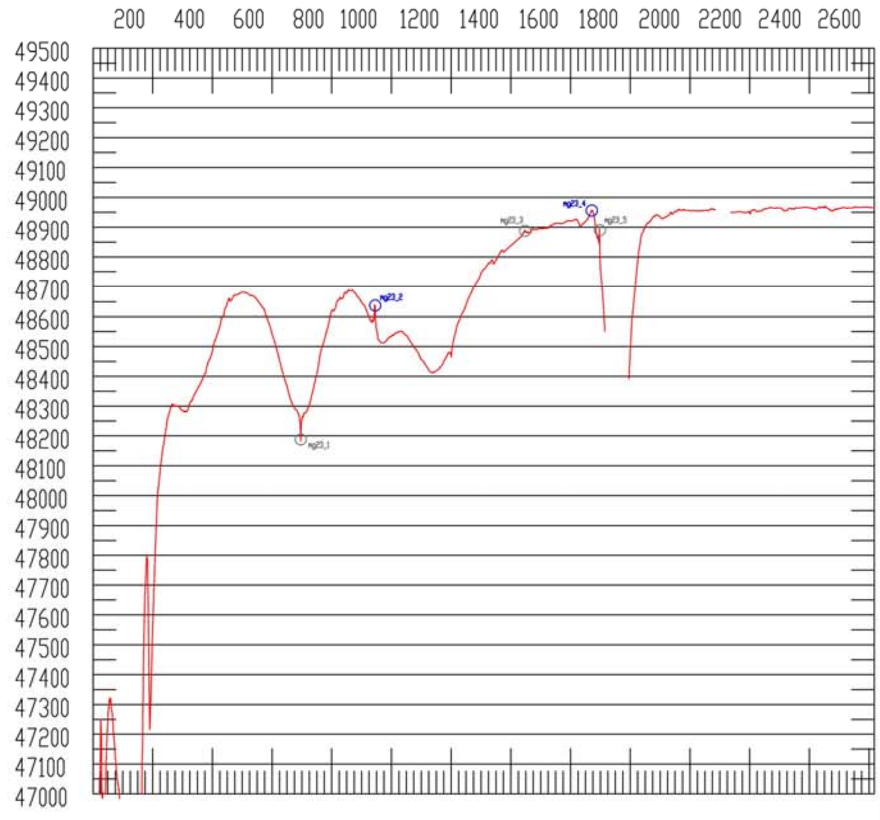
A3

Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Date 18.02.2014
Scale 1:100
Drawing No. -----
Project ABR Project, Dublin Port
Title Magnetometer Survey Line No. 21 [mg21_1 to mg21_8], EBWLT to Buoy 3 XS12-136 [West-East].

Line 22: mg22_1 to mg22_3



Line 23: mg23_1 to mg23_5



KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

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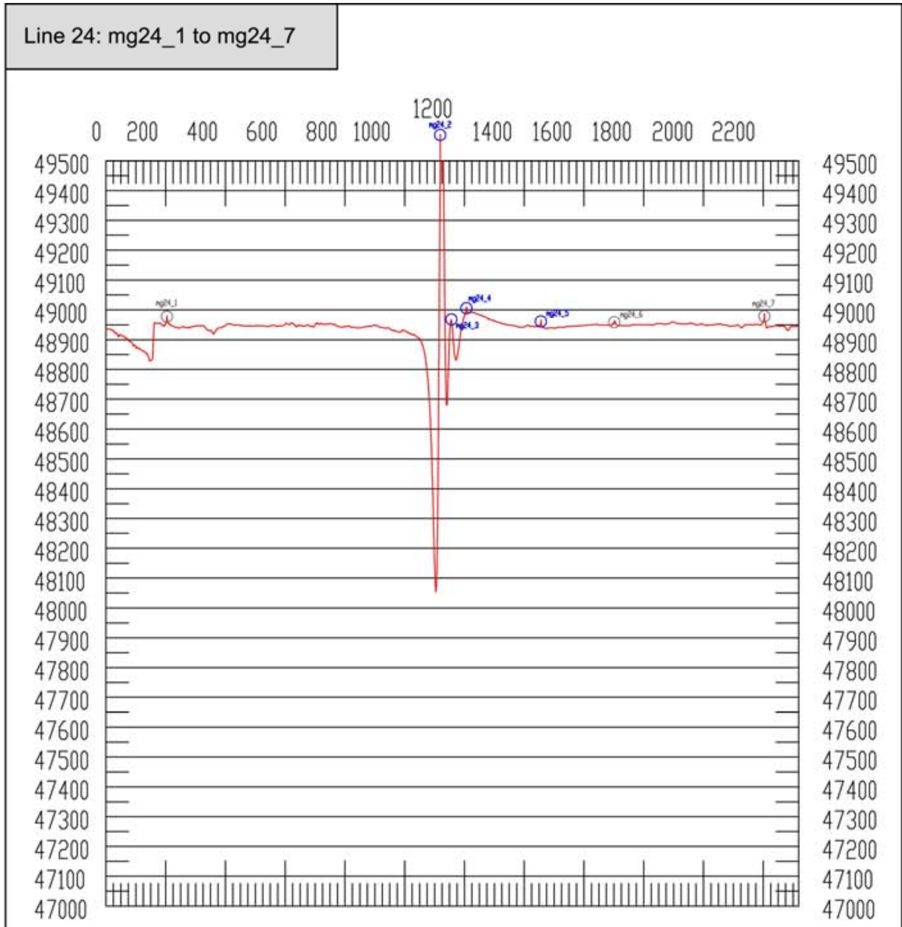
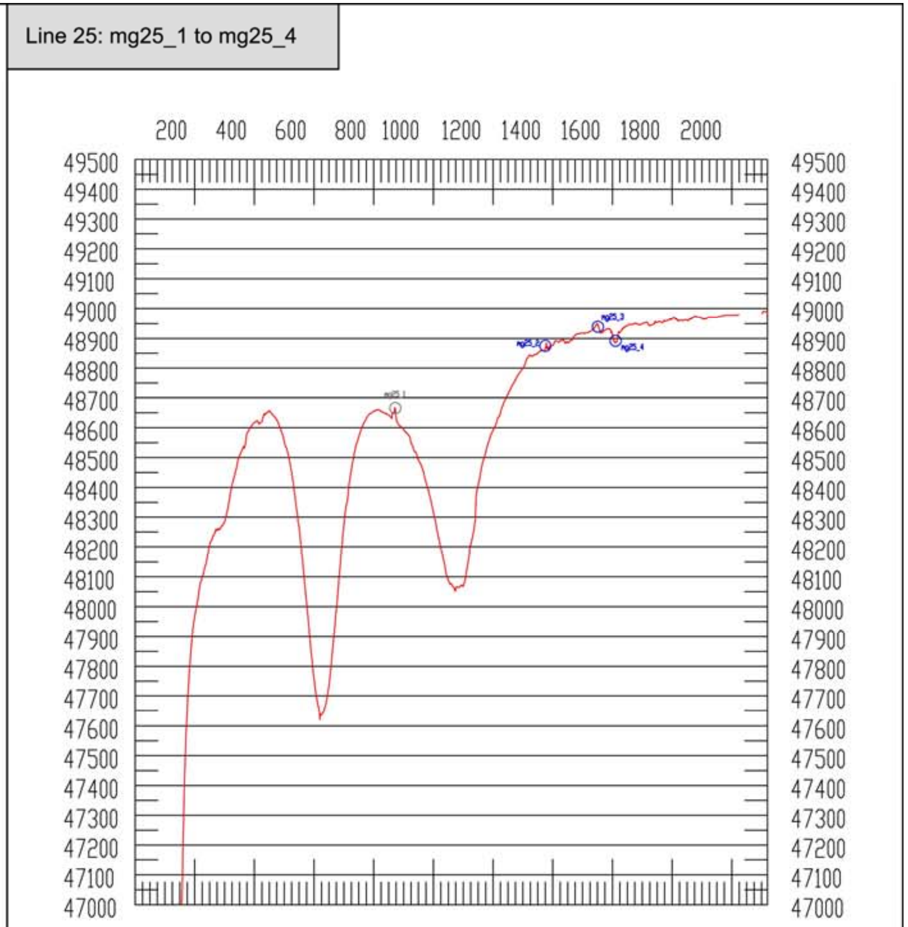
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 22 [mg22_1 to mg22_3] & Survey Line No. 23 [mg23_1 to mg_23_5], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:150	-----	ABR Project, Dublin Port	





KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

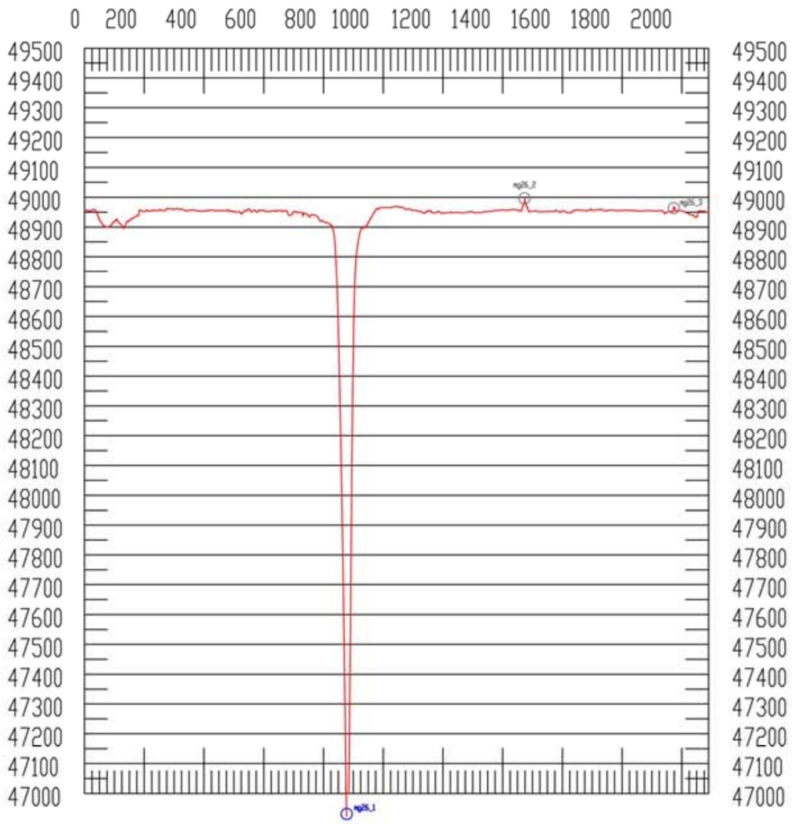
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

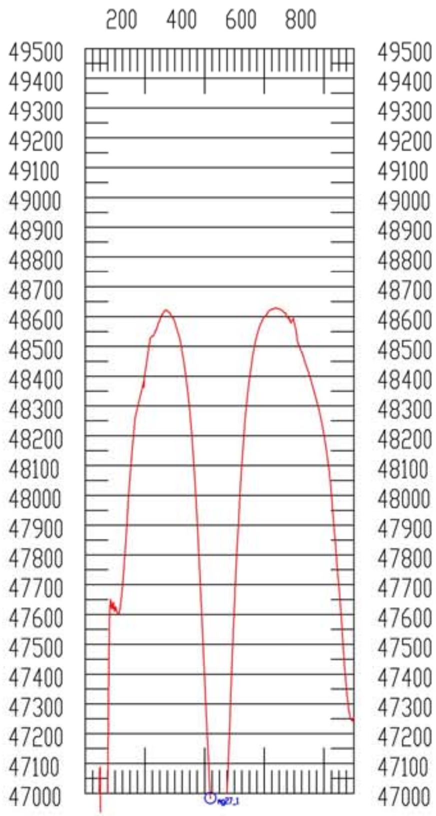
A3

Job/Exc No. ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company	**Title** Magnetometer Survey Line No. 24 [mg24_1 to mg24_7] & Survey Line No. 25 [mg25_1 to mg_25_4], EBWLT to Buoy 3 XS12-136 [West-East].
Date 18.02.2014	**Scale** 1:150	**Drawing No.** -----	**Project** ABR Project, Dublin Port	

Line 26: mg26_1 to mg26_3



Line 27: mg27_1



KEY:

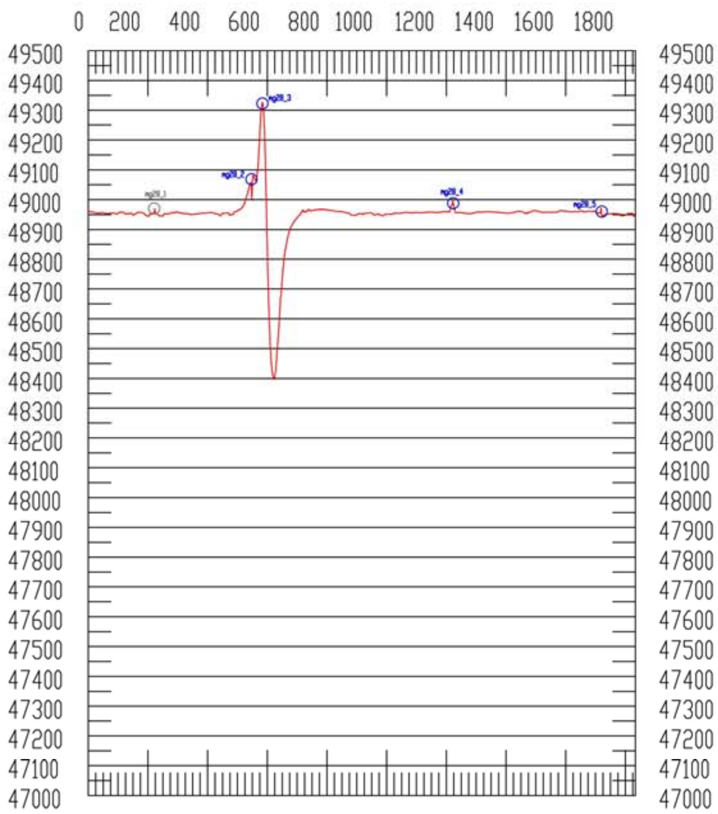
- mg# Magnetometer Target [retained]
- mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

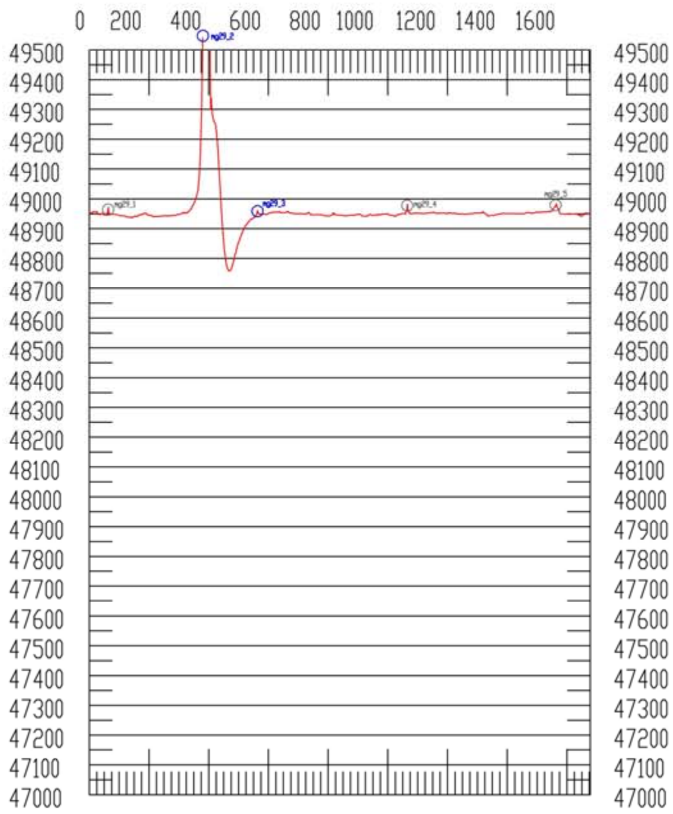
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 26 [mg26_1 to mg26_3] & Survey Line No. 27 [mg27_1], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:150	-----	ABR Project, Dublin Port	

Line 28: mg28_1 to mg28_5



Line 29: mg29_1 to mg29_5



KEY:

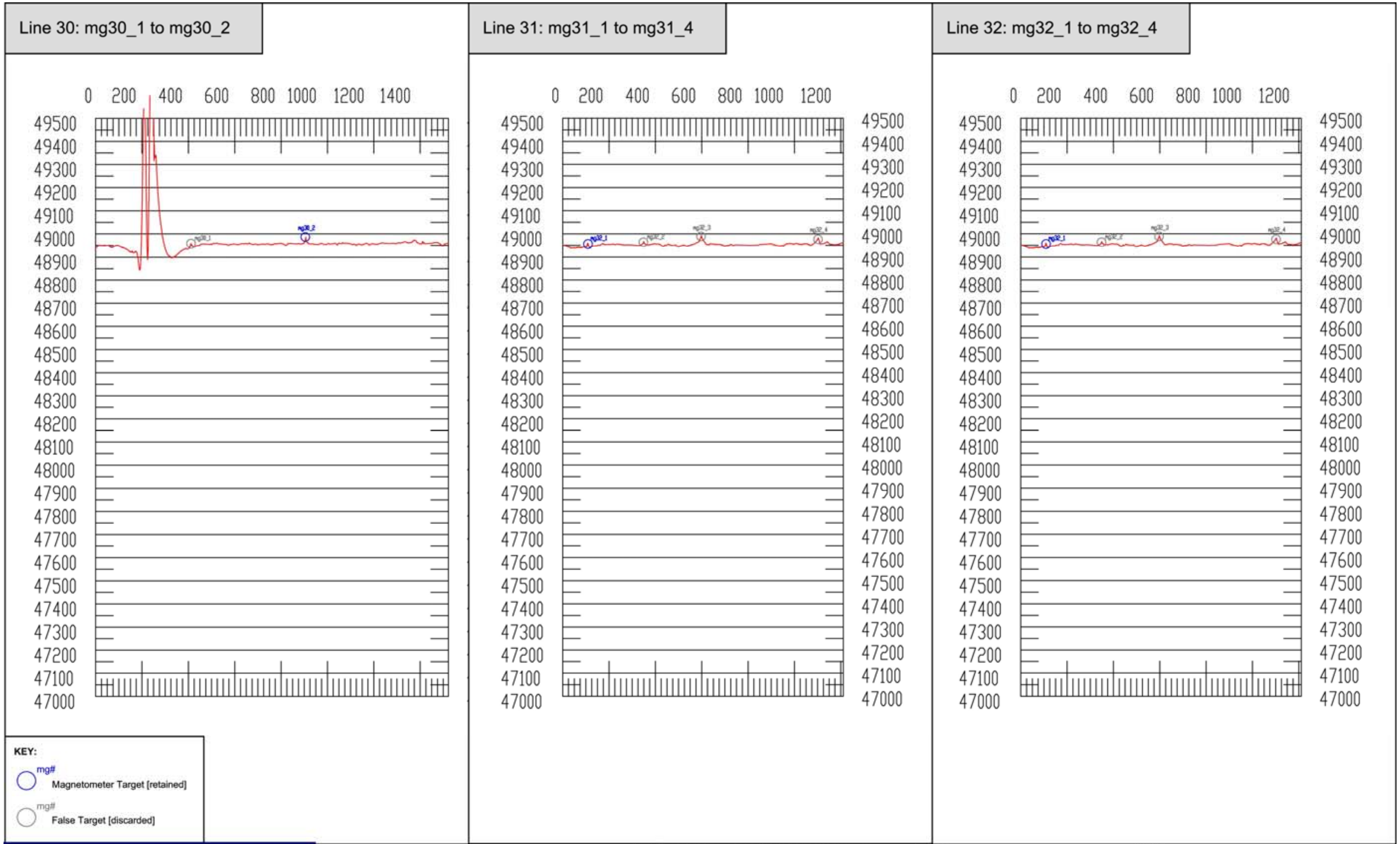
mg# Magnetometer Target [retained]

mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

Notes
- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- Archaeological interpretation of data undertaken by ADCO Ltd.
- Vertical range= Magnetic Intensity (nT)
- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 28 [mg28_1 to mg28_5] & Survey Line No. 29 [mg29_1 to mg29_5], EBWLT to Buoy 3 XS12-136 [West-East].
	Date 18.02.2014	**Scale** 1:150	**Drawing No.** -----	**Project** ABR Project, Dublin Port	



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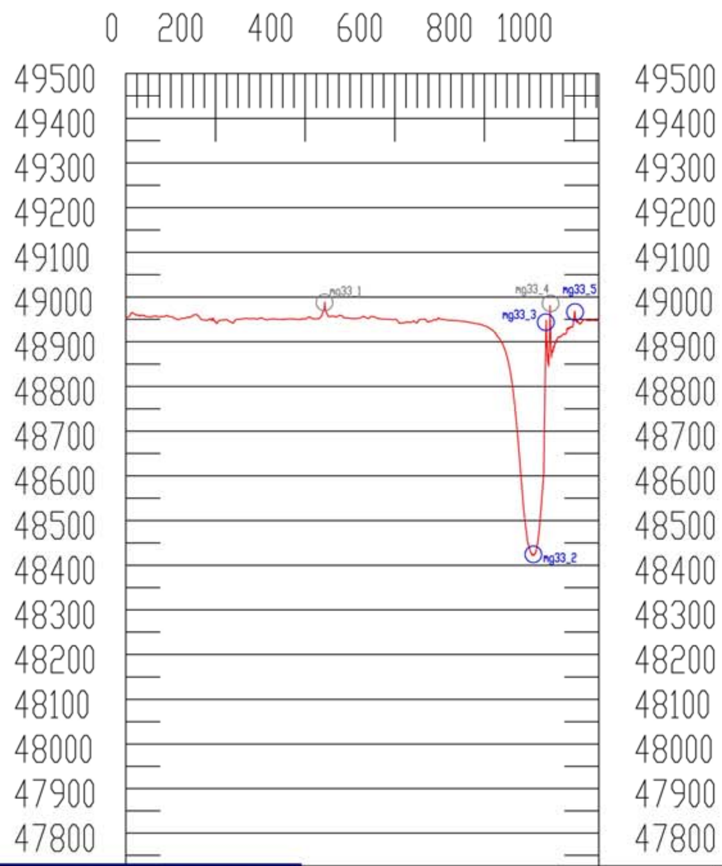
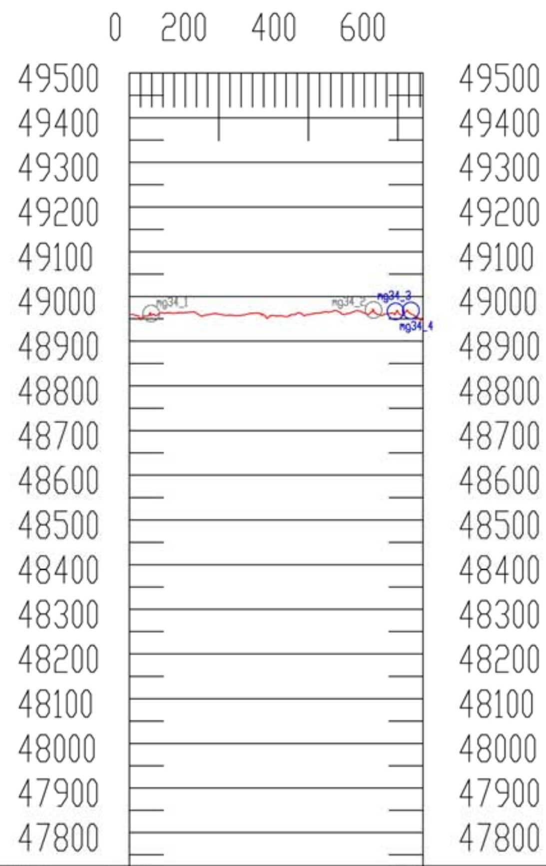
Notes	A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd. -- Archaeological interpretation of data undertaken by ADCO Ltd. -- Vertical range= Magnetic Intensity (nT) -- Horizontal range= distance (m)		ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Lines No. 30 [mg30_1 to mg30_2], No. 31 [mg31_1 to mg31_4], & No. 32 [mg32_1 to mg32_4], EBWLT to Buoy 3 XS12-136 [West-East].
		Date 18.02.2014	**Scale** 1:150	**Drawing No.** -----	**Project** ABR Project, Dublin Port	



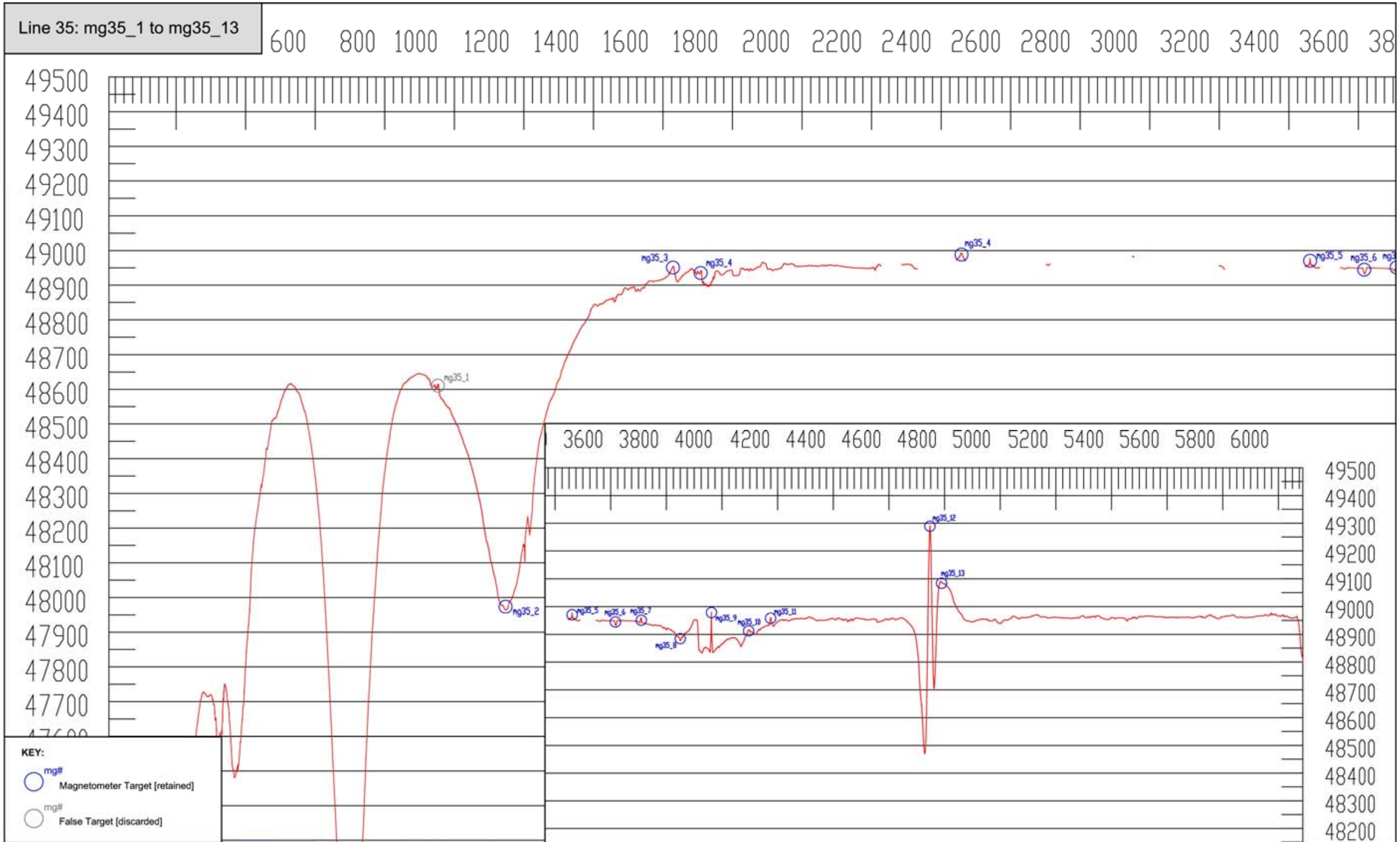


KEY:
mg# Magnetometer Target [retained]
mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3					
Job/Exc No. ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company.	**Title** Magnetometer Survey Line No. 33 [mg33_1 to mg33_5] & Survey Line No. 34 [mg34_1 to mg34_4], EBWLT to Buoy 3 XS12-136 [West-East].	
Date 18.02.2014	**Scale** 1:150	**Drawing No.** -----	**Project** ABR Project, Dublin Port		



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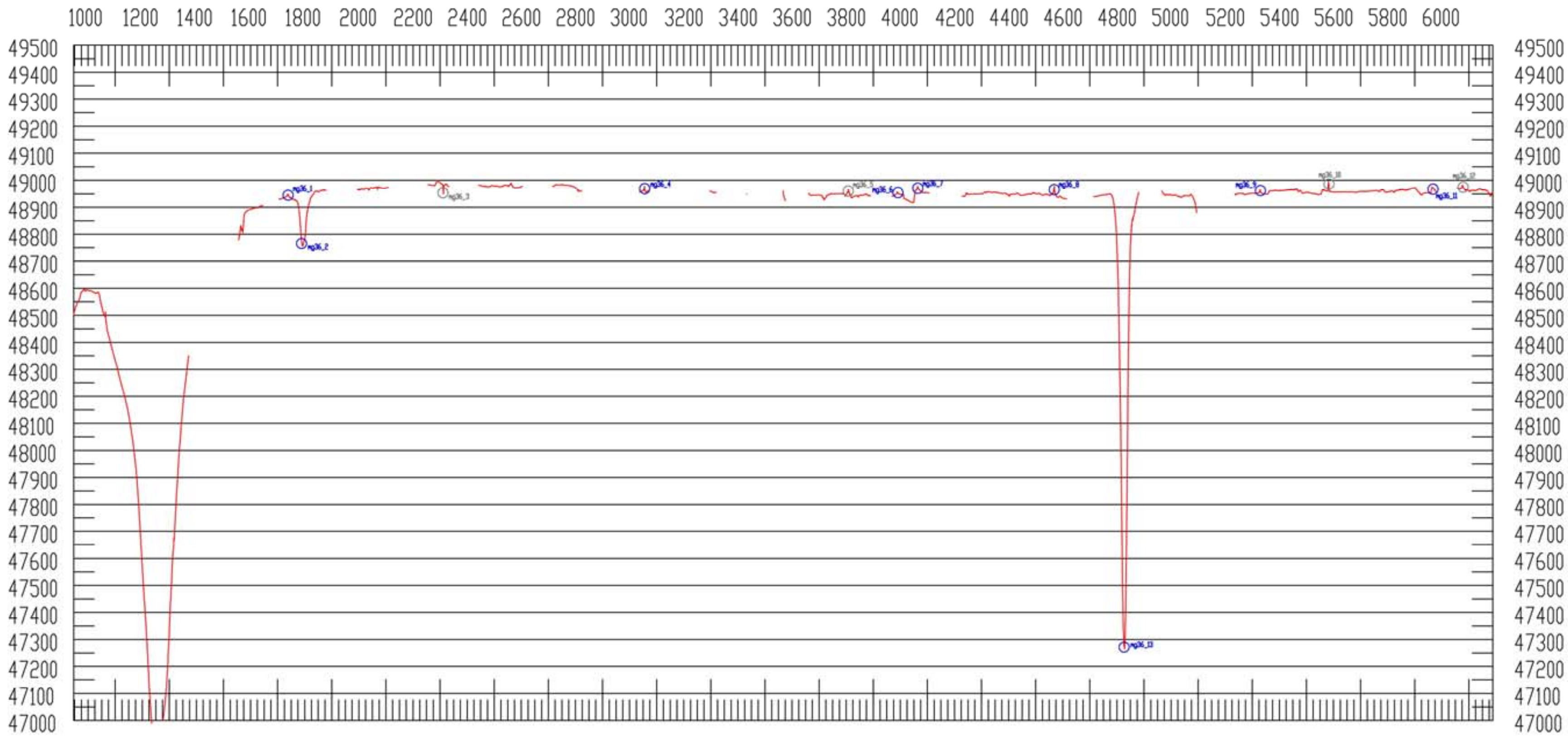
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 35 [mg35_1 to mg35_13], EBWLT to Buoy 3 XS12-136 [West-East].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line 36: mg36_1 to mg36_13



KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

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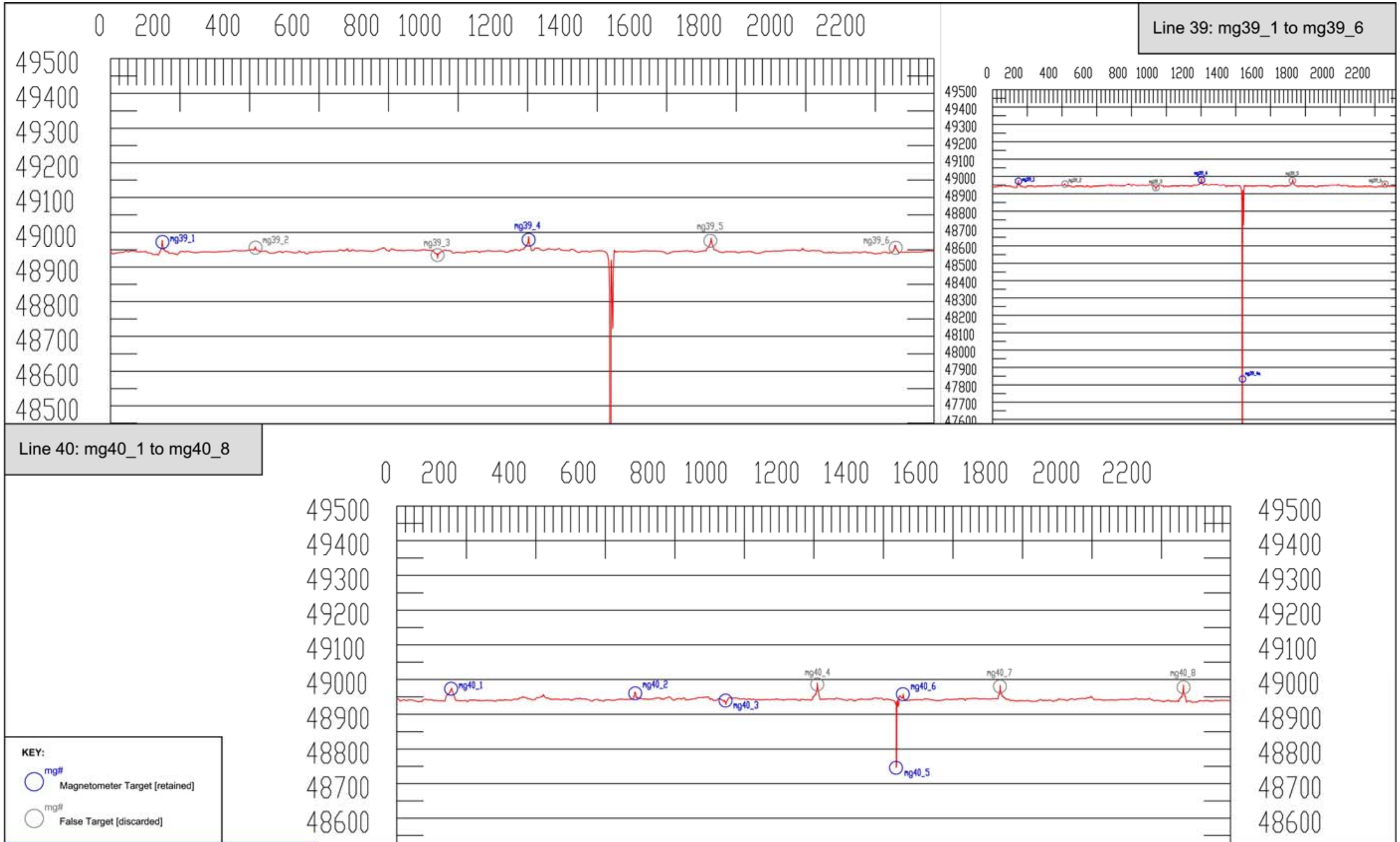
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3

Job/Exc No.	Compiled by	CAD reference	Client
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company
Date	**Scale**	**Drawing No.**	**Project**
18.02.2014	1:100	-----	ABR Project, Dublin Port

Title
Magnetometer Survey Line No. 36 [mg36_1 to mg36_13], EBWLT to Buoy 3 XS12-136 [West-East].



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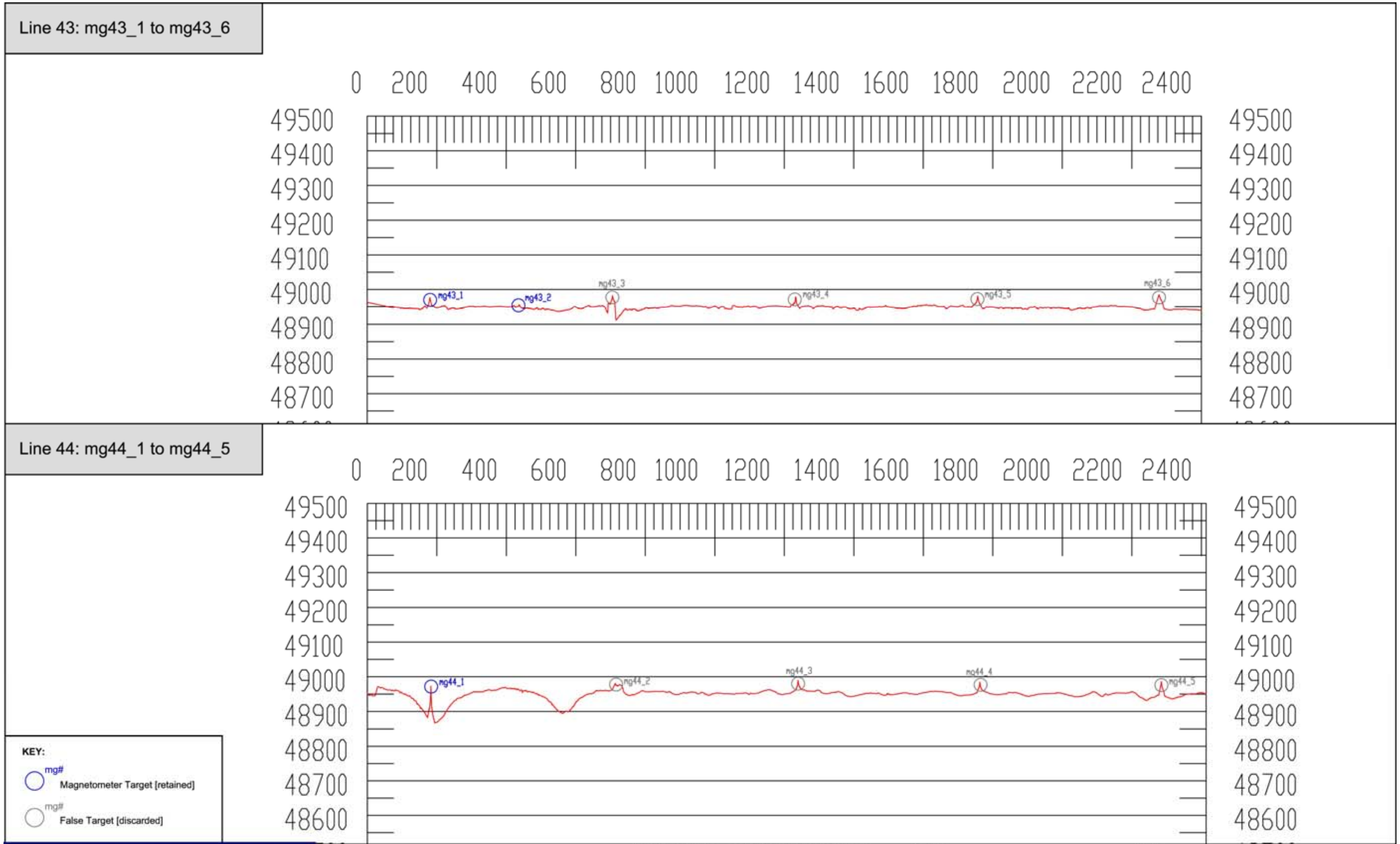
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 39 [mg39_1 to mg39_6], & survey Line No. 40 [mg340_1 to mg40_8], Buoy 3 Racon Buoy XS37-46 [NW-SE].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	



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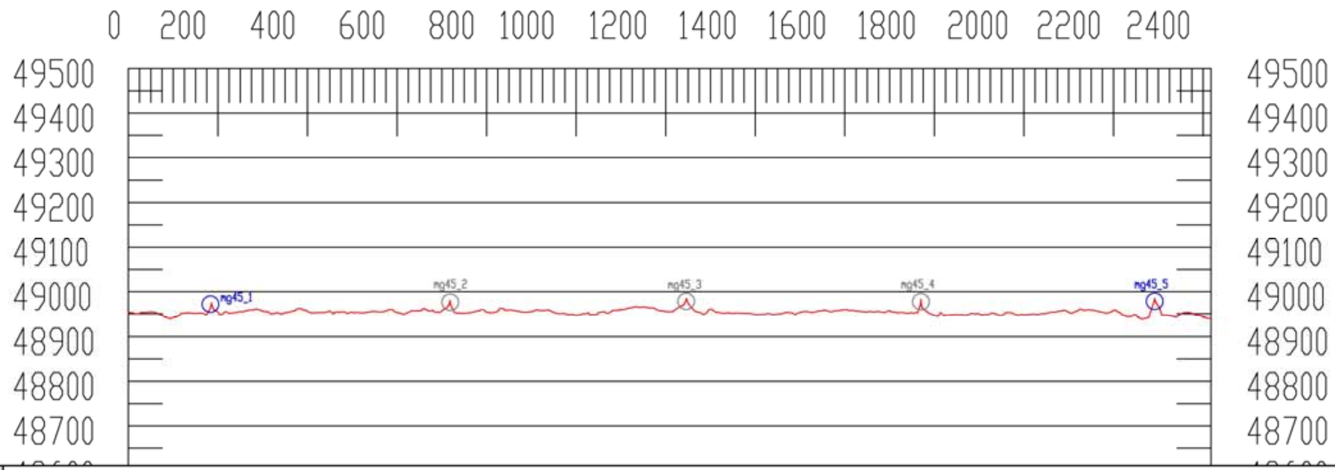
Tel. 056 4440236 email: info@adco-ie.com

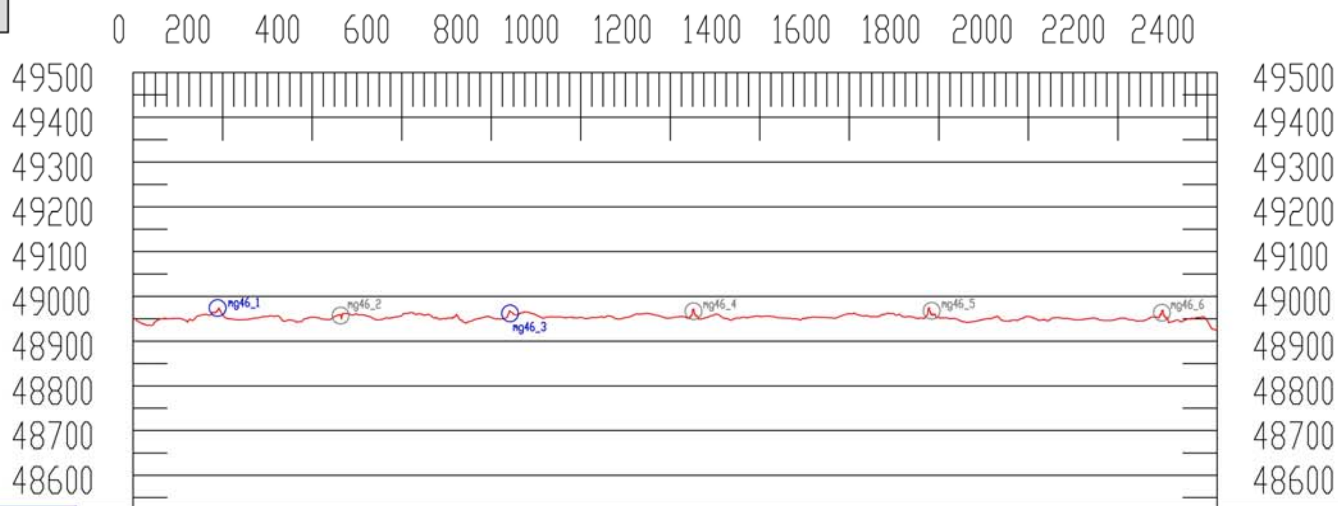
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 43 [mg43_1 to mg43_6], & Survey Line No. 44 [mg44_1 to mg44_5], Buoy 3 Racon Buoy XS37-46 [NW-SE].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line 45: mg45_1 to mg45_5



Line 46: mg46_1 to mg46_6



KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

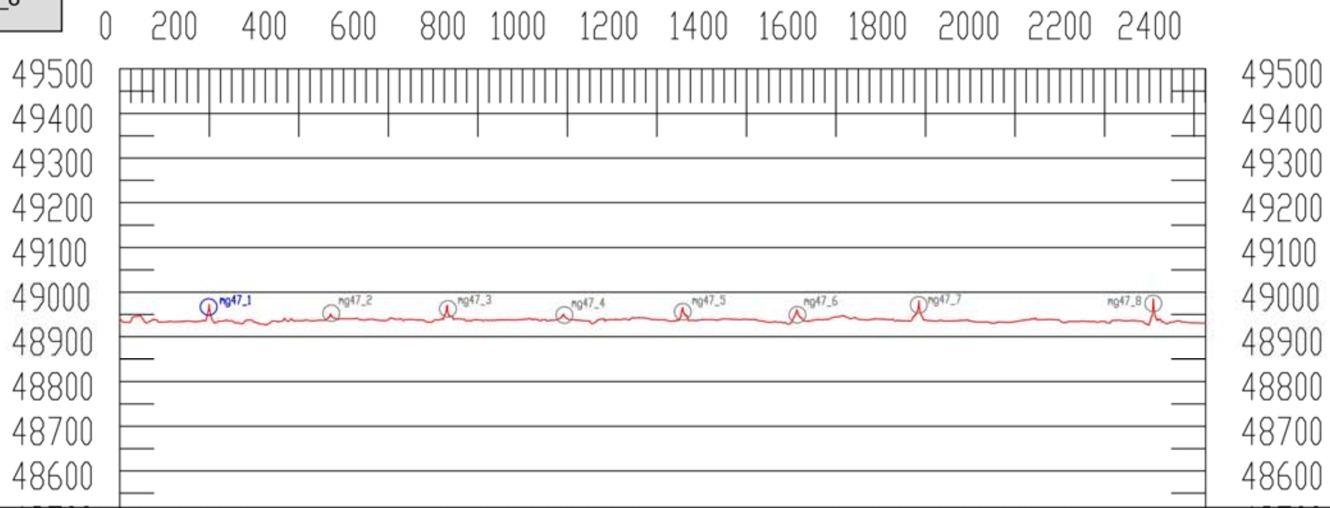
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3

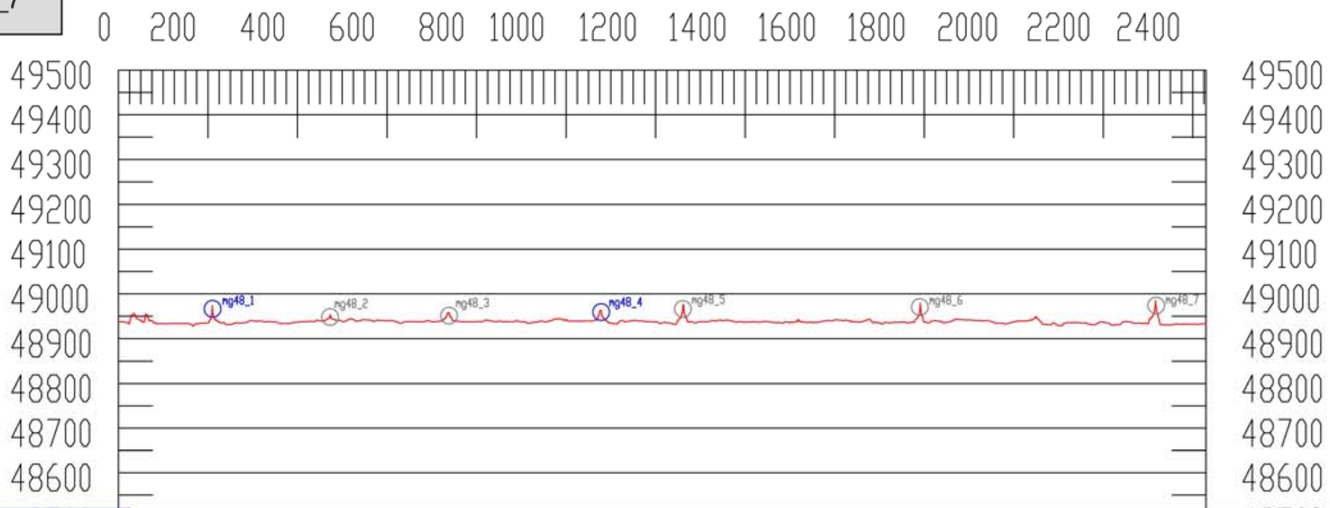
Job/Exc No.	Compiled by	CAD reference	Client
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company
Date	**Scale**	**Drawing No.**	**Project**
18.02.2014	1:100	------	ABR Project, Dublin Port

Title
Magnetometer Survey Line No. 45 [mg45_1 to mg45_5], & Survey Line No. 46 [mg46_1 to mg46_6], Buoy 3 Racon Buoy XS37-46 [NW-SE].

Line 47: mg47_1 to mg47_8



Line 48: mg48_1 to mg48_7



KEY:

mg# Magnetometer Target [retained]

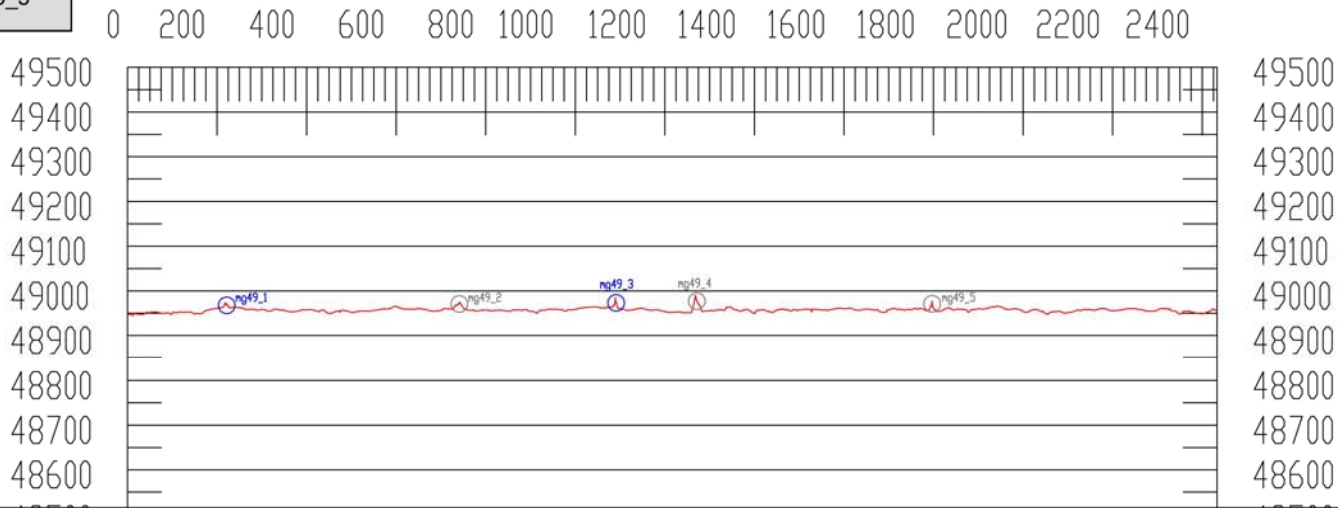
mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

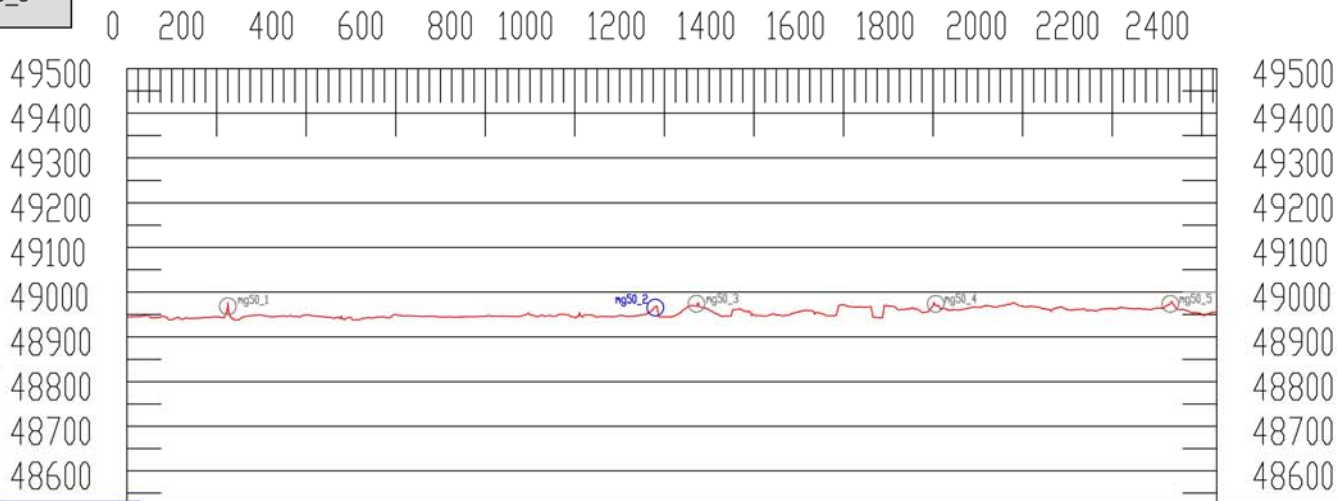
Notes
- -- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- -- Archaeological interpretation of data undertaken by ADCO Ltd.
- -- Vertical range= Magnetic Intensity (nT)
- -- Horizontal range= distance (m)

A3				
Job/Exc No. ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company	**Title** Magnetometer Survey Line No. 47 [mg47_1 to mg47_8], & Survey Line No. 48 [mg48_1 to mg48_7], Buoy 3 Racon Buoy XS47-81 [NW-SE].
Date 18.02.2014	**Scale** 1:100	**Drawing No.** -----	**Project** ABR Project, Dublin Port	

Line 49: mg49_1 to mg49_5



Line 50: mg50_1 to mg50_5



KEY:

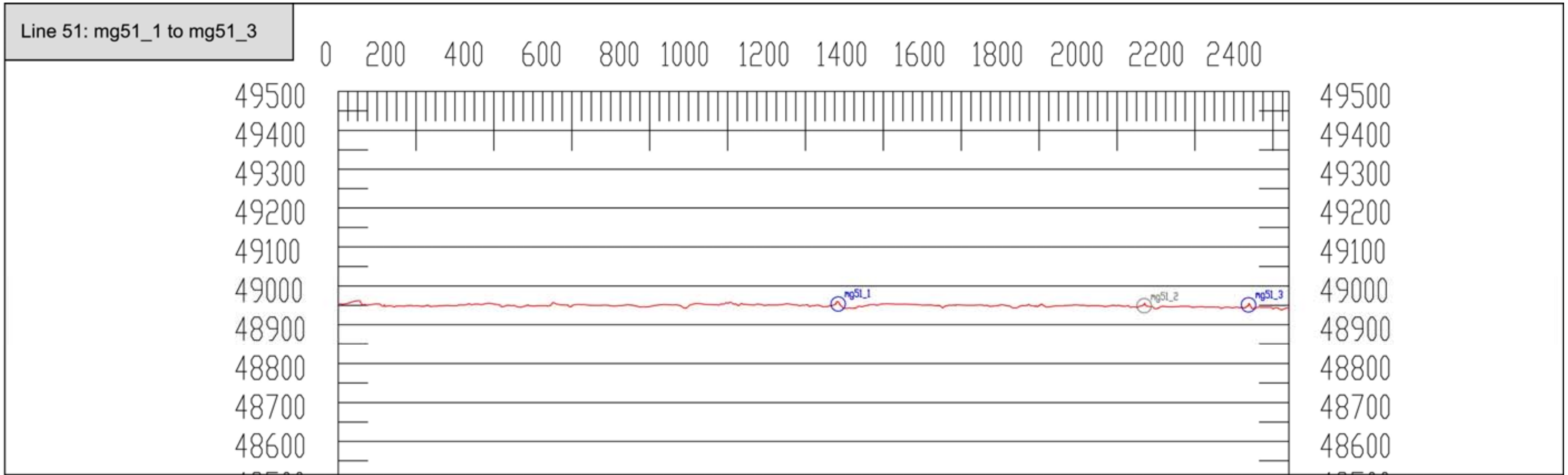
mg# Magnetometer Target [retained]

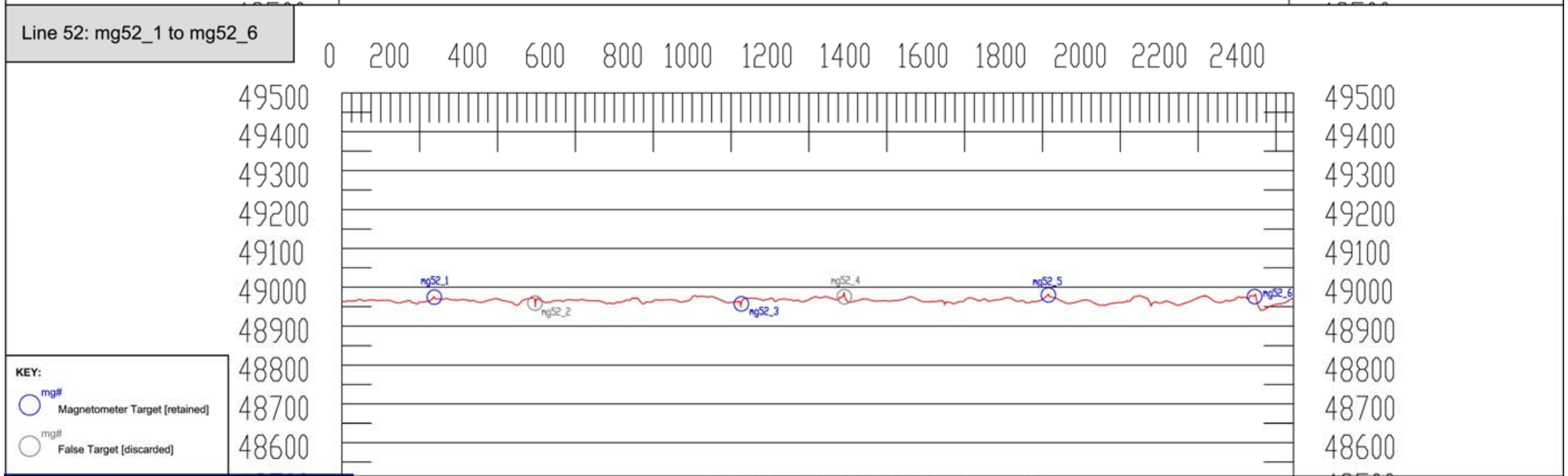
mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 49 [mg49_1 to mg49_5], & Survey Line No. 50 [mg50_1 to mg50_5], Buoy 3 Racon Buoy XS47-81 [NW-SE].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	------	ABR Project, Dublin Port	





KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

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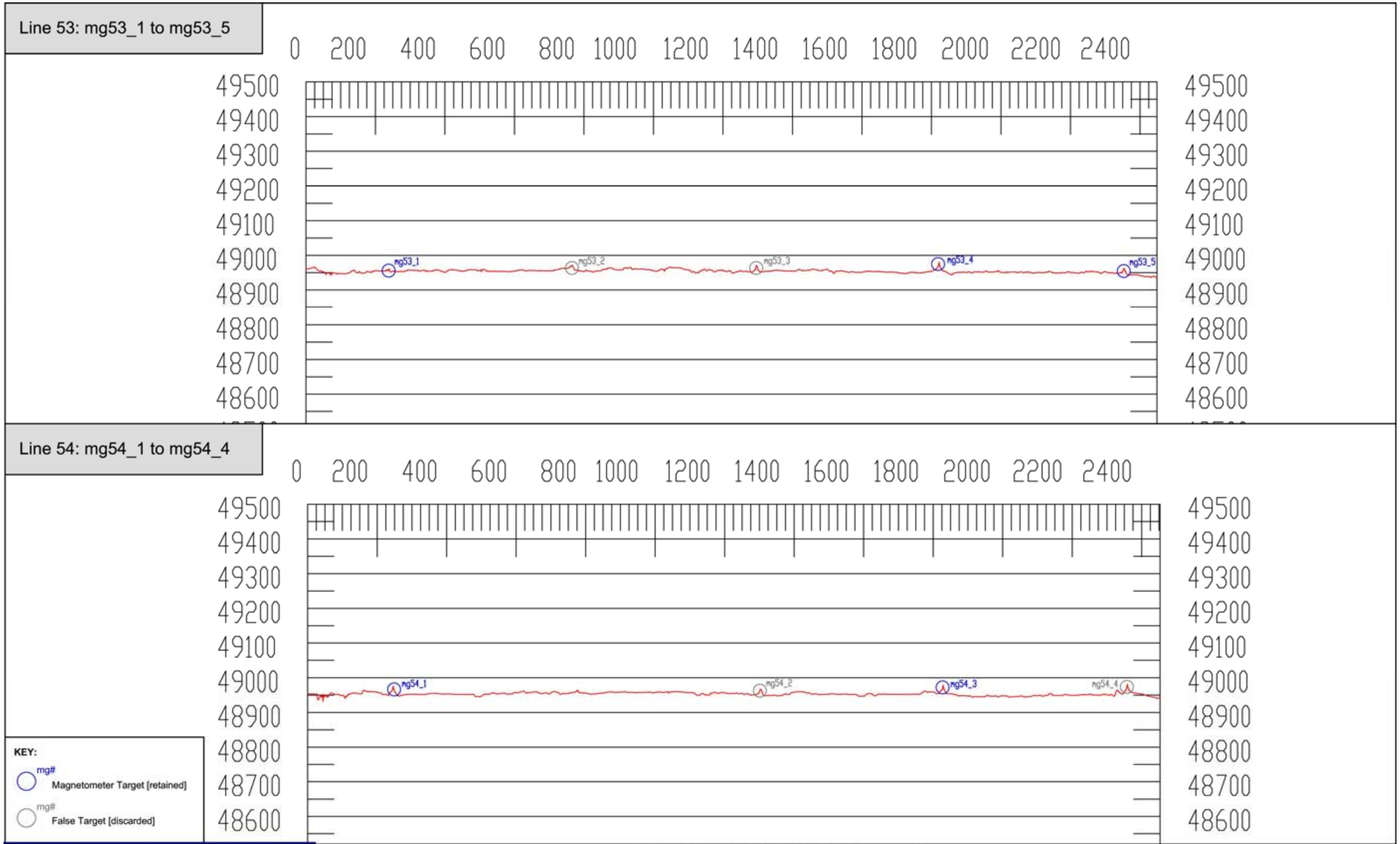
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 51 [mg51_1 to mg51_3], & Survey Line No. 52 [mg52_1 to mg52_6], Buoy 3 Racon Buoy XS47-81 [NW-SE].
	Date 18.02.2014	**Scale** 1:100	**Drawing No.** -----	**Project** ABR Project, Dublin Port	



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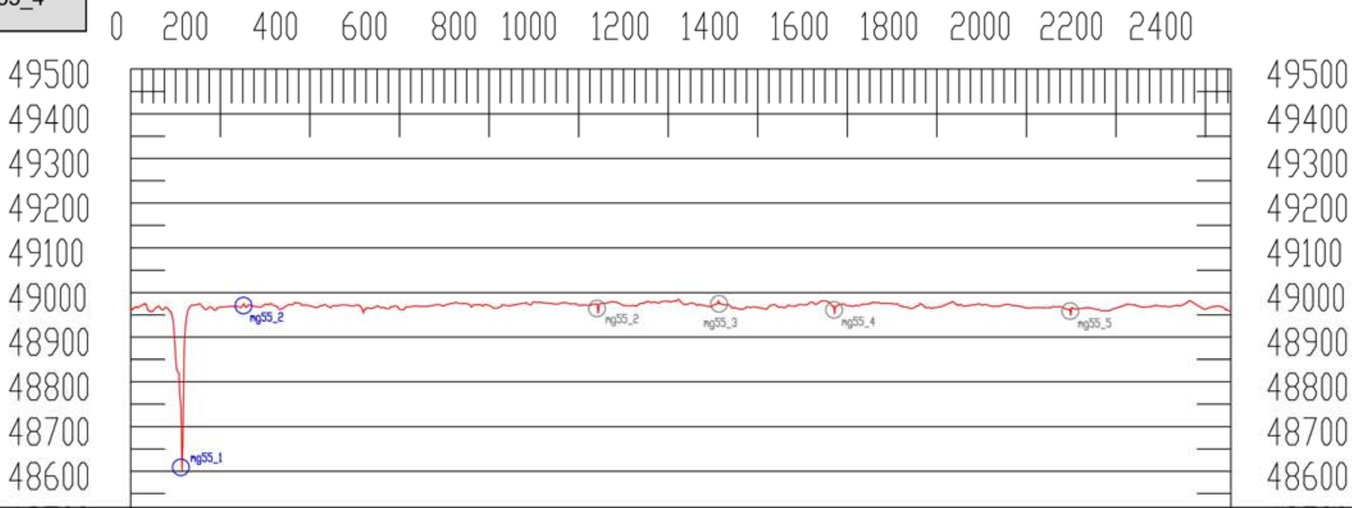
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

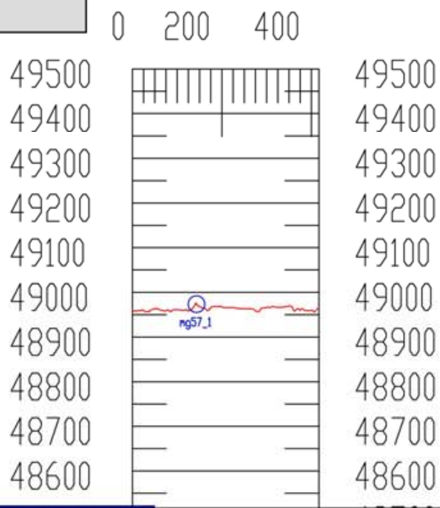
A3

Job/Exc No.	Compiled by	CAD reference	Client	Title
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 53 [mg53_1 to mg53_5], & Survey Line No. 54 [mg54_1 to mg54_4], Buoy 3 Racon Buoy XS47-81 [NW-SE].
Date	**Scale**	**Drawing No.**	**Project**	
18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line 55: mg55_1 to mg55_4



Line 57: mg57_1



KEY:

mg# Magnetometer Target [retained]

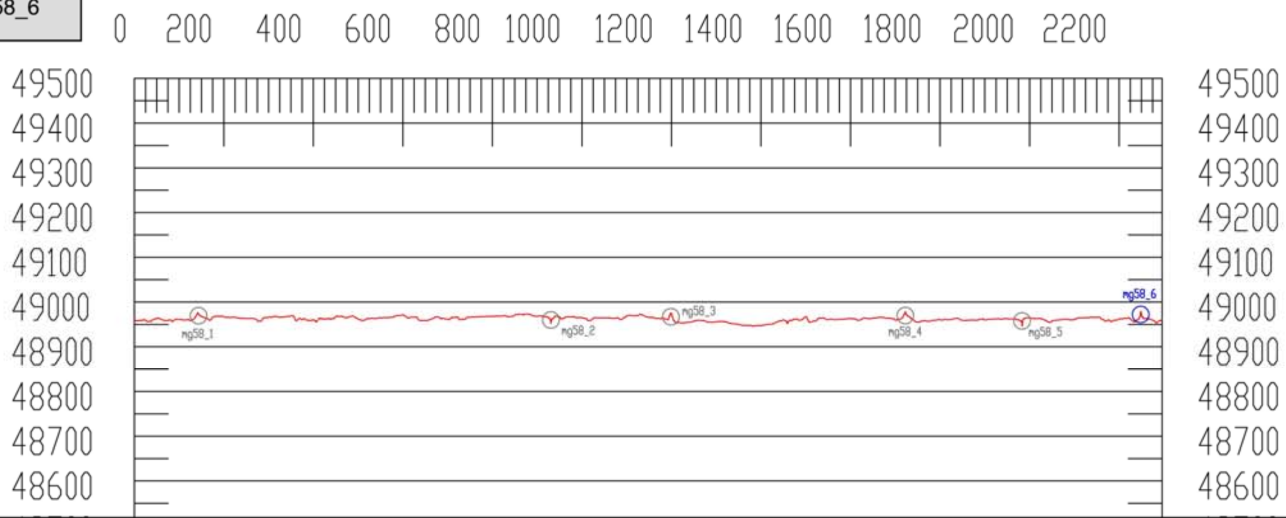
mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.

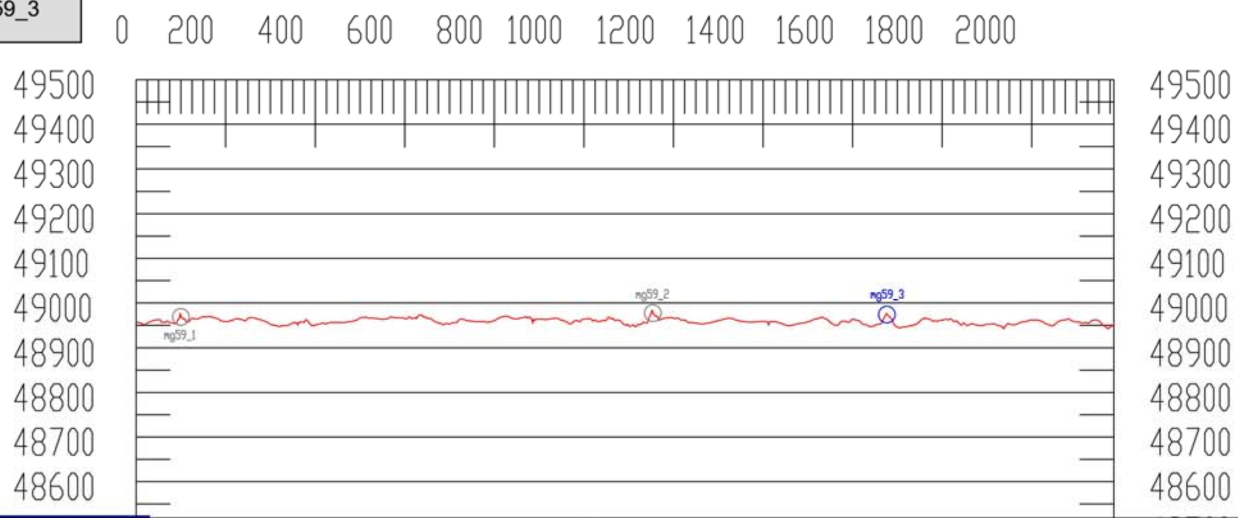
Tel. 056 4440236 email: info@adco-ie.com

Notes	A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd. -- Archaeological interpretation of data undertaken by ADCO Ltd. -- Vertical range= Magnetic Intensity (nT) -- Horizontal range= distance (m)		ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 55 [mg51_1 to mg55_4], & Survey Line No. 57 [mg57_1], Buoy 3 Racon Buoy XS47-81 [NW-SE].
		Date	**Scale**	**Drawing No.**	**Project**	
		18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line 58: mg58_1 to mg58_6



Line 59: mg59_1 to mg59_3



KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

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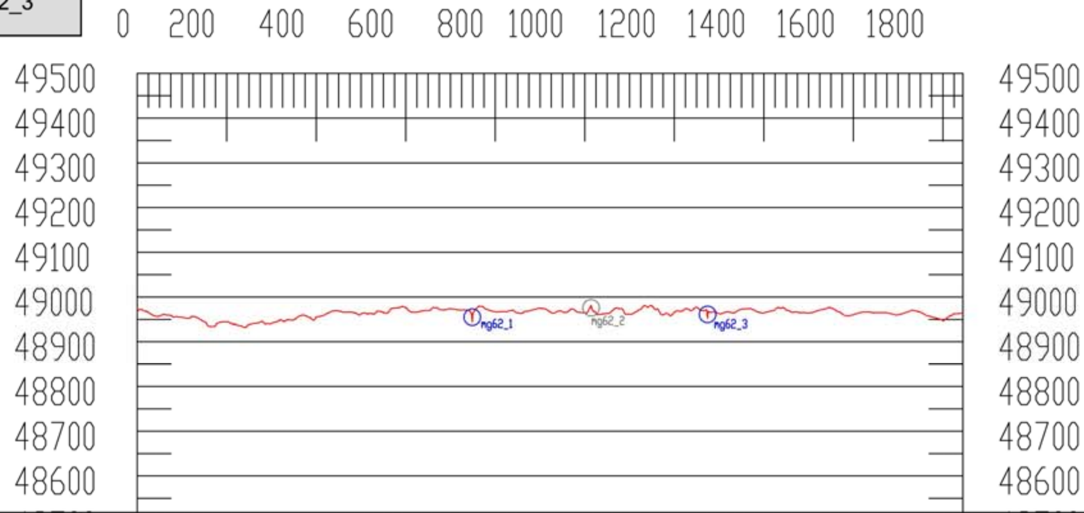
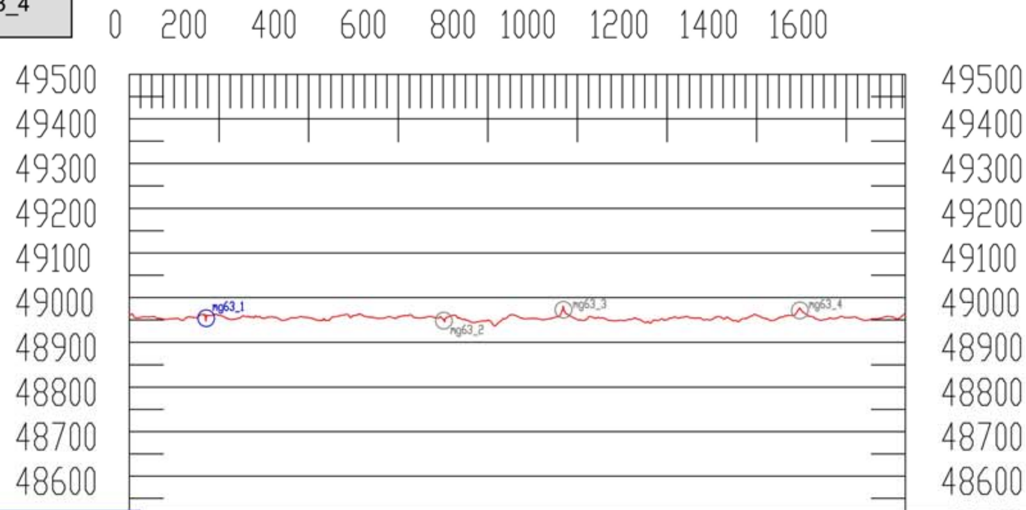
Tel. 056 4440236 email: info@adco-ie.com

Notes	A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd. -- Archaeological interpretation of data undertaken by ADCO Ltd. -- Vertical range= Magnetic Intensity (nT) -- Horizontal range= distance (m)		ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 58 [mg58_1 to mg58_6], & Survey Line No. 59 [mg59_1 to mg59_3], Buoy 3 Racon Buoy XS47-81 [NW-SE].
		Date	**Scale**	**Drawing No.**	**Project**	
		18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line62: mg62_1 to mg62_3



Line 63: mg63_1 to mg63_4



KEY:

mg# Magnetometer Target [retained]

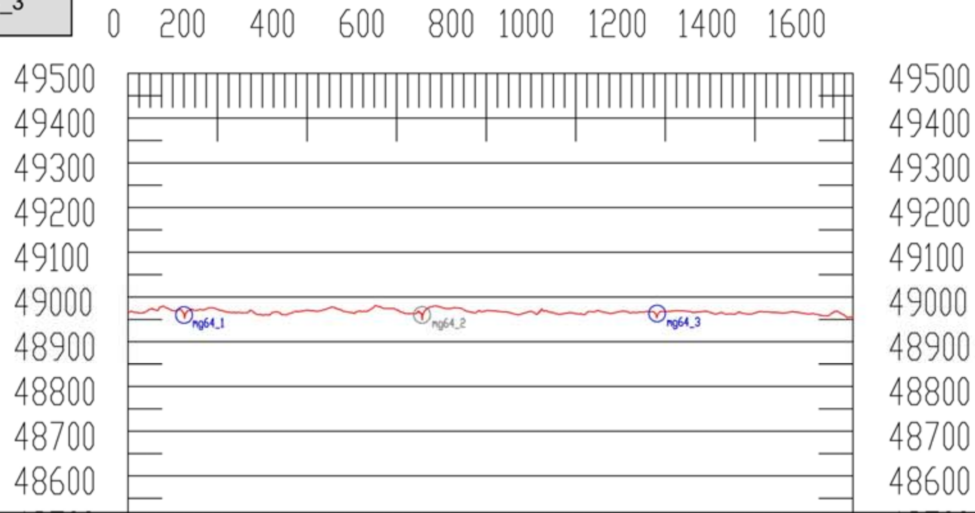
mg# False Target [discarded]

THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

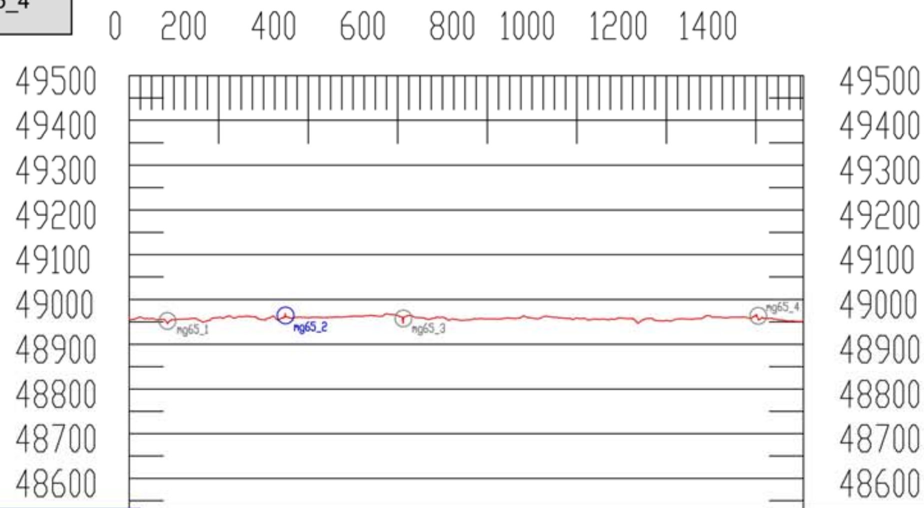
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 62 [mg62_1 to mg62_3], & Survey Line No. 63 [mg63_1 to mg63_4], Buoy 3 Racon Buoy XS47-81 [NW-SE].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:100	-----	ABR Project, Dublin Port	

Line64: mg64_1 to mg64_3



Line 65: mg65_1 to mg65_4



KEY:

mg# Magnetometer Target [retained]

mg# False Target [discarded]

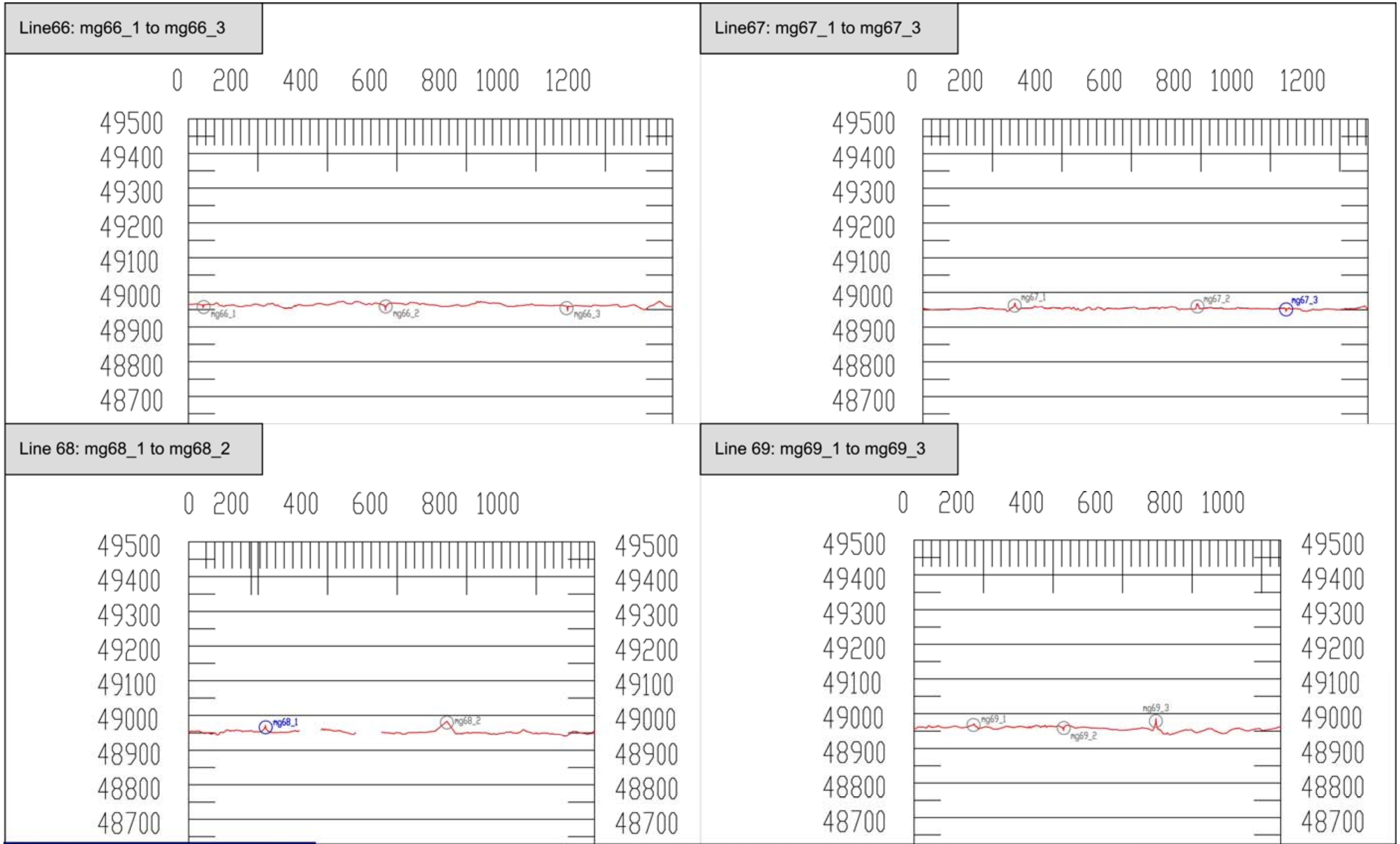
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

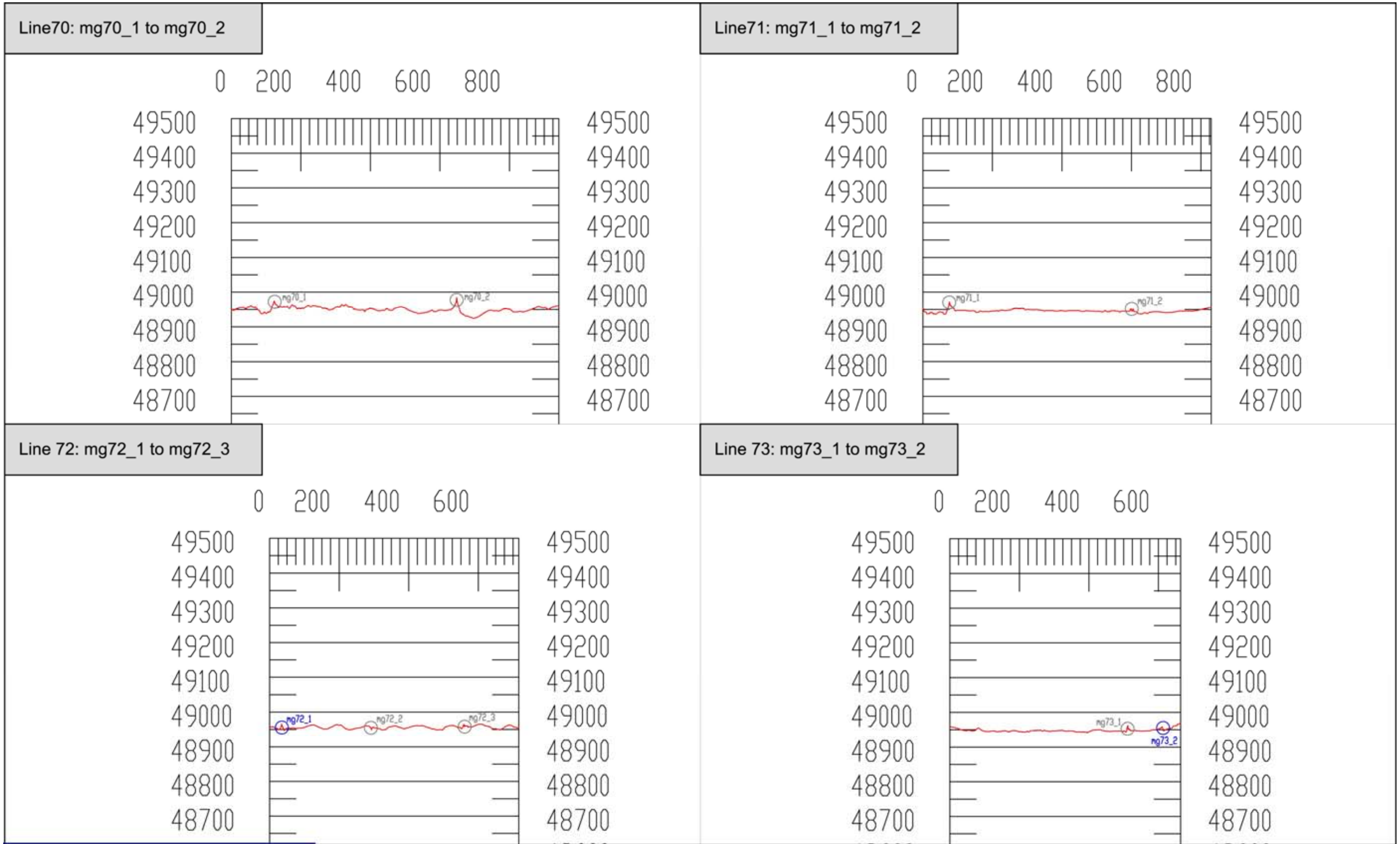
A3

Job/Exc No.	Compiled by	CAD reference	Client
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company
Date	**Scale**	**Drawing No.**	**Project**
18.02.2014	1:100	-----	ABR Project, Dublin Port

Title
Magnetometer Survey Line No. 64 [mg64_1 to mg64_3], & Survey Line No. 65 [mg65_1 to mg65_4], Buoy 3 Racon Buoy XS47-81 [NW-SE].



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** – Magnetometer Survey undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd. – Vertical range= Magnetic Intensity (nT) – Horizontal range= distance (m)	A3	**Job/Exc No.** ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company	**Title** Magnetometer Survey Line No. 66, Line No. 67, Line No. 68, and Line No.69, Buoy 3 Racon Buoy XS47-81 [NW-SE].
			Date 18.02.2014	**Scale** 1:75	**Drawing No.** -----	**Project** ABR Project, Dublin Port	



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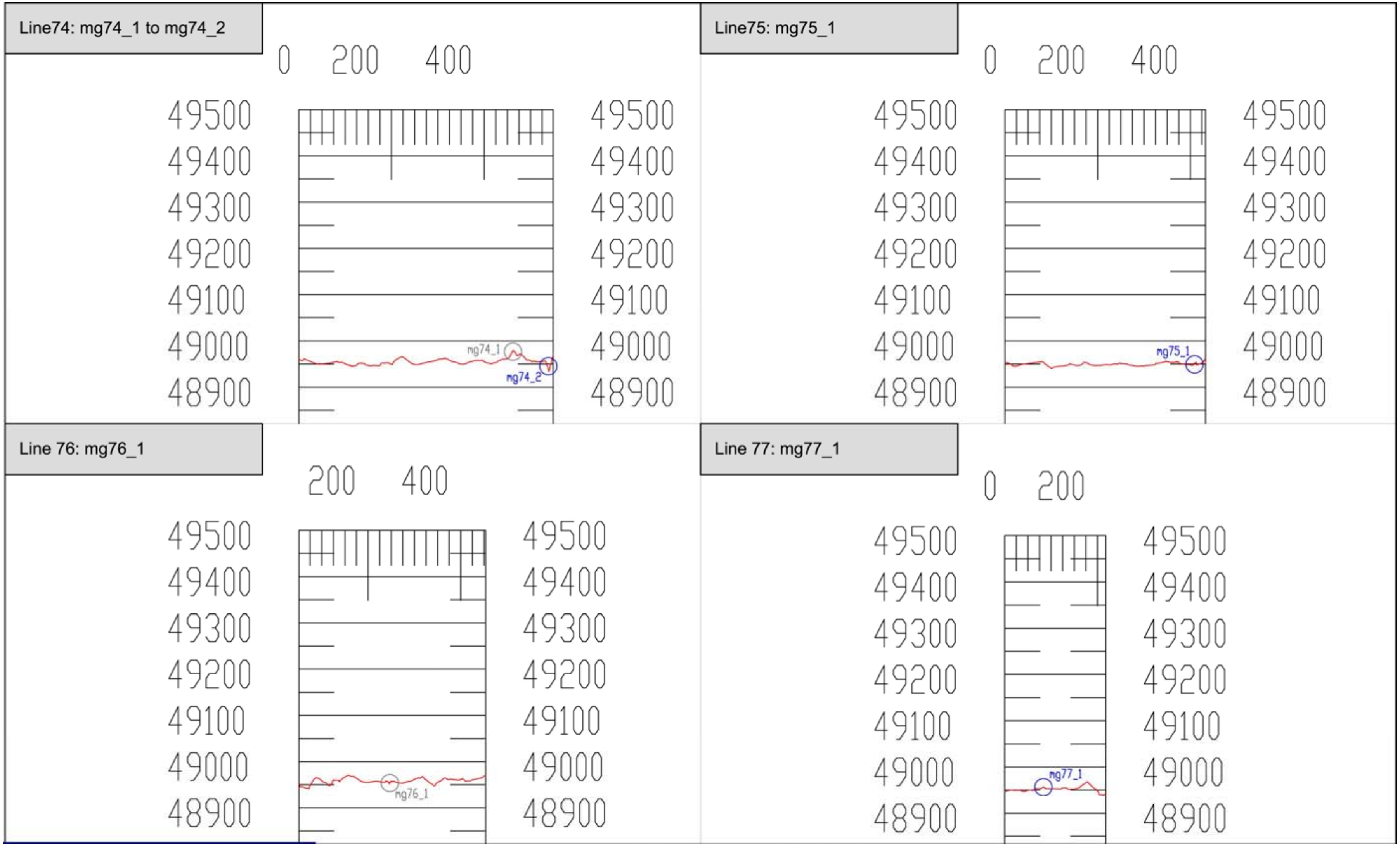
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)

A3

Job/Exc No.	Compiled by	CAD reference	Client	Title
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 70, Line No. 71, Line No.72, and Line No.73, Buoy 3 Racon Buoy XS47-81 [NW-SE].
Date	**Scale**	**Drawing No.**	**Project**	
18.02.2014	1:75	-----	ABR Project, Dublin Port	



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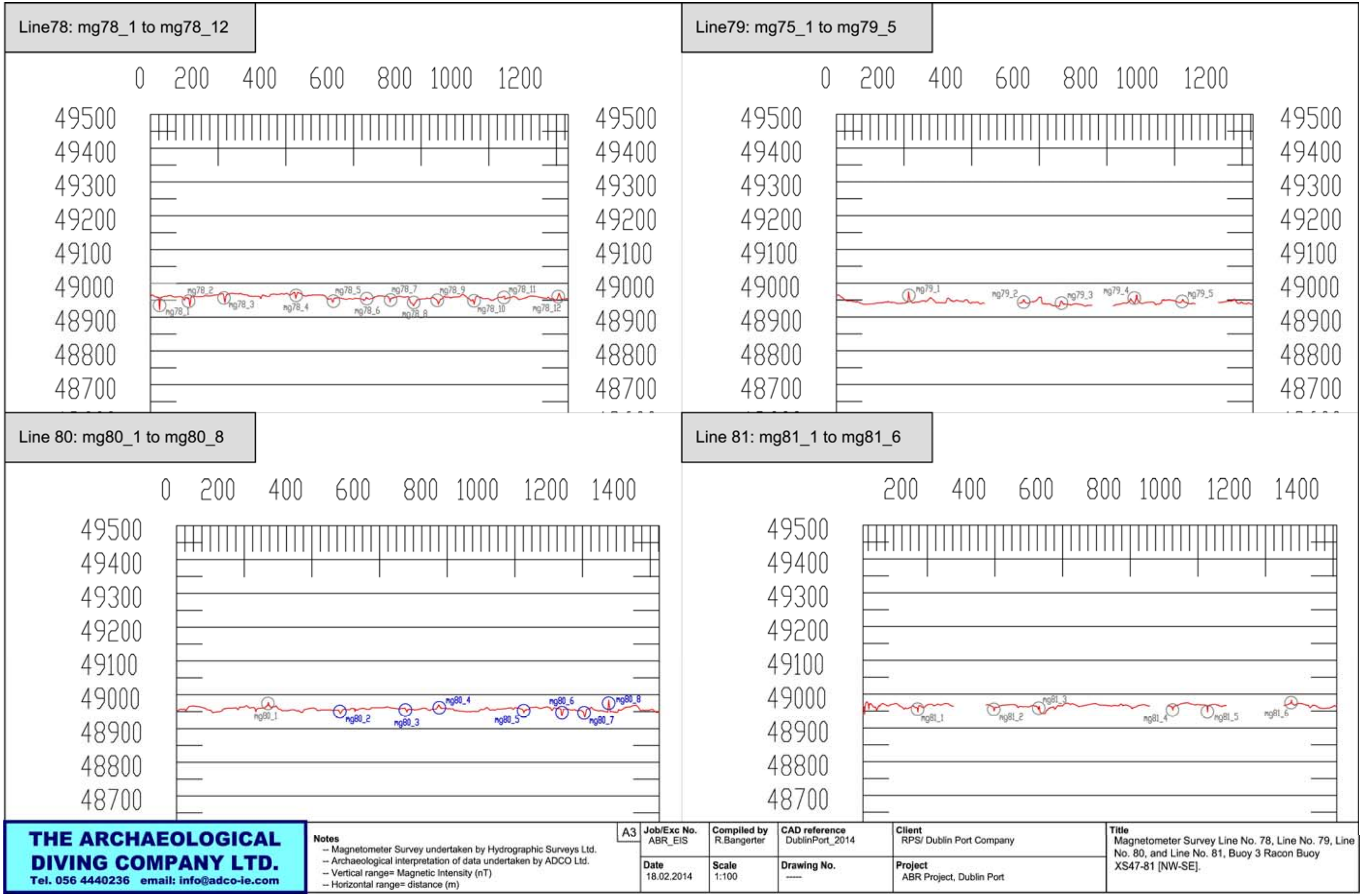
Notes
- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- Archaeological interpretation of data undertaken by ADCO Ltd.
- Vertical range= Magnetic Intensity (nT)
- Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Magnetometer Survey Line No. 74, Line No. 75, Line No. 76, and Line No. 77, Buoy 3 Racon Buoy XS47-81 [NW-SE].
	Date	**Scale**	**Drawing No.**	**Project**	
	18.02.2014	1:75	-----	ABR Project, Dublin Port	


Line78: mg78_1 to mg78_12
Line79: mg75_1 to mg79_5
Line 80: mg80_1 to mg80_8
Line 81: mg81_1 to mg81_6
0 200 400 600 800 1000 1200 1400
49500 49400 49300 49200 49100 49000 48900 48800 48700
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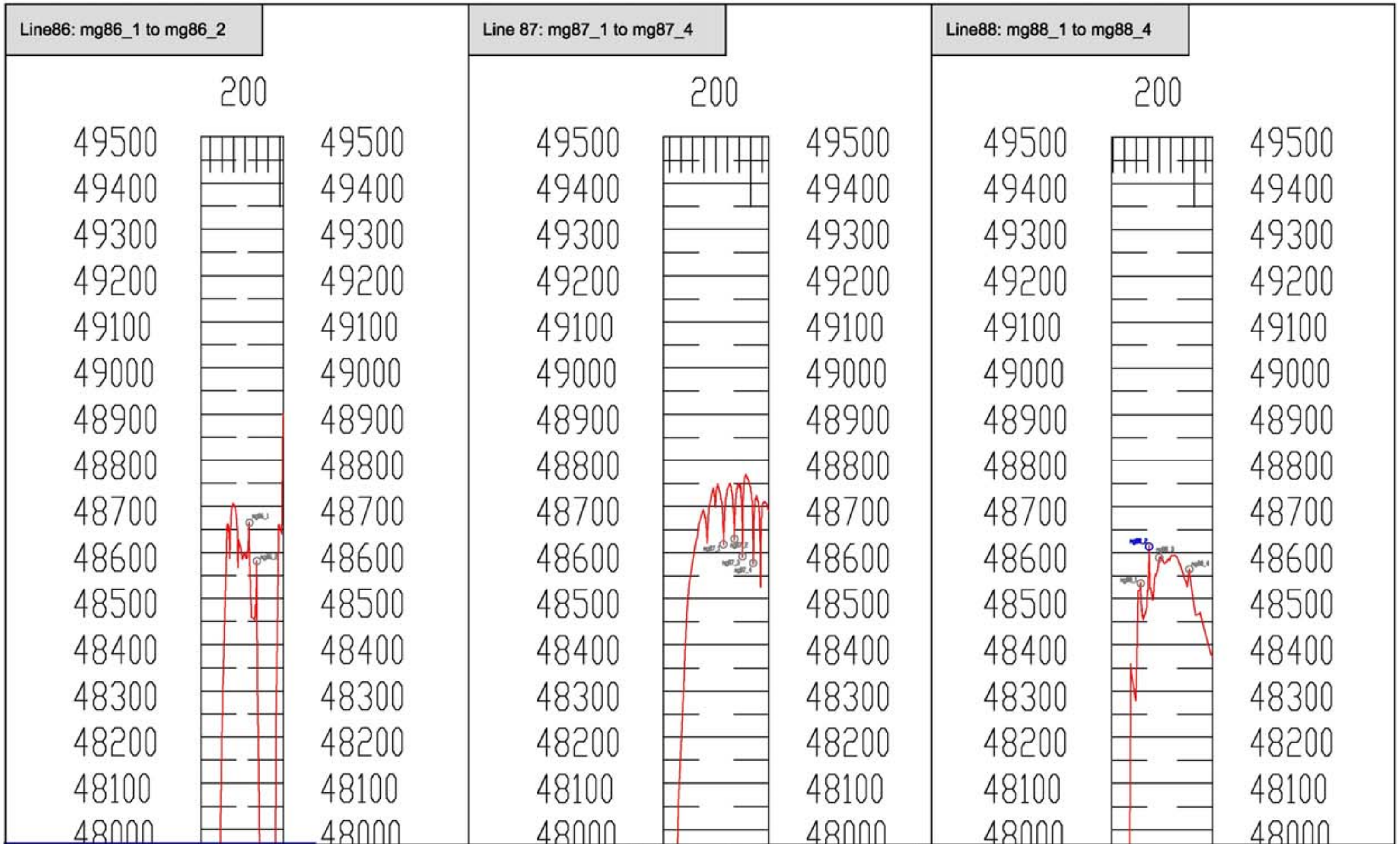
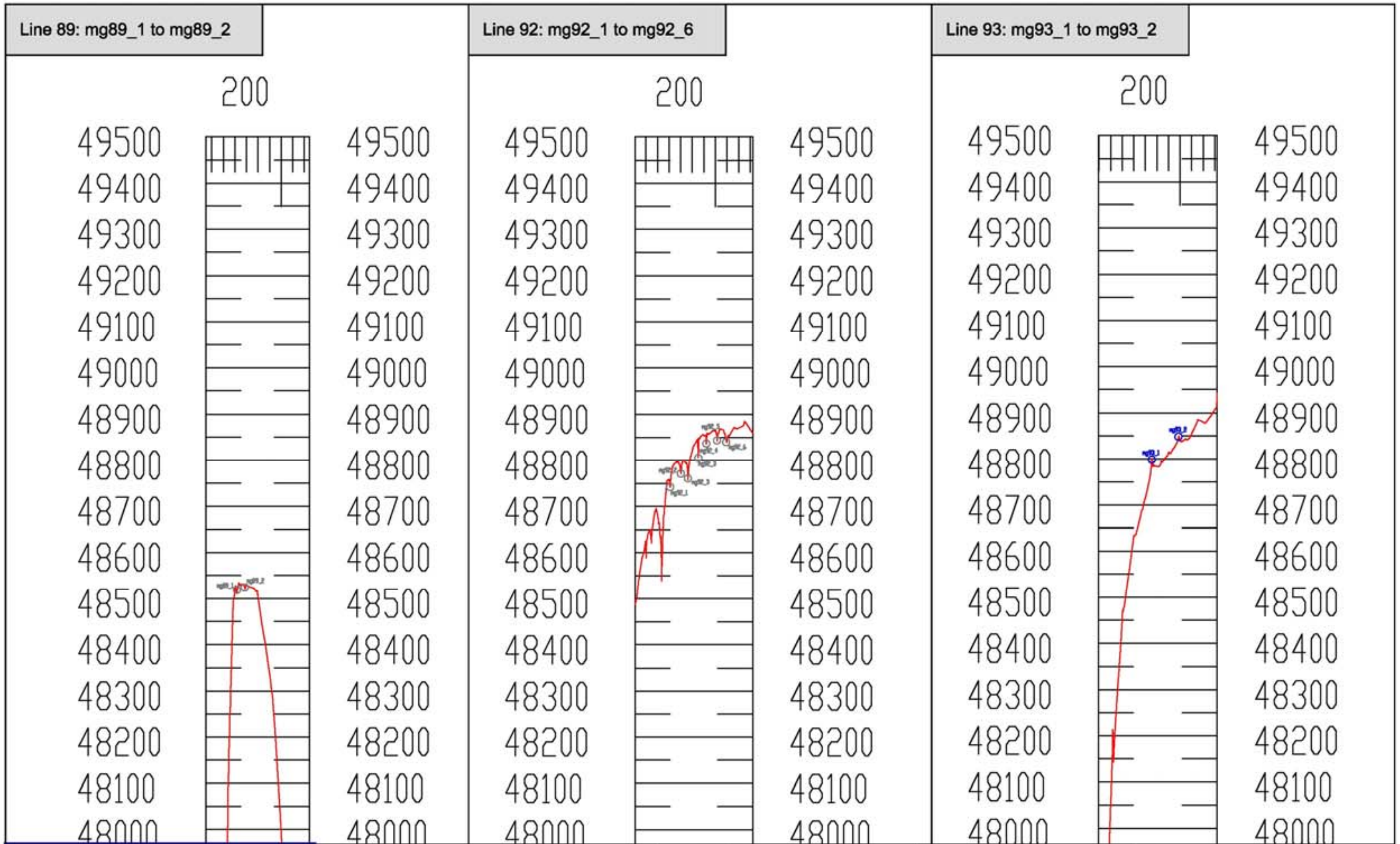
Notes
-- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
-- Archaeological interpretation of data undertaken by ADCO Ltd.
-- Vertical range= Magnetic Intensity (nT)
-- Horizontal range= distance (m)
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Title Magnetometer Survey Line No. 78, Line No. 79, Line No. 80, and Line No. 81, Buoy 3 Racon Buoy XS47-81 [NW-SE].
Date 18.02.2014
Scale 1:100
Drawing No. -----
Project ABR Project, Dublin Port



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	Notes – Magnetometer Survey undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd. – Vertical range= Magnetic Intensity (nT) – Horizontal range= distance (m)	A3 Job/Exc No. ABR_EIS Date 18.02.2014	Compiled by R.Bangerter Scale 1:75	CAD reference DublinPort_2014 Drawing No. —	Client RPS/ Dublin Port Company Project ABR Project, Dublin Port	Title Magnetometer Survey Line No. 86, Line No. 87, Line No. 88, Cross Lines XS83-120 [N-S].



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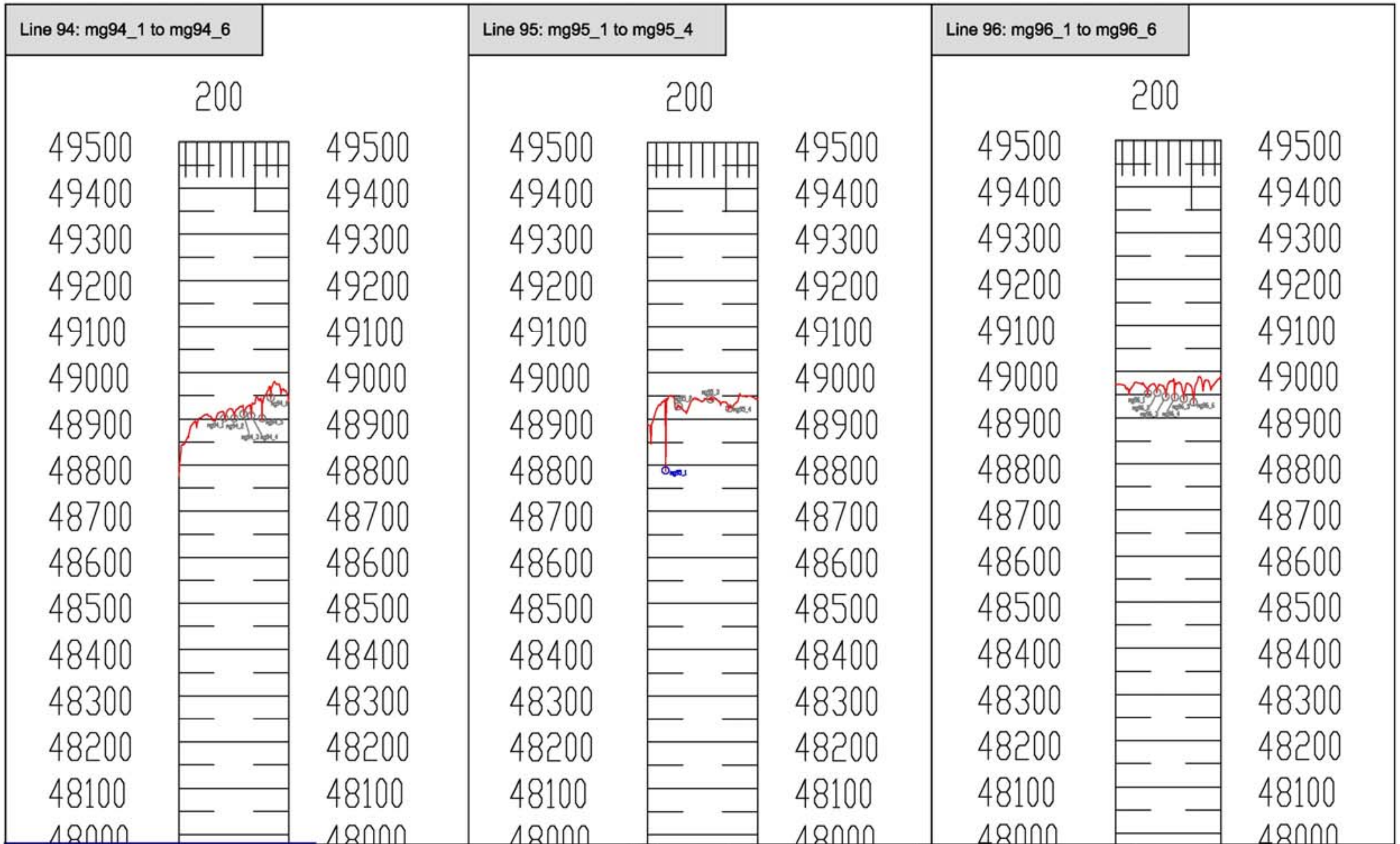
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
– Vertical range= Magnetic Intensity (nT)
– Horizontal range= distance (m)

A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
	ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 89, Line No. 92, Line No. 93, Cross Lines XS83-120 [N-S].
	Date 18.02.2014	**Scale** 1:75	**Drawing No.** ----	**Project** ABR Project, Dublin Port	



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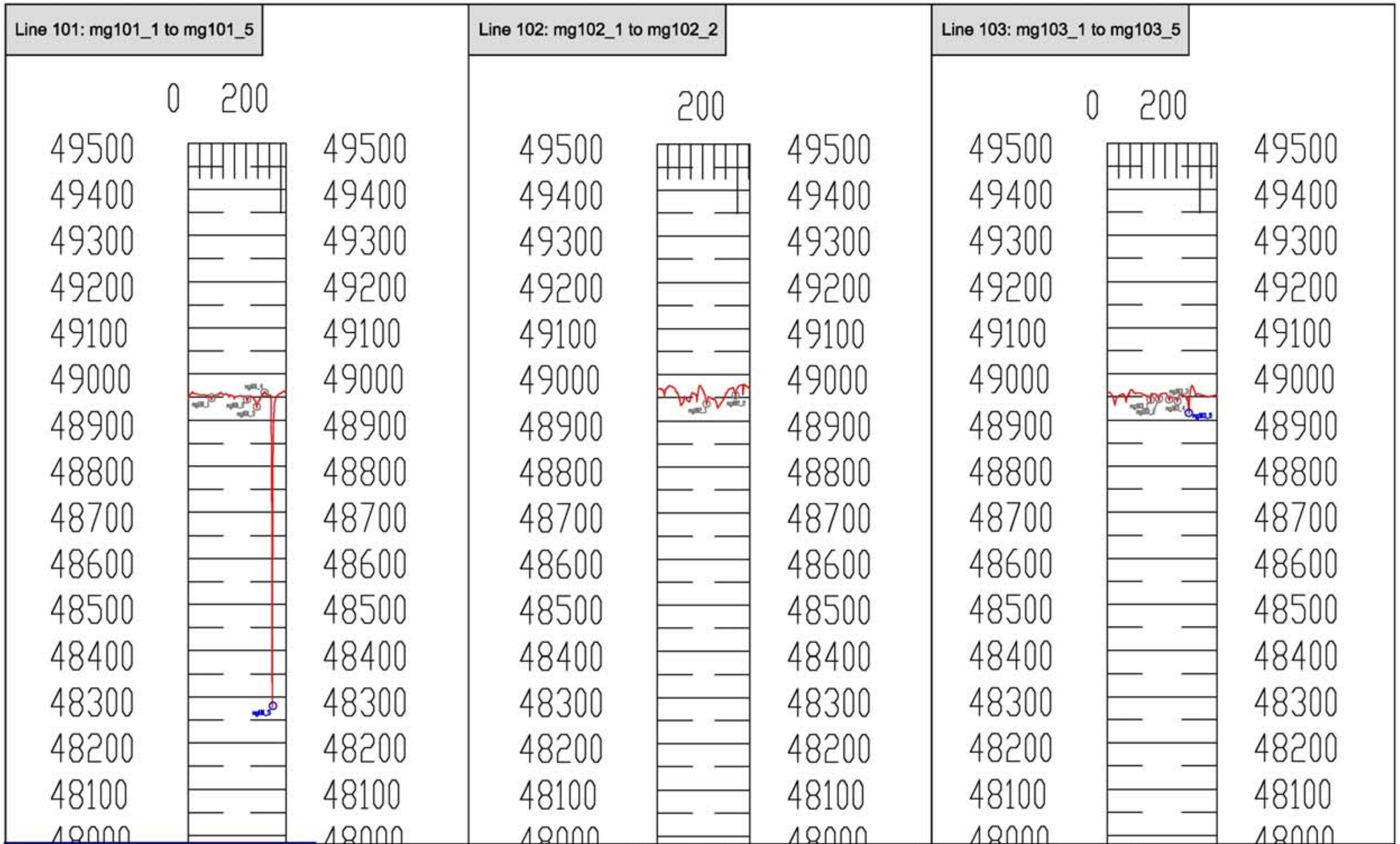
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
– Vertical range= Magnetic Intensity (nT)
– Horizontal range= distance (m)

A3					
	Job/Exc No. ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company.	**Title** Magnetometer Survey Line No. 94, Line No. 95, Line No. 96, Cross Lines XS83-120 [N-S].
	Date 18.02.2014	**Scale** 1:75	**Drawing No.** —–	**Project** ABR Project, Dublin Port	



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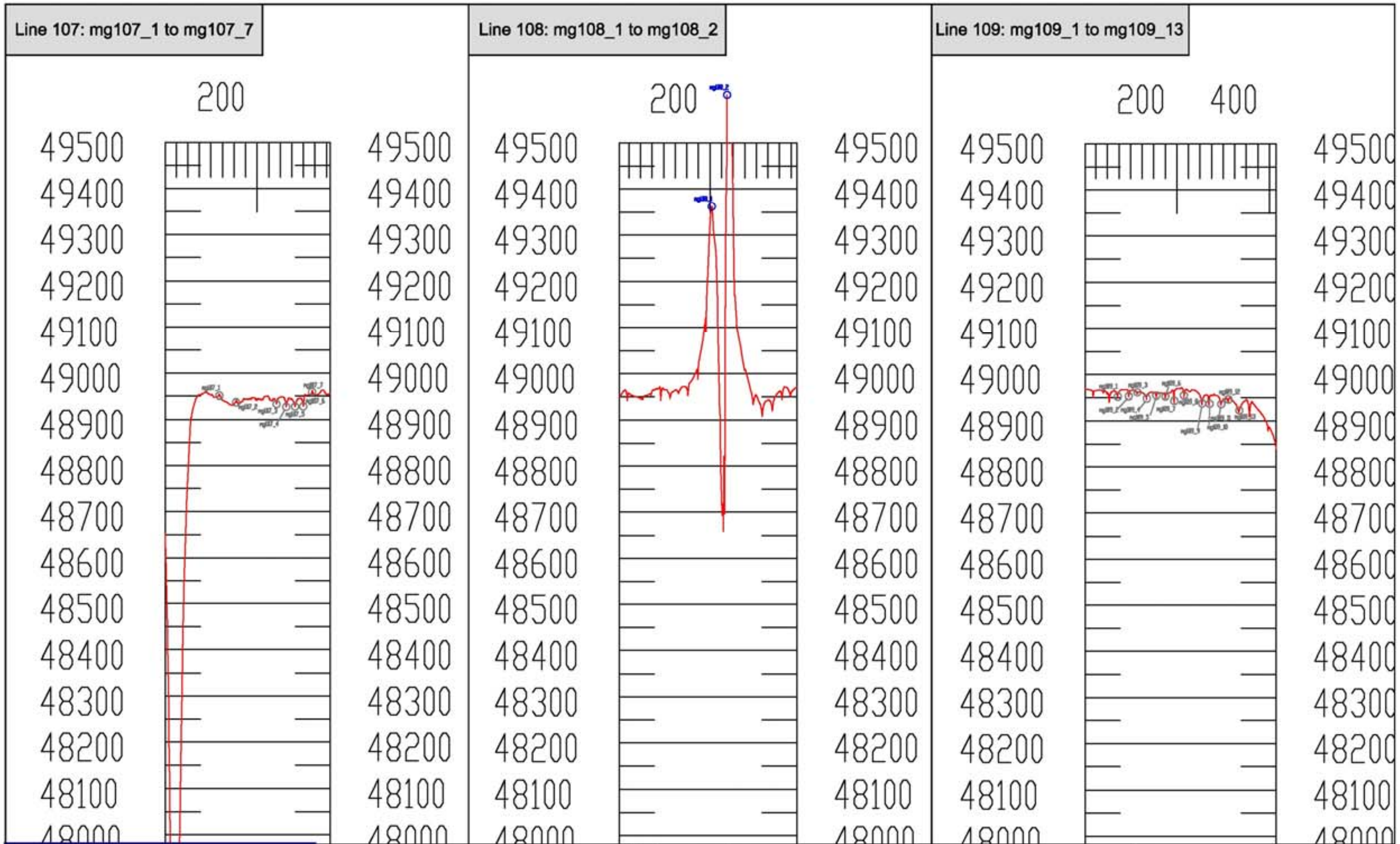
Notes
- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- Archaeological interpretation of data undertaken by ADCO Ltd.
- Vertical range= Magnetic Intensity (nT)
- Horizontal range= distance (m)

A3	**Job/Exc No.** ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company
	Date 18.02.2014	**Scale** 1:75	**Drawing No.** —	**Project** ABR Project, Dublin Port

Title
Magnetometer Survey Line No. 101, Line No. 102, Line No. 103, Cross Lines XS83-120 [N-S].



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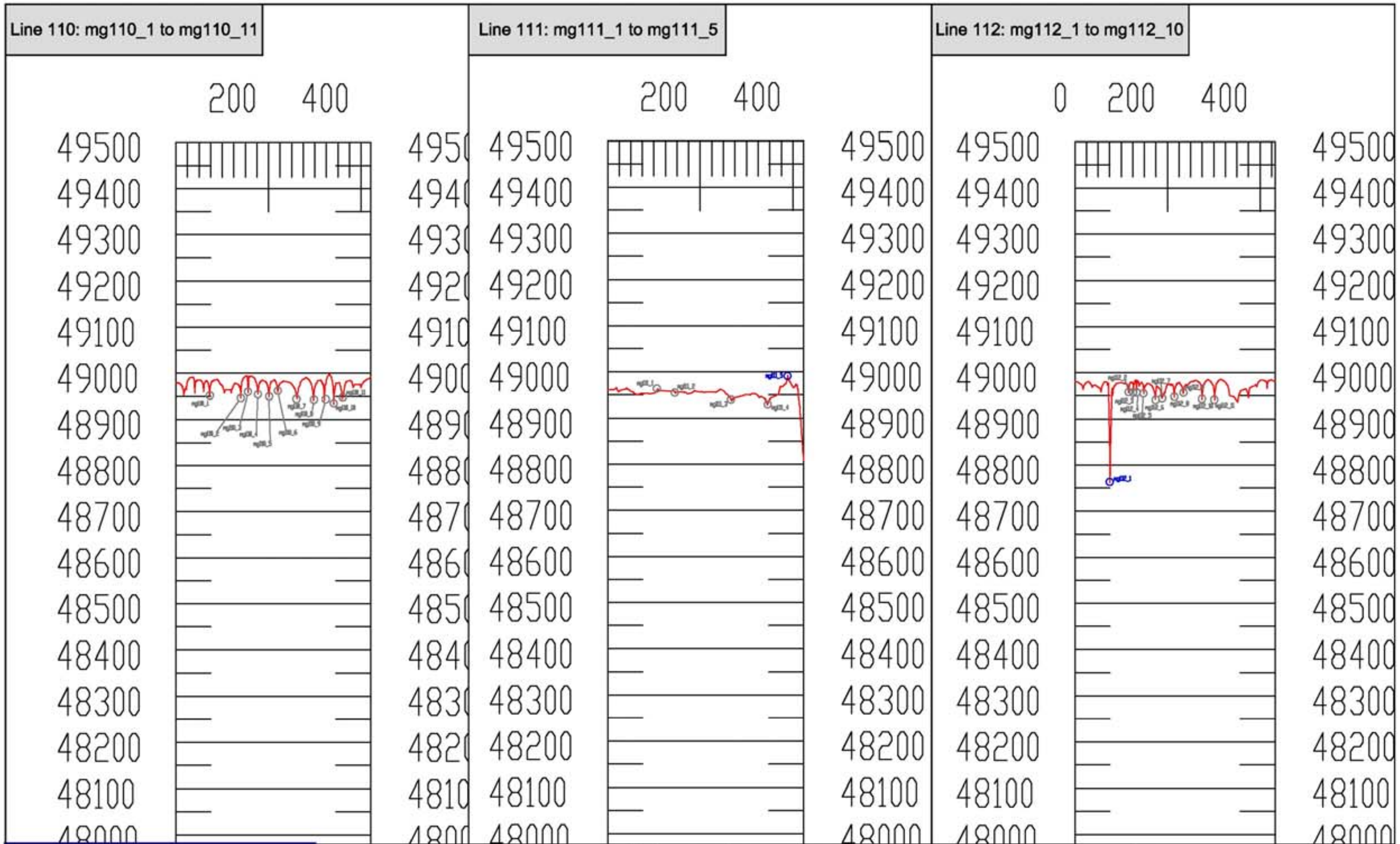
Notes
- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- Archaeological interpretation of data undertaken by ADCO Ltd.
- Vertical range= Magnetic Intensity (nT)
- Horizontal range= distance (m)

A3				
Job/Exc No. ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company	**Title** Magnetometer Survey Line No. 107, Line No. 108, Line No. 109, Cross Lines XS83-120 [N-S].
Date 18.02.2014	**Scale** 1:75	**Drawing No.** ---	**Project** ABR Project, Dublin Port	



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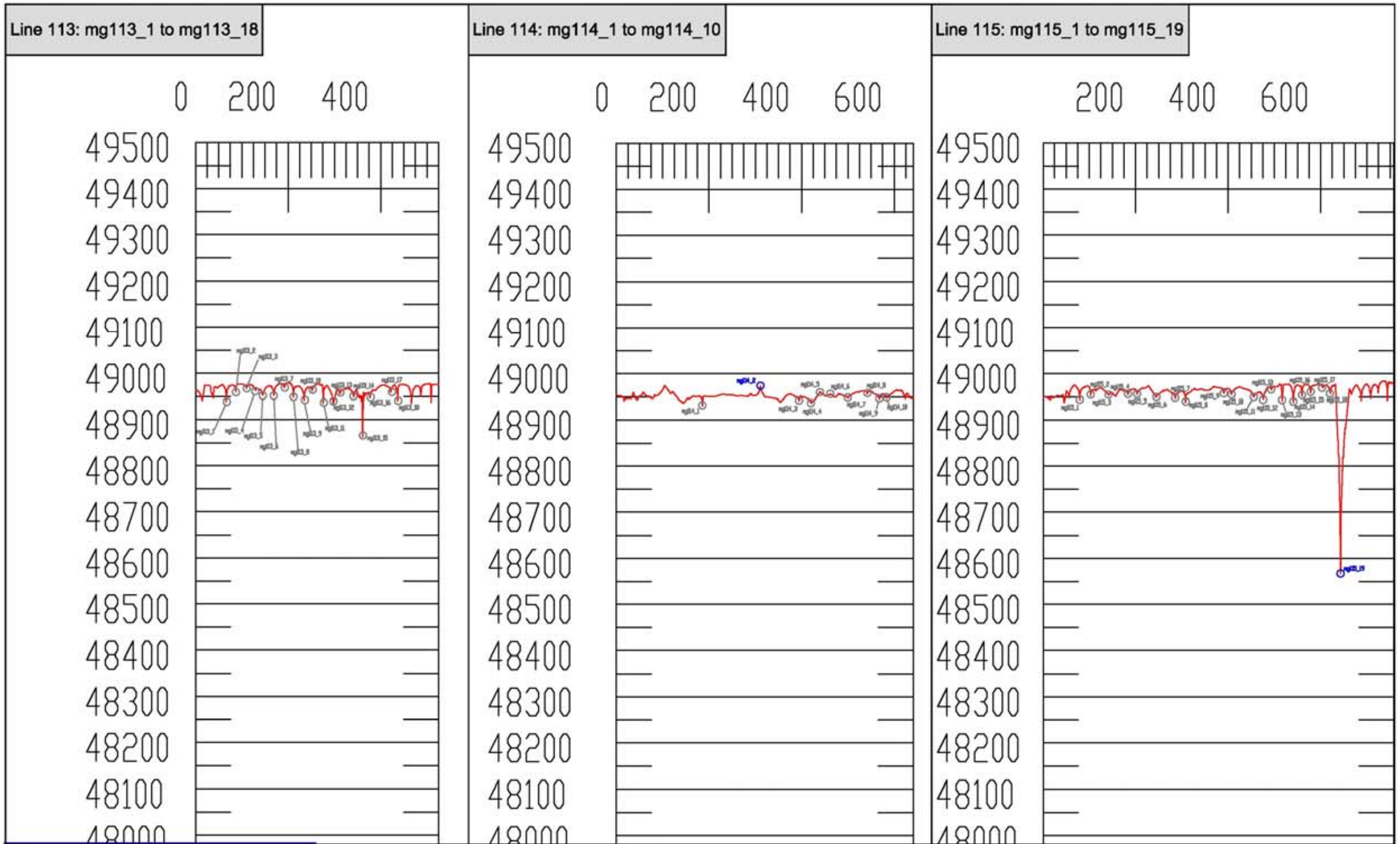
Notes
- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- Archaeological interpretation of data undertaken by ADCO Ltd.
- Vertical range= Magnetic Intensity (nT)
- Horizontal range= distance (m)

A3				
Job/Exc No. ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company	**Title** Magnetometer Survey Line No. 110, Line No. 111, Line No. 112, Cross Lines XS83-120 [N-S].
Date 18.02.2014	**Scale** 1:75	**Drawing No.** ——	**Project** ABR Project, Dublin Port	



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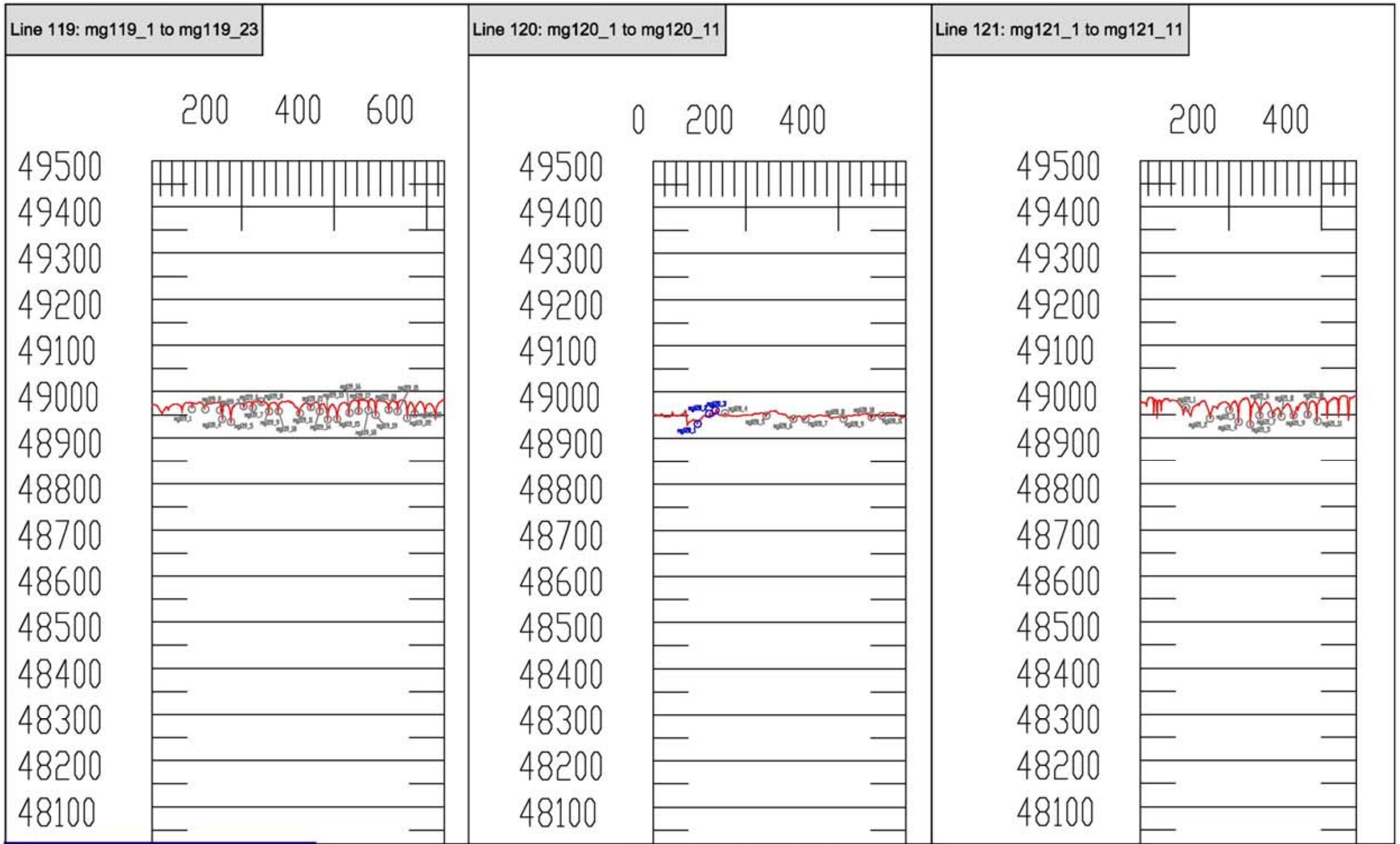
Notes
- Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
- Archaeological interpretation of data undertaken by ADCO Ltd.
- Vertical range= Magnetic Intensity (nT)
- Horizontal range= distance (m)

A3

Job/Exc No.	Compiled by	CAD reference	Client	Title
ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company	Magnetometer Survey Line No. 113, Line No. 114, Line No. 115, Cross Lines XS83-120 [N-S].
Date	**Scale**	**Drawing No.**	**Project**	
18.02.2014	1:75	---	ABR Project, Dublin Port	



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** – Magnetometer Survey undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd. – Vertical range= Magnetic Intensity (nT) – Horizontal range= distance (m) A3	**Job/Exc No.** ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company
		Date 18.02.2014	**Scale** 1:75	**Drawing No.** —	**Project** ABR Project, Dublin Port

Title Magnetometer Survey Line No. 119, Line No. 120, Line No. 121, Cross Lines XS83-120 [N-S].

SUB-BOTTOM PROFILE SURVEY

Source: Vessel Track Plots, Data Record

Coordinates presented on data record in Lat/Long, and converted to ITM.

Notes:

1. Under Ref/Reference, sb1_1 refers to 'sub-bottom survey line 1_target 1'.

2. The highlighted values reflect a discussion with Hydrographic Surveys Ltd on the possible interpretation of individual anomalies.

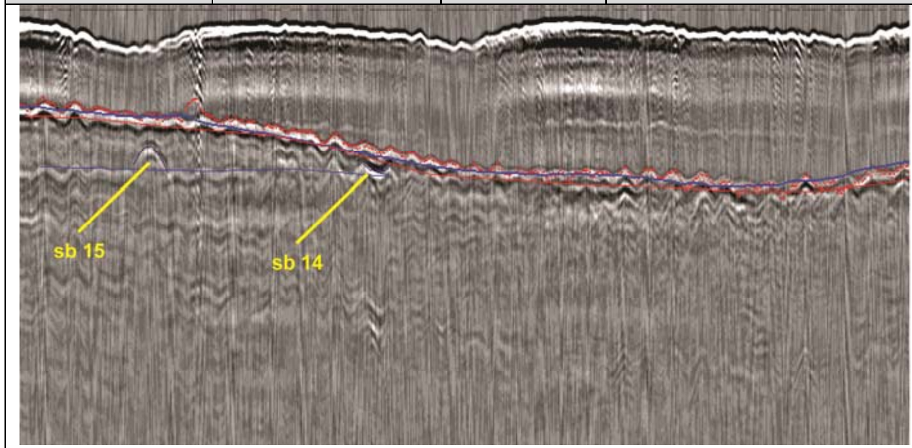
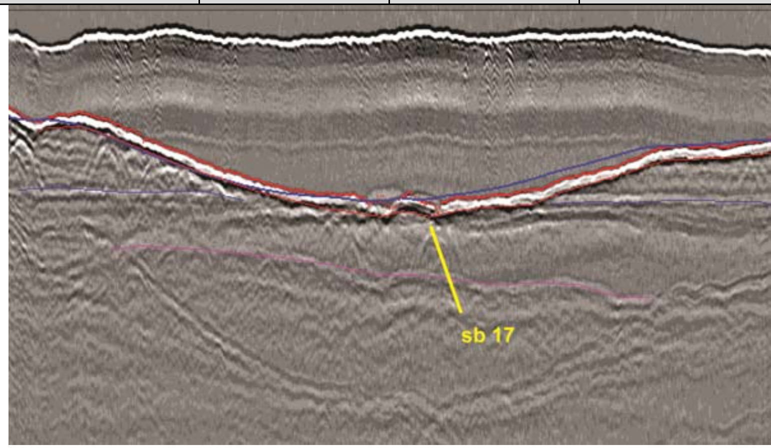
Refer to Figures 12.27-12.32 for the distribution of the anomalies

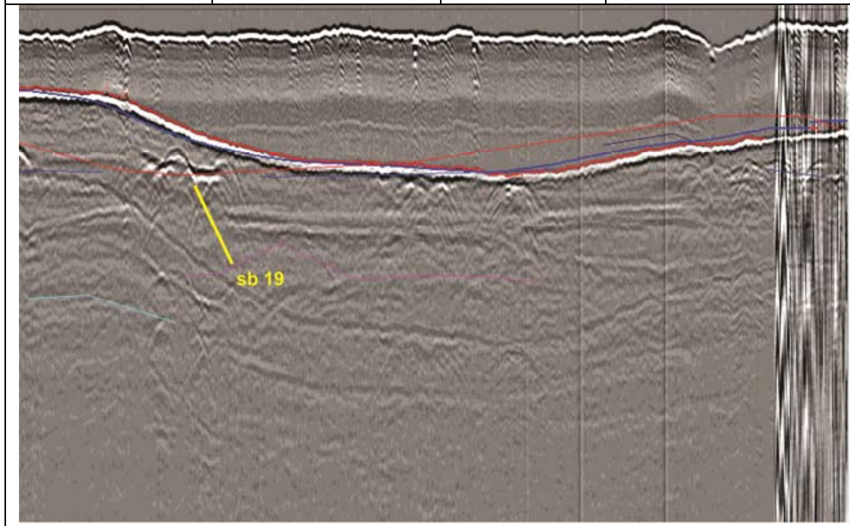
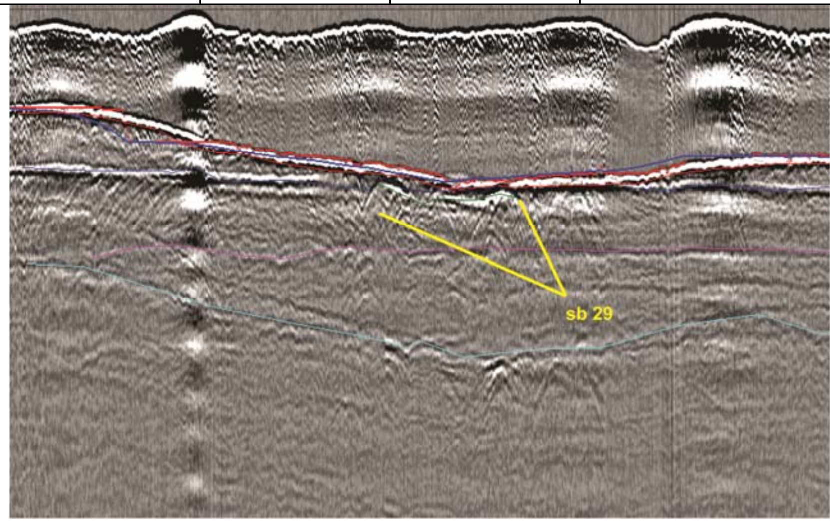
Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
sb1	06/06/2013	122513	Bow-shaped reflector at c. 2m below seabed. Coordinates taken at end point. There are no other anomalies close by. Figure 12.32	693522e 5912912n	726969.33	732770.36	• None, outside dredge area
sb2	06/06/2013	144253	Bow-shaped feature just below surface extending c. 1m deep. Coordinates taken at end point. Located on the N side of the channel S of Terminal 5. Figure 12.29	687178e 5914244n	720644.85	734191.05	• Pre-dredge dive • Archaeological monitoring of dredging
sb3	06/06/2013	153313	Bow-shaped feature just below surface extending c. 1m deep. Interrupted in	684821e 59143604n	718289.78	734340.45	• Pre-dredge dive • Archaeological monitoring of dredging

Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
			places due to play on surface. Coordinates taken at end point. Positioned at base of NQE, channel side. Figure 12.28				
sb4	07/06/2013	125242	There is a defined inverted U shape, the apex of which crowns the seabed surface at the coordinate recorded. Located between the Lead-in jetty and the Bulk jetty, Alexandra Basin. Figure 12.28	684945e 5914554n	718416.47	734532.29	• Pre-dredge dive • Archaeological monitoring of dredging
sb5	11/06/2013	91831	Bow-shaped reflector immediately below surface (c 3m) extending to c. 5m depth. There is no other target within 50m of the anomaly. Figure 12.29	687231e 5914140n.	720696.38	734086.32	• Archaeological monitoring of dredging
sb6	11/06/2013	130542	Slight u-shaped feature showing on data trace of poor quality. Reflector dipping to 2m. Coordinates taken at end point. Within 18m of side-scan anomaly 143_1. Figure 12.29	687644e 5914094n	721108.68	734034.54	• None, outside dredge area
sb7	18/06/2013	112623	U-shaped reflector extending below seabed surface up to 4m. Coordinates taken at end point. 250m from any other anomaly and outside impact area. Figure 12.32	692787e 5913215n	726238.68	733083.61	• None, outside dredge area

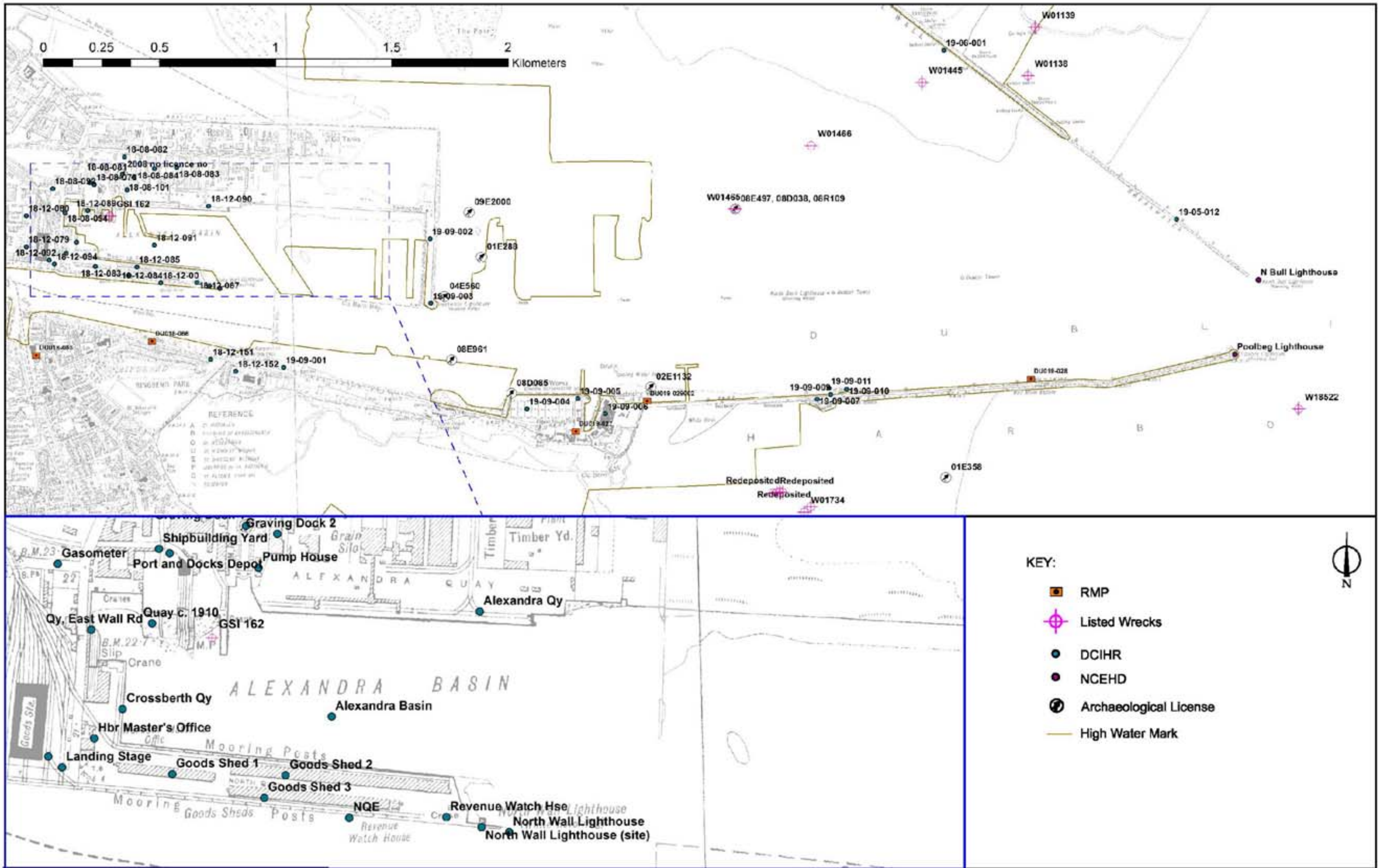
Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
sb8	18/06/2013	121351	U-shaped reflector extending below seabed surface to 2m. Coordinates taken at end point. Figure 12.32	693098e 5912783n	726543.59	732647.31	• Non, outside dredge area
sb9	19/06/2013	111358	Trough-like reflector interposed with sea-state disturbance. 0.5m to 5m below surface. Coordinates taken at end point. Located in turning area for shipping, c. 215m from nearest other anomaly, side-scan 129_1. Figure 12.32	694235e 5913782n.	727694.42	733630.25	• Archaeological monitoring of dredging
sb10	19/06/2013	123227	Broad u-shaped reflector beneath horizontal reflector at 4m, extending to c. 6m below surface. Coordinates taken at end point. Just outside channel on N side, ideally situated to be wreckage. Within 20m of side-scan sonar cluster 53_1, Nav Buoy 3. Figure 12.31	692159e 5914330n.	725626.39	734207.25	• Location is technically outside dredge area • Archaeological monitoring of dredging
sb11	20/06/2013	84340	U-shaped reflector at bed level. Coordinates taken at end point. Within 35m of wreckage associated with the loss of the container ship *Kilkenny*. Figure 12.31	691925e 5914522n	725395.11	734402.51	• None, outside dredge area
sb12	24/06/2013	114216	Linear reflector dropping from surface a further 10m deep, Coordinates taken at end point. Located within 45m of side-scan sonar cluster 36_2,	694227e 5913477n	727682.15	733325.4	• Pre-dredge dive • Archaeological monitoring of dredging

Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
			46_4, where diving has identified a series of exposed sections of iron that appears to be modern. Figure 12.32				
sb13	01/07/2013	100304	U-shaped reflector, extending 4m below bed level. Coordinates taken at end point. 143m from nearest other anomaly. Figure 12.32	694056e 5913582n	727512.64	733432.78	• Archaeological monitoring of dredging
sb14	02/07/2013	143739	Possible reflector at bed level. Located 50m E of Nav Buoy 5, this target is within the channel and probably outside the footprint for the cross-Bay sewer. Figure 12.31	691076e 5914314n	724543.31	734206.43	• Pre-dredge dive • Archaeological monitoring of dredging
sb15	02/07/2013	143739	Second reflector on data trace. Located to the N of sb14, and lies outside impact area. Its presence in this undredged area suggests a possible archaeological feature. Figure 12.31	691073e 5914394n	724541.43	734286.46	• None, outside dredge area

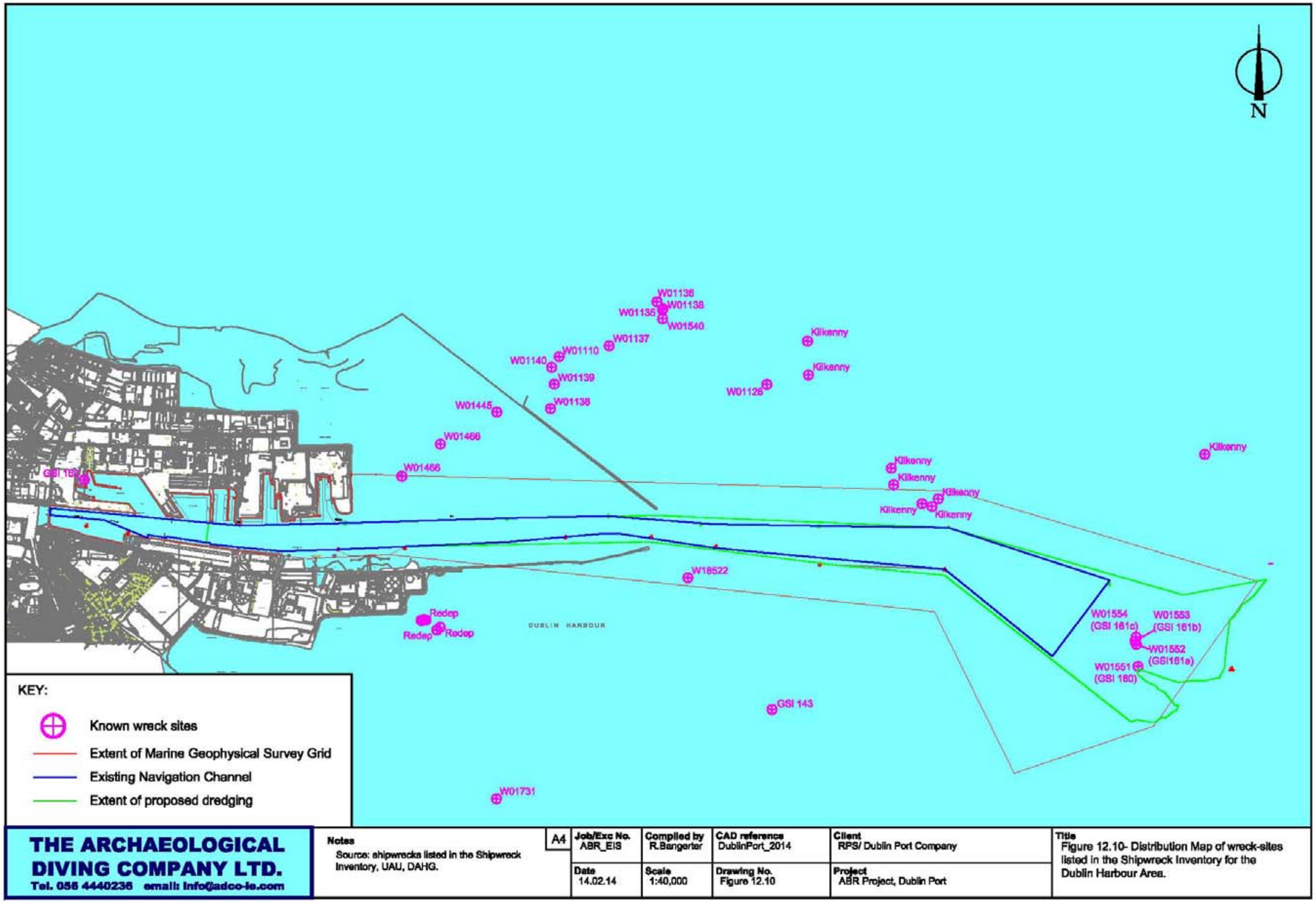
Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
							
sb16	02/07/2013	144940	Reflector just below bed level. This target is located close to sb14 and sb15 and is also outside the impact area. Its presence in this undredged area suggests a possible archaeological feature. Figure 12.31	691154e 5914399n	724622.49	734290.3	• None, outside dredge area
sb17	03/07/2013	55114	Reflector. Located in the central channel, *c.* 130m E of the harbour entrance, the target is 100m from the nearest other anomaly. Figure 12.30	689769e 5914302n	723236.32	734212.74	• Archaeological monitoring of dredging
sb18	03/07/2013	63749	Reflector on side of channel. Target is *c.* 100m from any other anomaly but its location suggests the potential for	689979e 5914116n	723443.68	734023.82	• Pre-dredge dive • Archaeological monitoring of dredging

Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
			wreckage. Figure 12.30				
							
sb19	03/07/2013	64651	Multiple reflectors. These features may indicate old channel lines. Figure 12.30	690098e 5914141n	723563.02	734047.15	• Pre-dredge dive • Archaeological monitoring of dredging
sb20	03/07/2013	105333	Point object. Located in isolation from other targets. Figure 12.31	691300e 5914018n	724763.13	733907.33	• Archaeological monitoring od dredging
sb21	03/07/2013	121942	Reflector observed. Outside channel. Figure 12.31	691668e 5914361n	725135.89	734245.13	• None, outside dredge area
sb22	03/07/2013	65807	Repeat of reflectors seen on line 64951, but observed in the central channel area, indicative of palaeo-channel.	690074e 5914356n	723542.03	734262.46	• Archaeological monitoring of dredging

Reference	Survey Date	Survey Line	Observations	UTM 29N e, n	ITMe	ITMn	Mitigation
			Figure 12.30				
sb23	03/07/2013	70231	Reflector on side of slope, indicative of palaeo-channel. Figure 12.30	690110e 5914166n	723575.37	734071.98	• Archaeological monitoring of dredging
sb24	03/07/2013	70231	Reflector in central channel, indicative of palaeo-channel. Figure 12.30	690117e 5914166n	723582.37	734071.88	• Archaeological monitoring of dredging
sb25	03/07/2013	70651	Reverse image of reflectors shown on line 70231, indicative of palaeo-channel. Figure 12.30	690156e 5914265n	723622.75	734170.32	• Archaeological monitoring of dredging
sb26	03/07/2013	70651	Reverse image of reflectors shown on line 70231, indicative of palaeo-channel. Figure 12.30	690196e 5914159n	723661.26	734063.78	• Archaeological monitoring of dredging
sb27	03/07/2013	71045	As on 70231, indicative of palaeo-channel. Figure 12.30	690189e 5914292n	723656.12	734196.86	• Archaeological monitoring of dredging
sb28	03/07/2013	71045	As on 70231, indicative of palaeo-channel. Figure 12.30	690196e 5914159n	723661.26	734063.78	• Archaeological monitoring of dredging
sb29	03/07/2013	94534	Reflector observed. Isolated feature in central channel area. Figure 12.31	690753e 5914256n	724219.54	734152.96	• Archaeological monitoring of dredging
sb30	03/07/2013	102041	Reflector observed. Isolated feature in central channel area. Figure 12.31	690874e 5914197n	724339.70	734092.27	• Archaeological monitoring of dredging



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	Notes	A4	Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference Dublin Port	Client RPS/ Dublin Port Company	Title Figure 12.9- Known Archaeological and Industrial Heritage Features within Dublin Port and Harbour.
			Date 18.02.14	Scale As shown	Drawing No. Figure 12.9	Project ABR Project, Dublin Port.	


N
W01136
W01135
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W01137
W01110
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W01138
W01445
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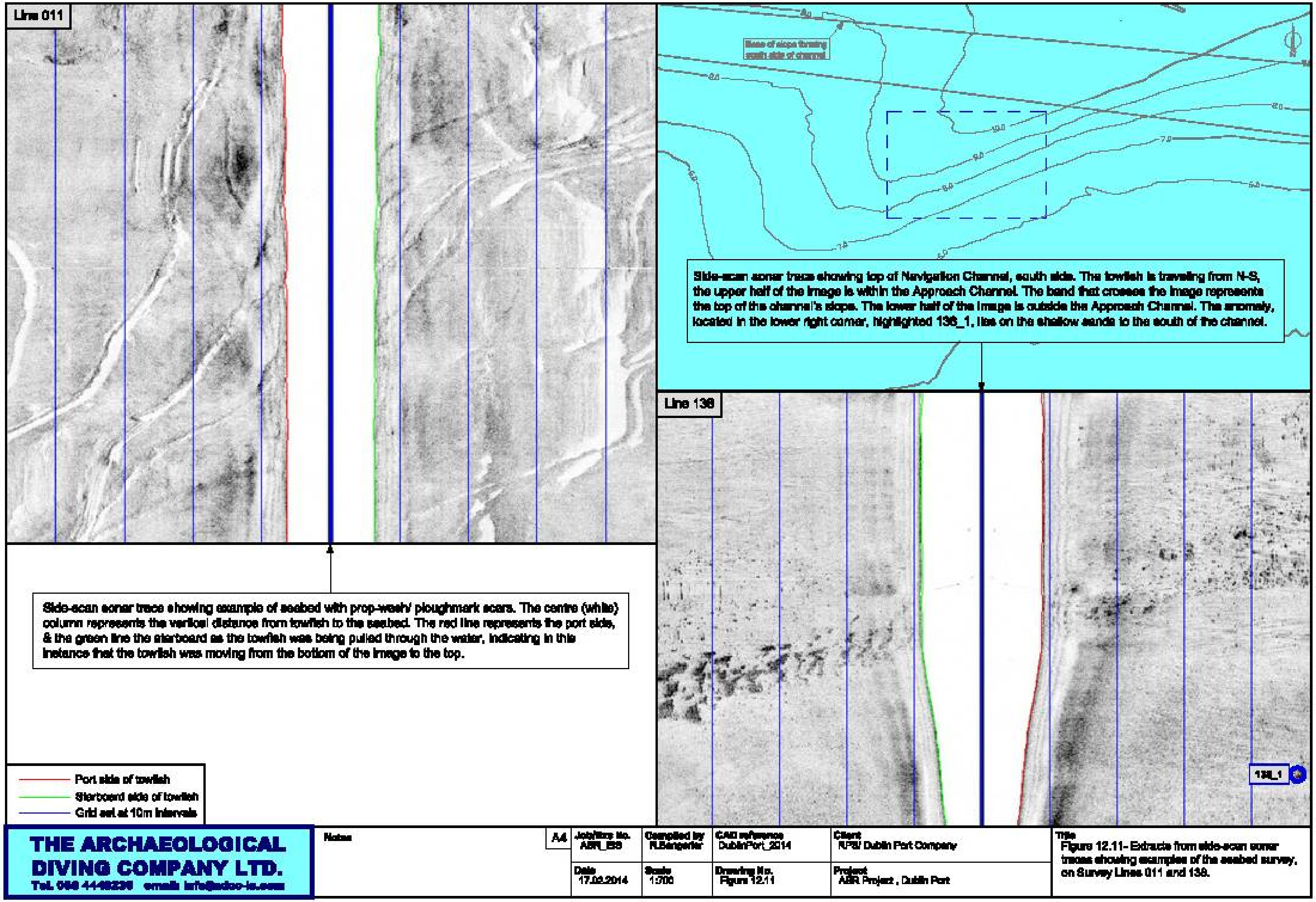
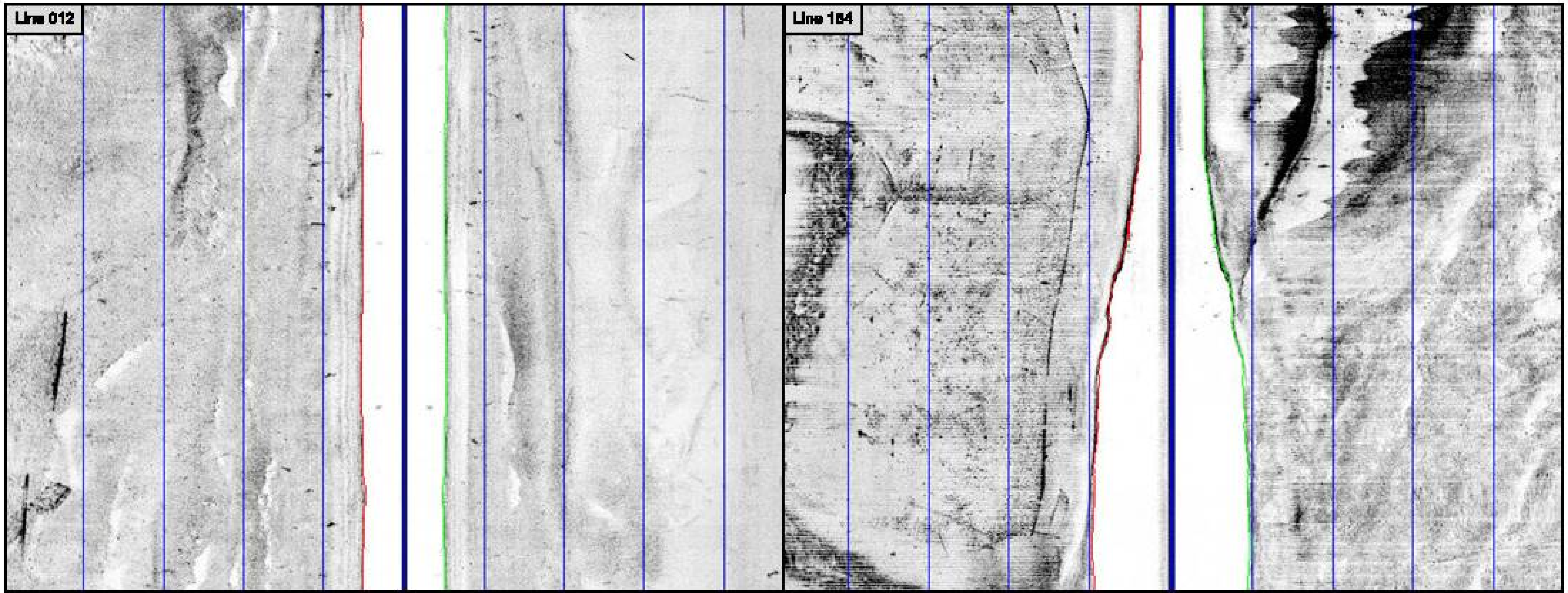
Kilkenny
Kilkenny
Kilkenny
Kilkenny
GSI 159
W18522
Redep
Redep
Redep
DUBLIN HARBOUR
W01554
(GSI 161c)
W01553
(GSI 161b)
W01552
(GSI161a)
W01551
(GSI 160)
GSI 143
W01731
KEY:
Known wreck sites
Extent of Marine Geophysical Survey Grid
Existing Navigation Channel
Extent of proposed dredging
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
Source: shipwrecks listed in the Shipwreck Inventory, UAU, DAHG.
A4
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Date 14.02.14
Scale 1:40,000
Drawing No. Figure 12.10
Project ABR Project, Dublin Port
Title Figure 12.10- Distribution Map of wreck-sites listed in the Shipwreck Inventory for the Dublin Harbour Area.


Line 011
Side-scan sonar trace showing example of seabed with prop-wash/ ploughmark scars. The centre (white) column represents the vertical distance from towfish to the seabed. The red line represents the port side, & the green line the starboard as the towfish was being pulled through the water, indicating in this instance that the towfish was moving from the bottom of the image to the top.
Port side of towfish
Starboard side of towfish
Grid set at 10m intervals
Side-scan sonar trace showing top of Navigation Channel, south side. The towfish is traveling from N-S, the upper half of the image is within the Approach Channel. The band that crosses the image represents the top of the channel's slope. The lower half of the image is outside the Approach Channel. The anomaly, located in the lower right corner, highlighted 136_1, lies on the shallow sands to the south of the channel.
Line 136
136_1
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Notes
A4
Compiled by
CAD reference
DublinPort_2014
Client
RPS/ Dublin Port Company
Date
17.03.2014
Scale
1:700
Drawing No.
Figure 12.11
Project
ABR Project , Dublin Port
Title
Figure 12.11- Extracts from side-scan sonar traces showing examples of the seabed survey, on Survey Lines 011 and 136.

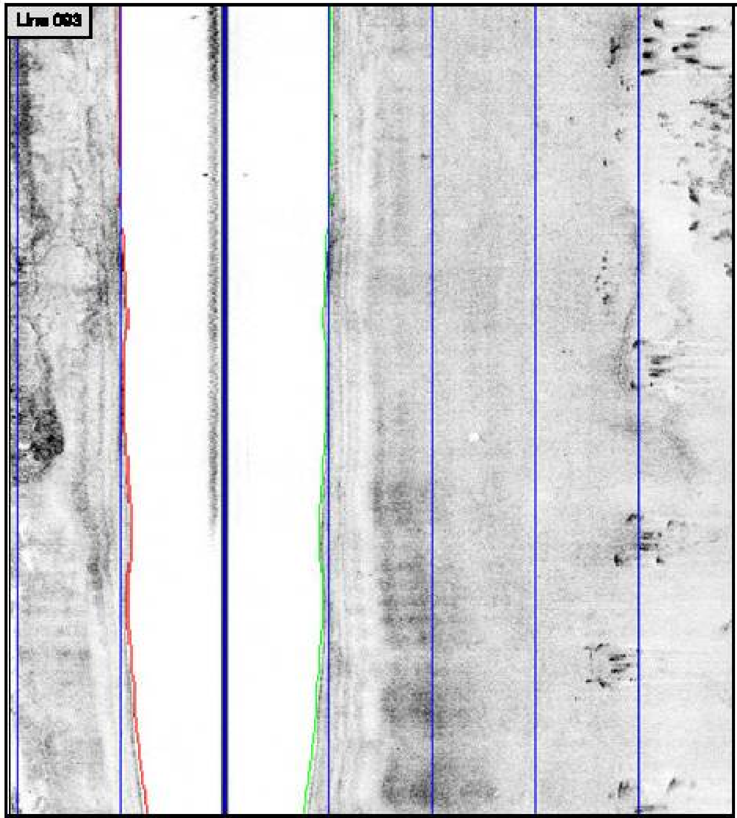


Side-scan sonar trace showing moored cargo ship on port side of the South Quay, which is highlighted by the intermittent strong black lines on the port (left) side of the image. The array of small objects indicate small-piece debris littering the sandy seabed.

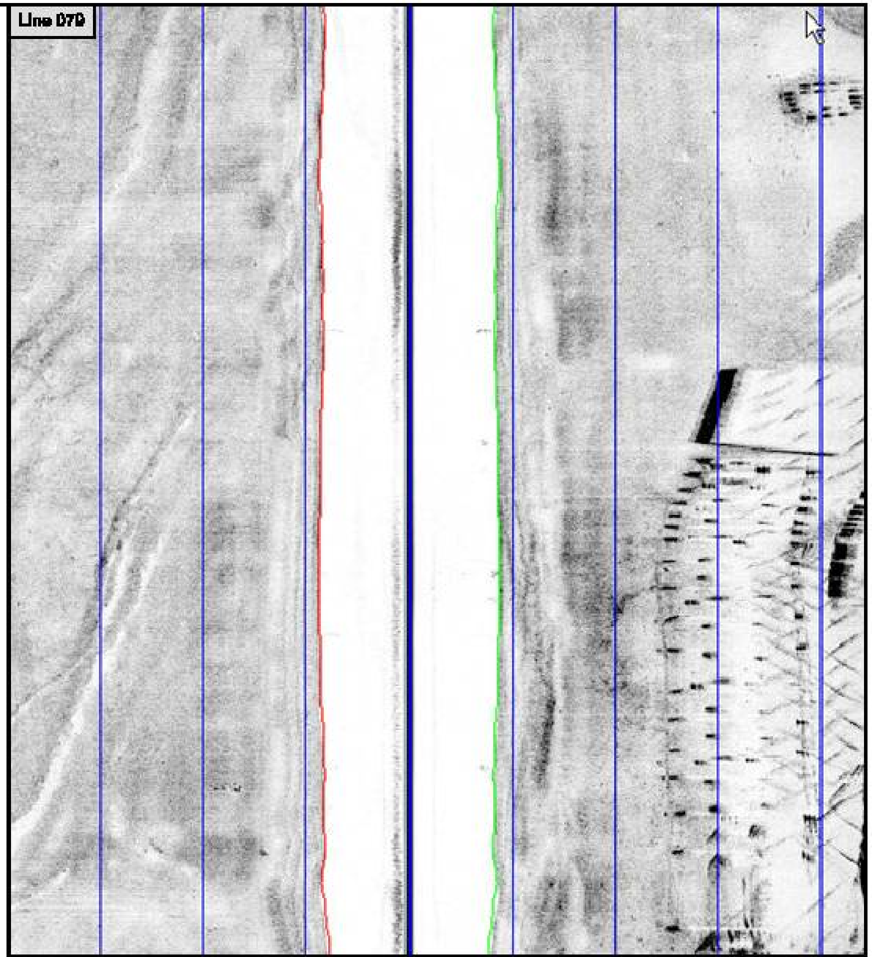
Side-scan sonar trace showing moorings and vessel outlines at Poolbeg Yacht club. The seabed shallows noticeably towards the top of the image, indicating the distinction between the dredged area within the fairway in contrast to that within the marina. Note the stick-like arrangements indicated on the port (left) side of the image. These represent a combination of moored vessels, lying at anchor, and the base of the marina's pontoon jetties. The curvature in the outer line does not reflect any curvature in the pontoon, but rather reflects the fact that the survey vessel turned at this point. The dark 'knobbly' band on the far left of the image represents the base of the Yacht Club's rock-armour protection.

Port side of towfish
Starboard side of towfish
Grid set at 10m intervals

THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4449236 email: info@adco-ie.com	Notes	A4	Job/Site No. ABR_EIS	Compiled by R.Bangerter	CAD reference DublinPort_2014	Client RPS/ Dublin Port Company	Title Figure 12.12- Extracts from side-scan sonar traces showing examples of the seabed survey, on Survey Lines 012 and 154.
			Date 17.02.2014	Scale 1:700	Drawing No. Figure 12.12	Project ABR Project , Dublin Port	



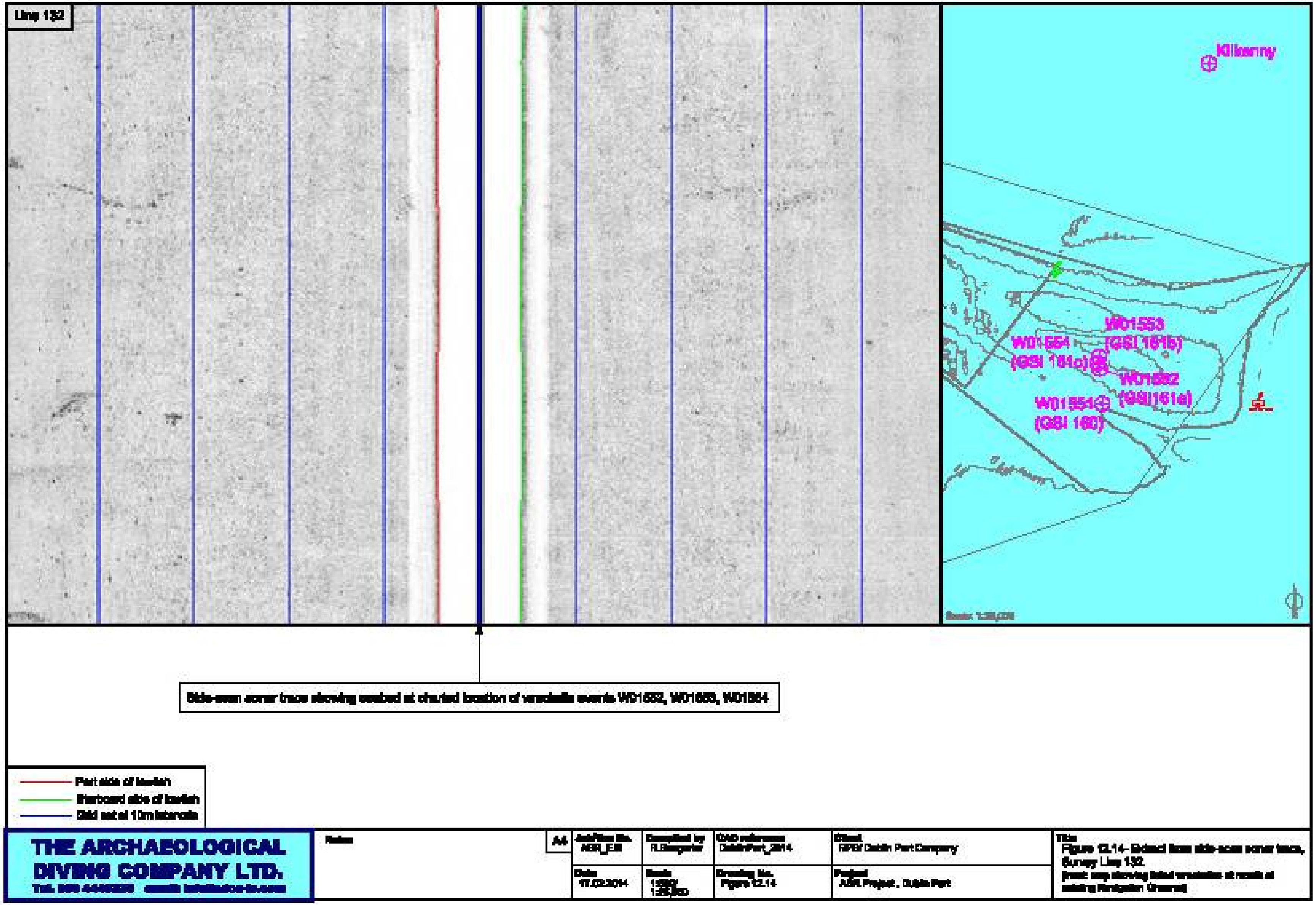
Side-scan sonar trace showing the clustered pile foundations of the dolphin moorings of Berth 52 and the sandy/silty nature of the seabed within the inlet.

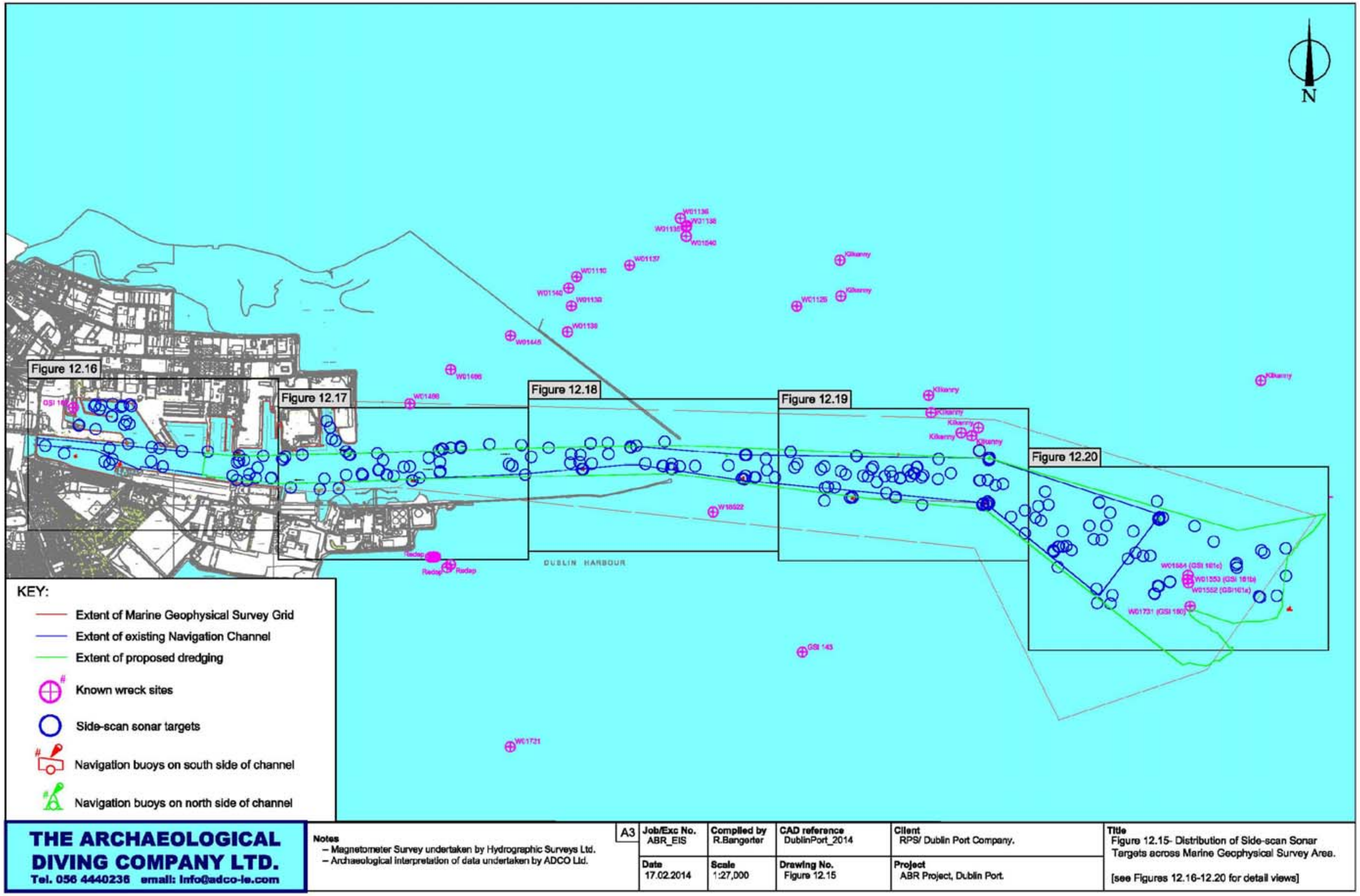


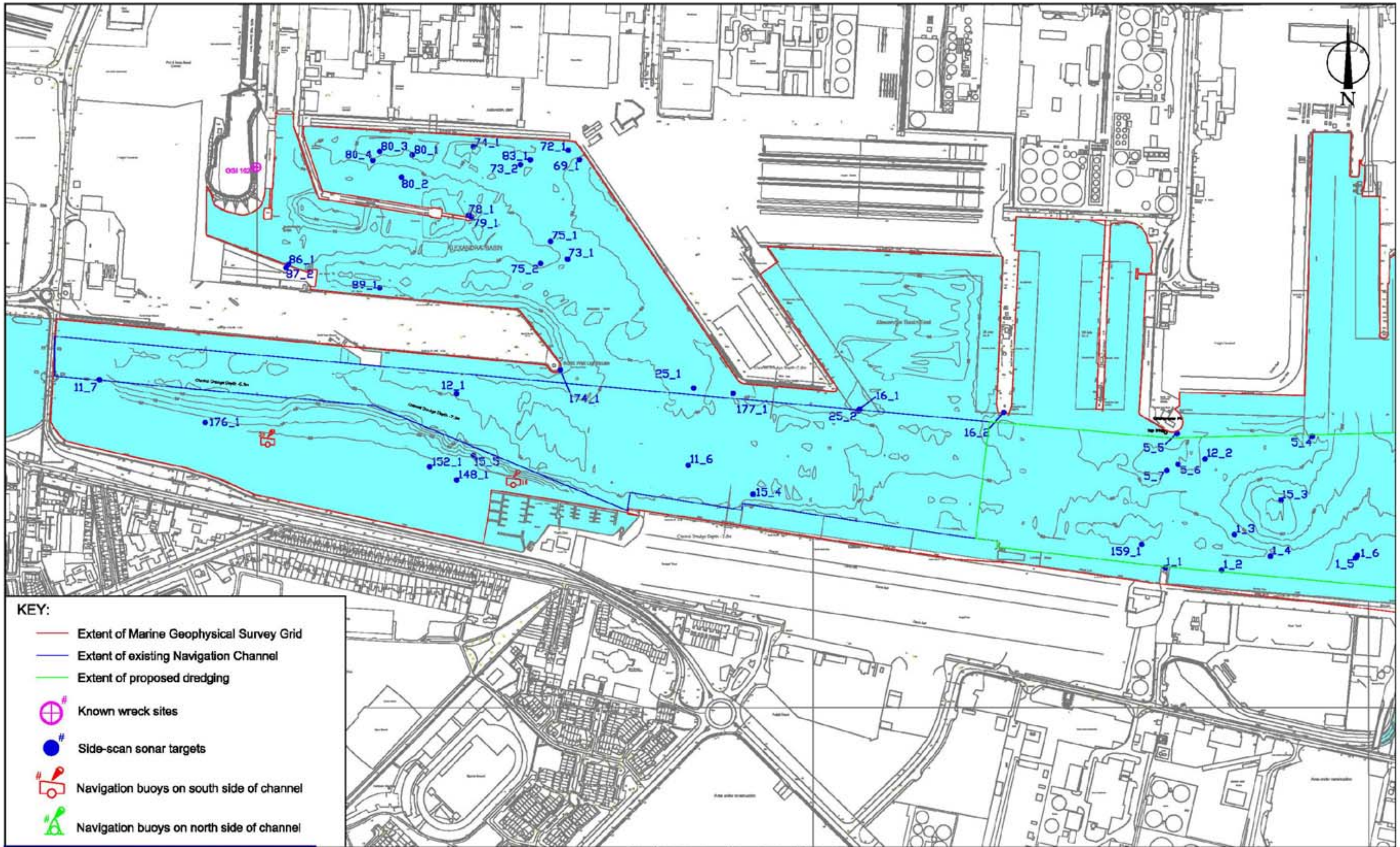
Side-scan sonar trace showing the Bulk Jetty on the bottom of the image, and the Dolphin Pier (anomaly 79_1) at the top of the image, Alexandra Basin West. The curvature in the alignment of the jetty reflects the curvature of the survey vessel. The detail of the individual foundation piles is clear.

Port side of towfish
Starboard side of towfish
Grid set at 10m intervals

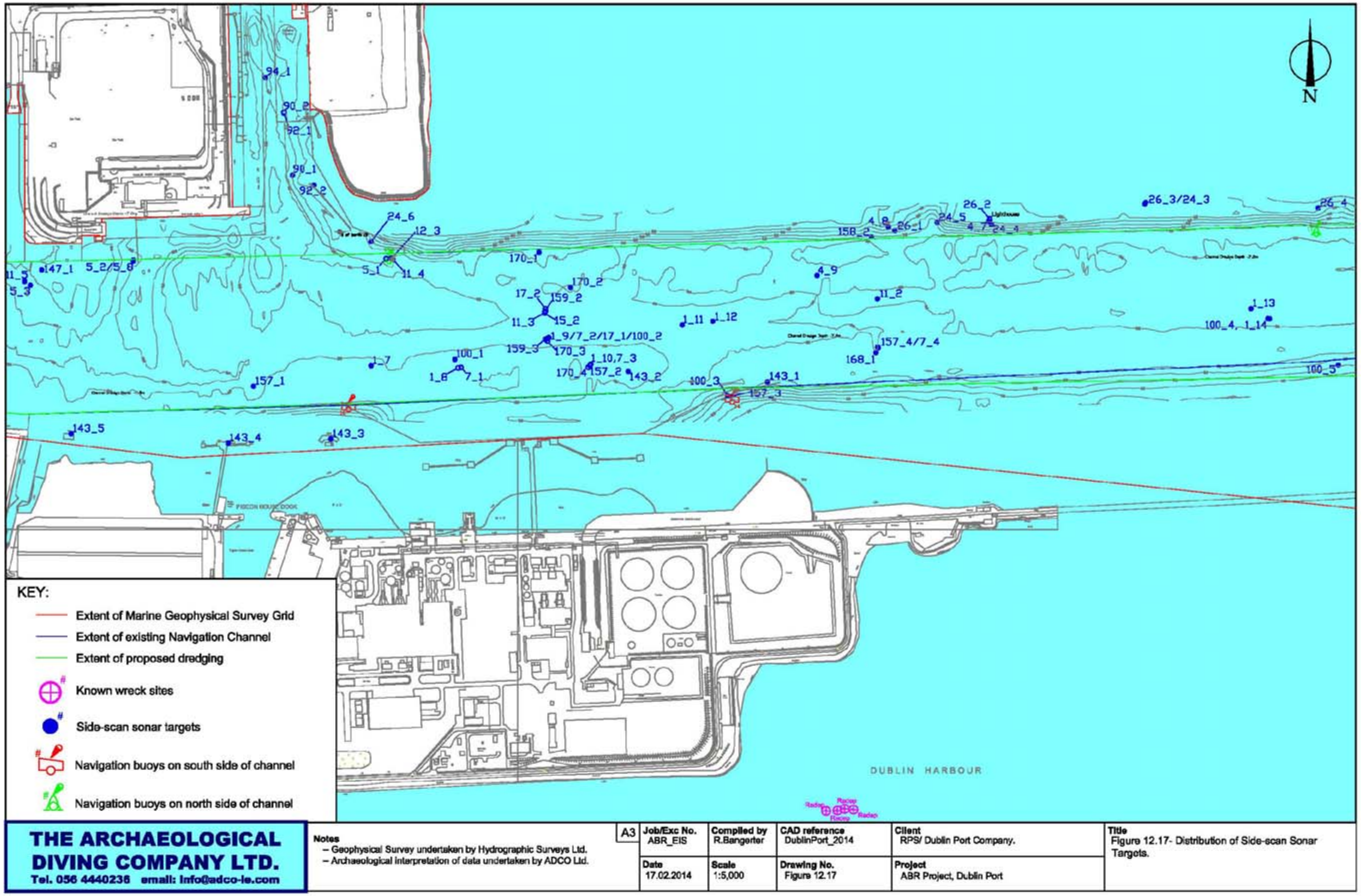
THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 059 4449236 email: info@adco-ie.com	Notes	A4	Job/Site No. ABR_ES	Compiled by R.Bangerter	CAD reference DublinPort_2014	Client RPS/ Dublin Port Company	Title Figure 12.13- Extracts from side-scan sonar traces showing examples of the seabed survey, on Survey Lines 093 and 079.
			Date 17.02.2014	Scale 1:800	Drawing No. Figure 12.13	Project ABR Project , Dublin Port	

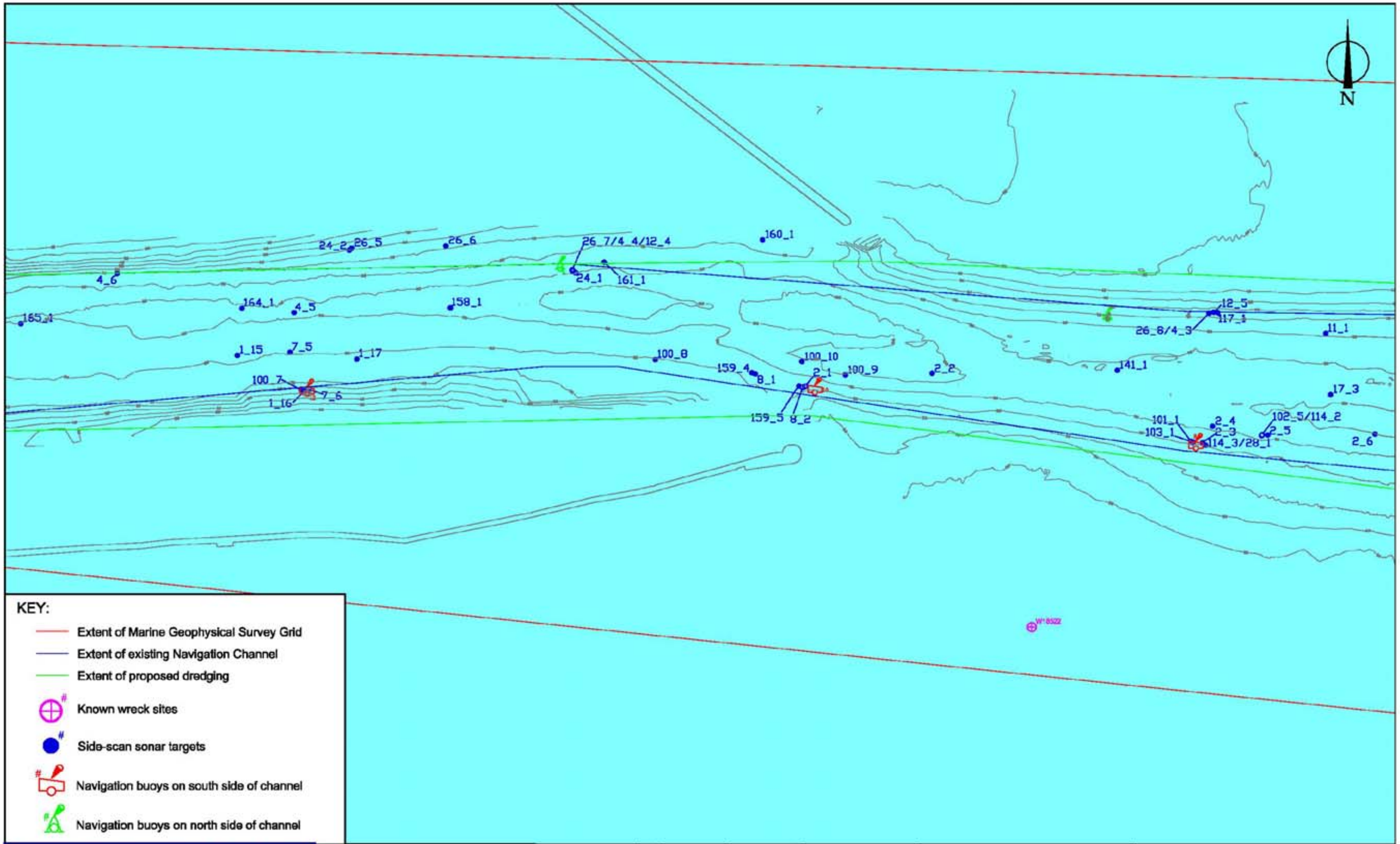

Line 132
Kilkenny
W01553
(GSI 161b)
W01554
(GSI 161c)
W01552
(GSI 161a)
W01551
(GSI 160)
THE ARCHAEOLOGICAL
DIVING COMPANY LTD.
A4


N
Figure 12.16
Figure 12.17
Figure 12.18
Figure 12.19
Figure 12.20
DUBLIN HARBOUR
KEY:
Extent of Marine Geophysical Survey Grid
Extent of existing Navigation Channel
Extent of proposed dredging
Known wreck sites
Side-scan sonar targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company.
Date 17.02.2014
Scale 1:27,000
Drawing No. Figure 12.15
Project ABR Project, Dublin Port.
Title Figure 12.15- Distribution of Side-scan Sonar Targets across Marine Geophysical Survey Area.
[see Figures 12.16-12.20 for detail views]



THE ARCHAEOLOGICAL DIVING COMPANY LTD.	Notes	A3	Job/Exc No.	Compiled by	CAD reference	Client	Title
Tel. 056 4440236 email: info@adco-ie.com	– Geophysical Survey undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd.		ABR_EIS	R.Bangerter	DublinPort_2014	RPS/ Dublin Port Company.	Figure 12.16- Distribution of Side-scan Sonar Targets.
			Date	**Scale**	**Drawing No.**	**Project**	
			17.02.2014	1:5,000	Figure 12.16	ABR Project, Dublin Port	

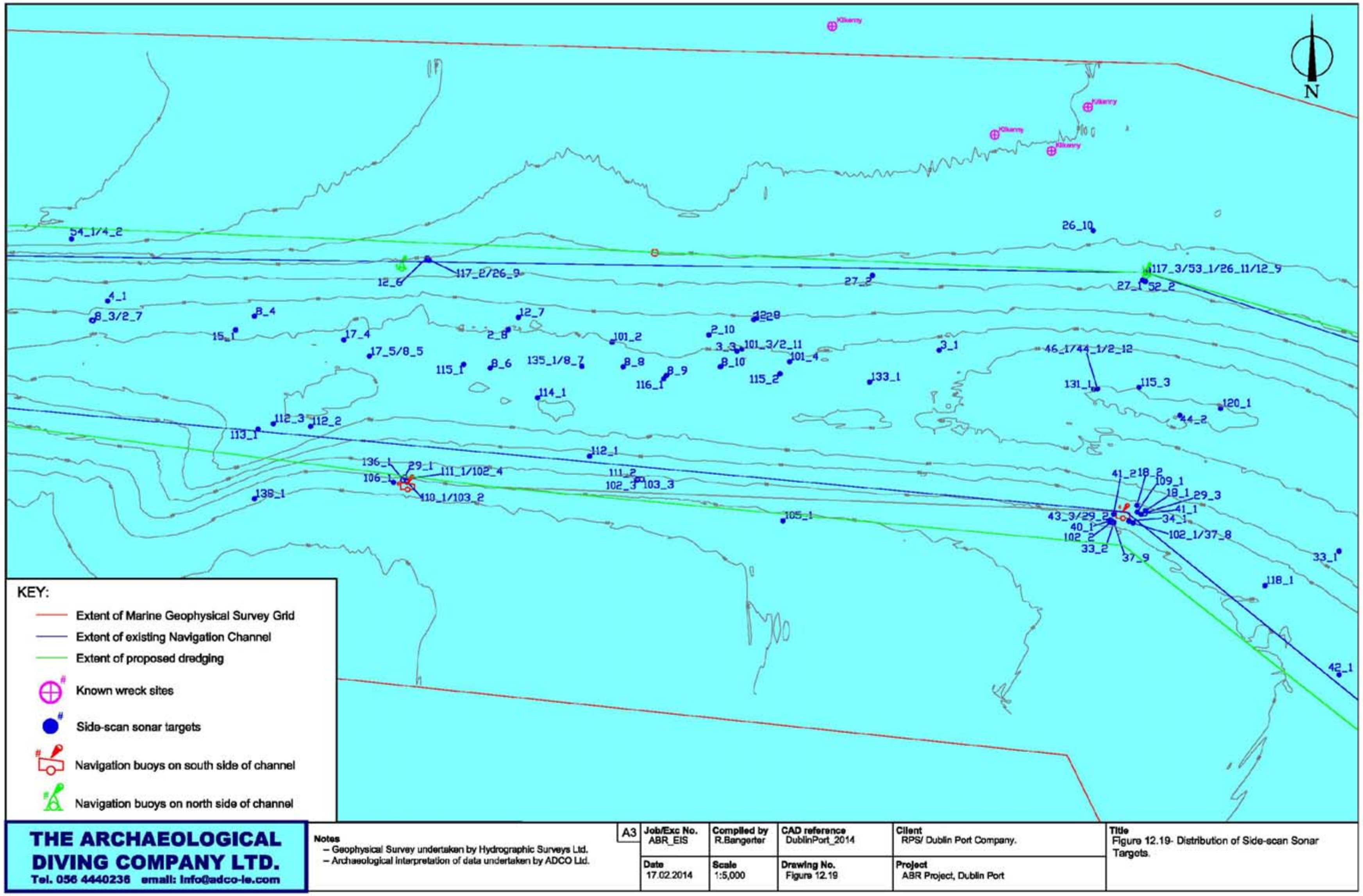

N
DUBLIN HARBOUR
KEY:
Extent of Marine Geophysical Survey Grid
Extent of existing Navigation Channel
Extent of proposed dredging
Known wreck sites
Side-scan sonar targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Geophysical Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company.
Title Figure 12.17- Distribution of Side-scan Sonar Targets.
Date 17.02.2014
Scale 1:5,000
Drawing No. Figure 12.17
Project ABR Project, Dublin Port

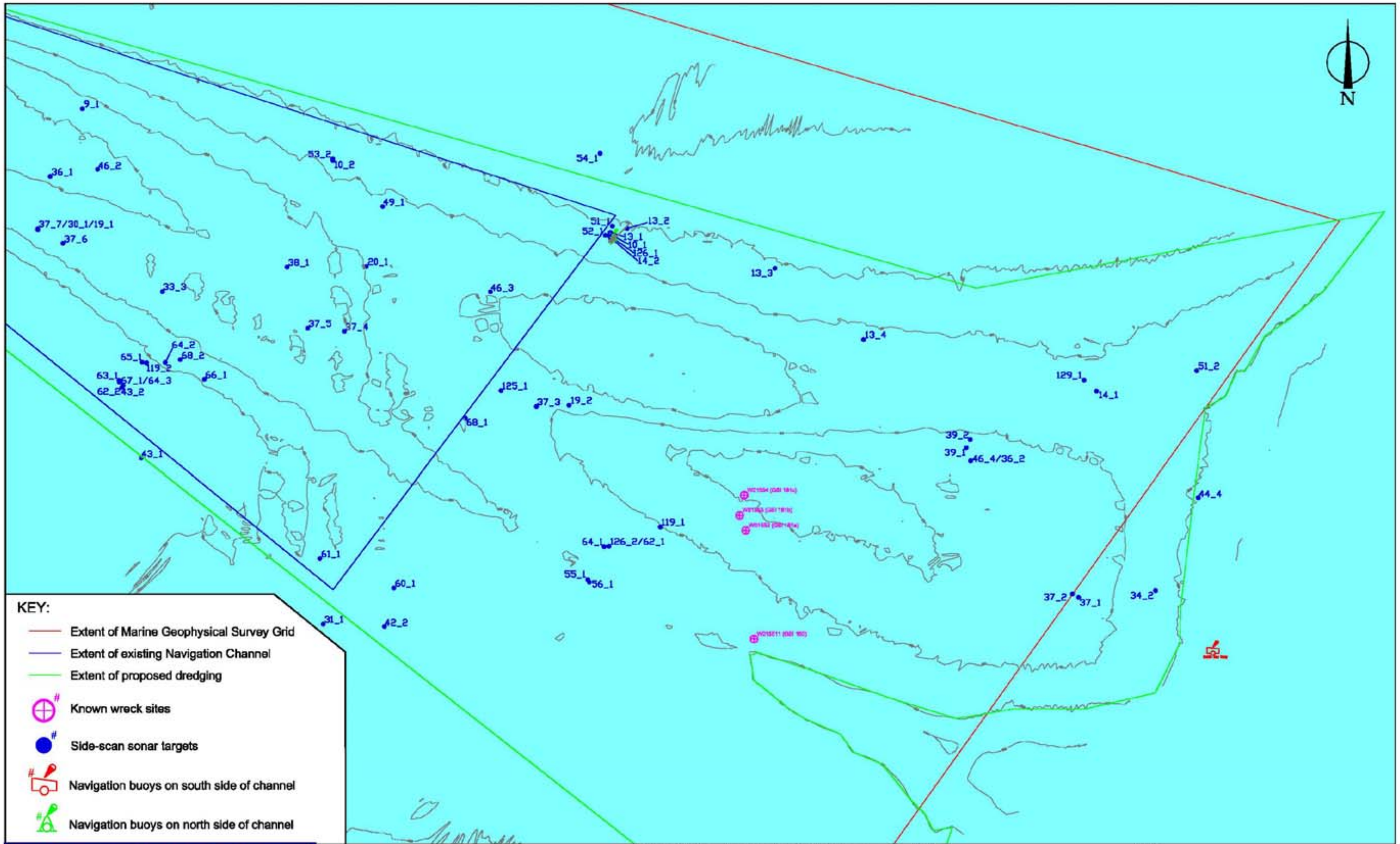


THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com

Notes
– Geophysical Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.

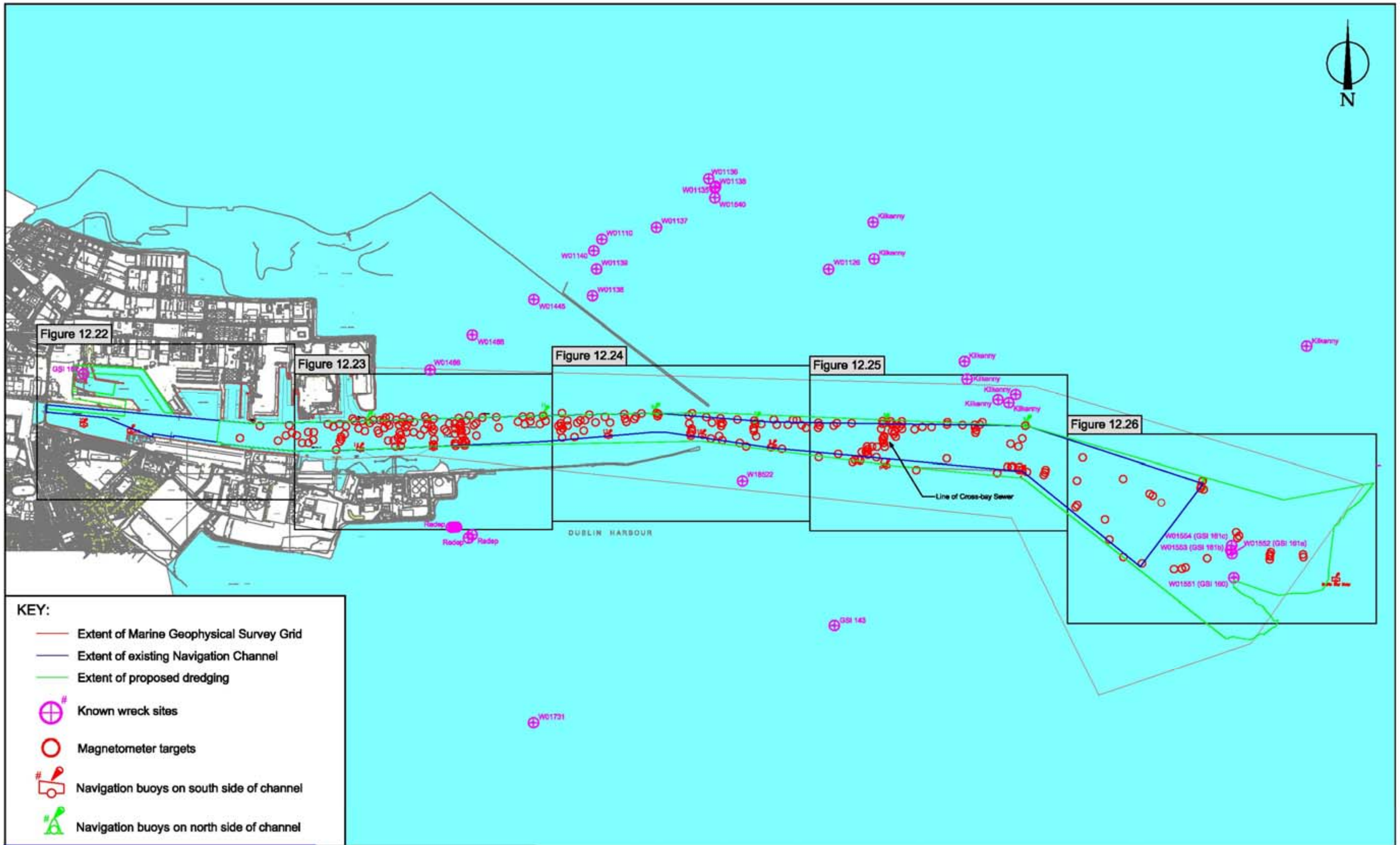
A3				
Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference DublinPort_2014	Client RPS/ Dublin Port Company.	Title Figure 12.18- Distribution of Side-scan Sonar Targets.
Date 17.02.2014	Scale 1:5,000	Drawing No. Figure 12.18	Project ABR Project, Dublin Port	


N
KEY:
Extent of Marine Geophysical Survey Grid
Extent of existing Navigation Channel
Extent of proposed dredging
Known wreck sites
Side-scan sonar targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Geophysical Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company.
Date 17.02.2014
Scale 1:5,000
Drawing No. Figure 12.19
Project ABR Project, Dublin Port
Title Figure 12.19- Distribution of Side-scan Sonar Targets.

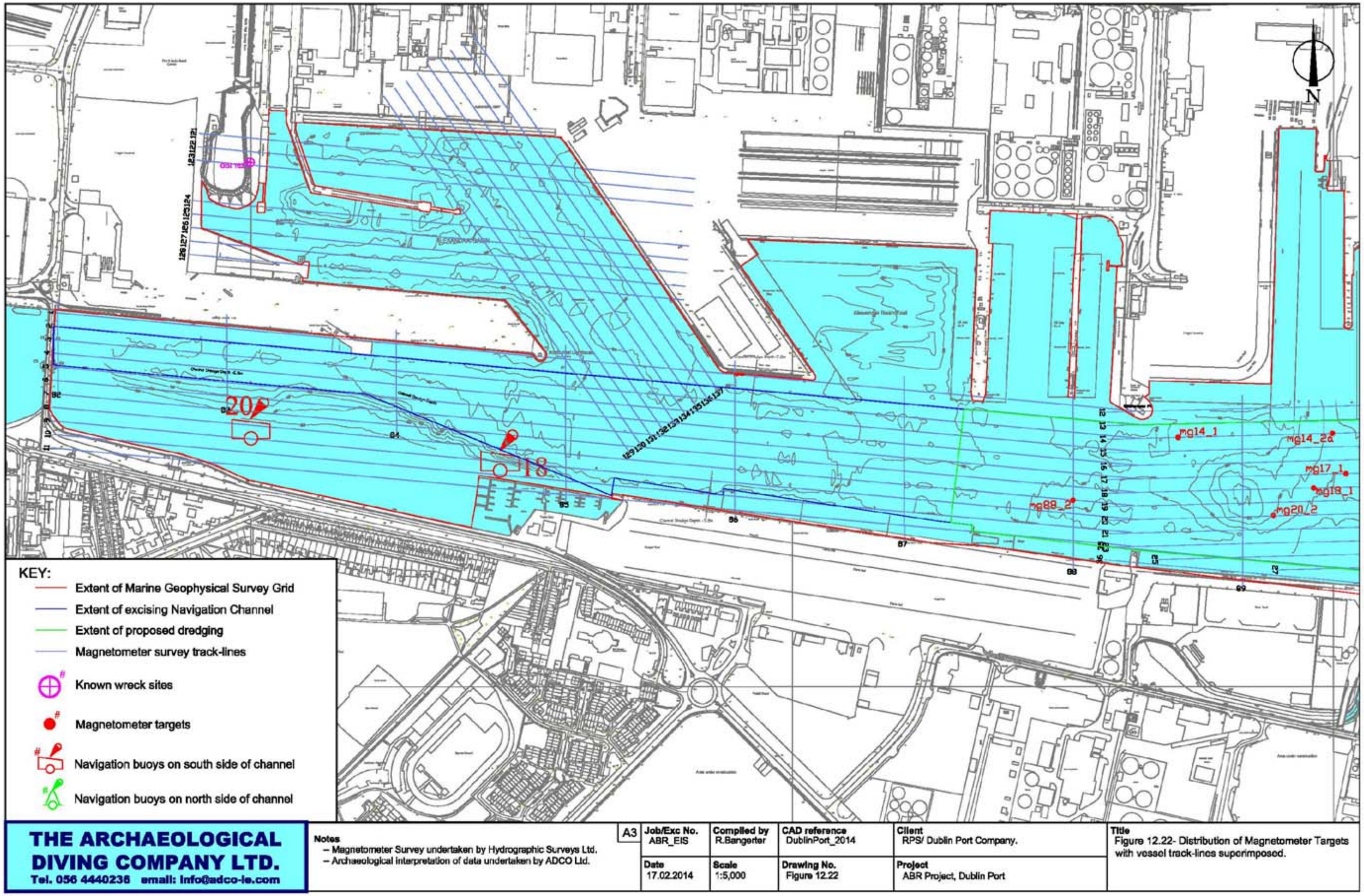


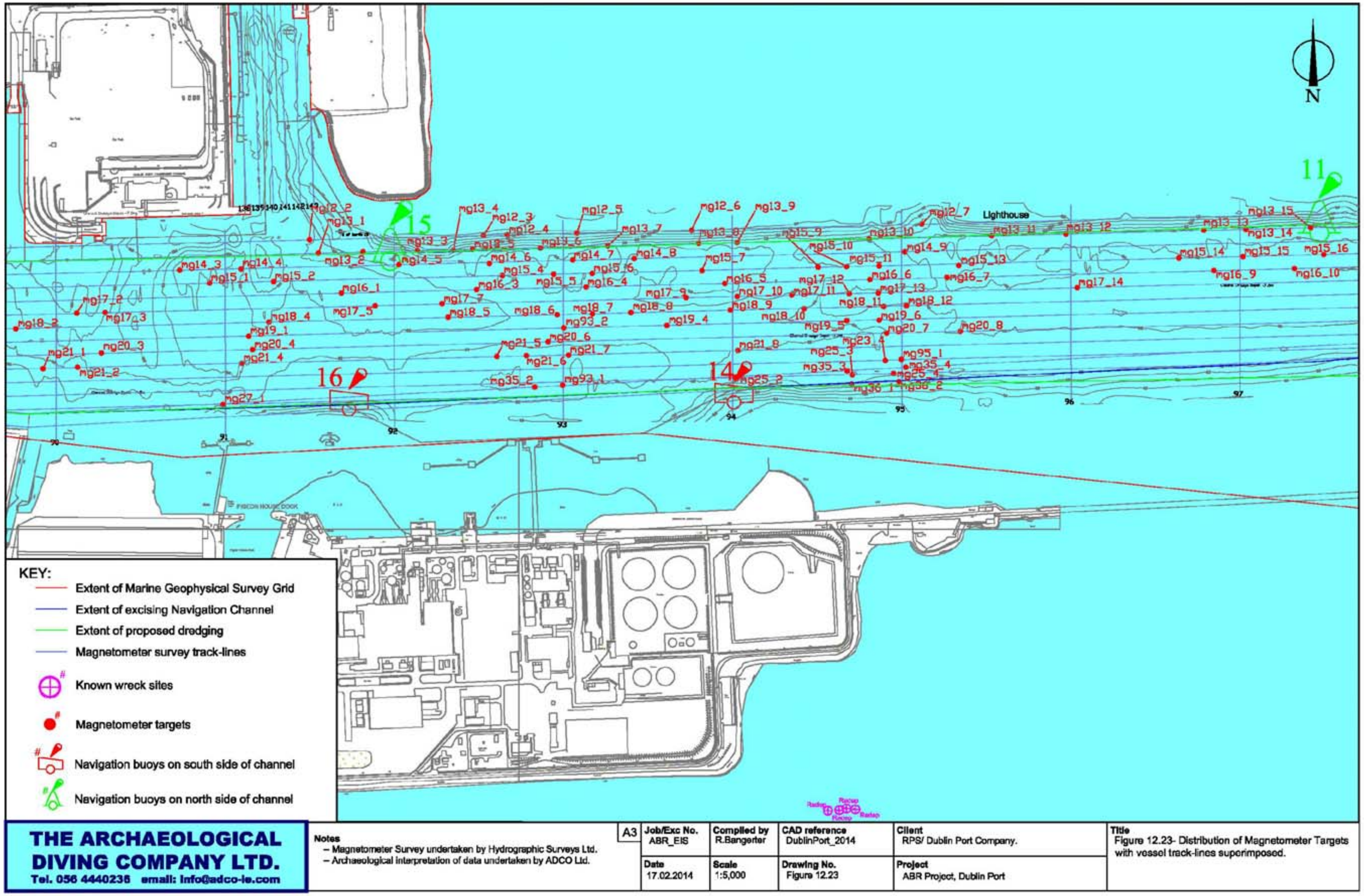
THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** – Geophysical Survey undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd.	A3 **Job/Exc No.** ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company
		Date 17.02.2014	**Scale** 1:6,000	**Drawing No.** Figure 12.20	**Project** ABR Project, Dublin Port

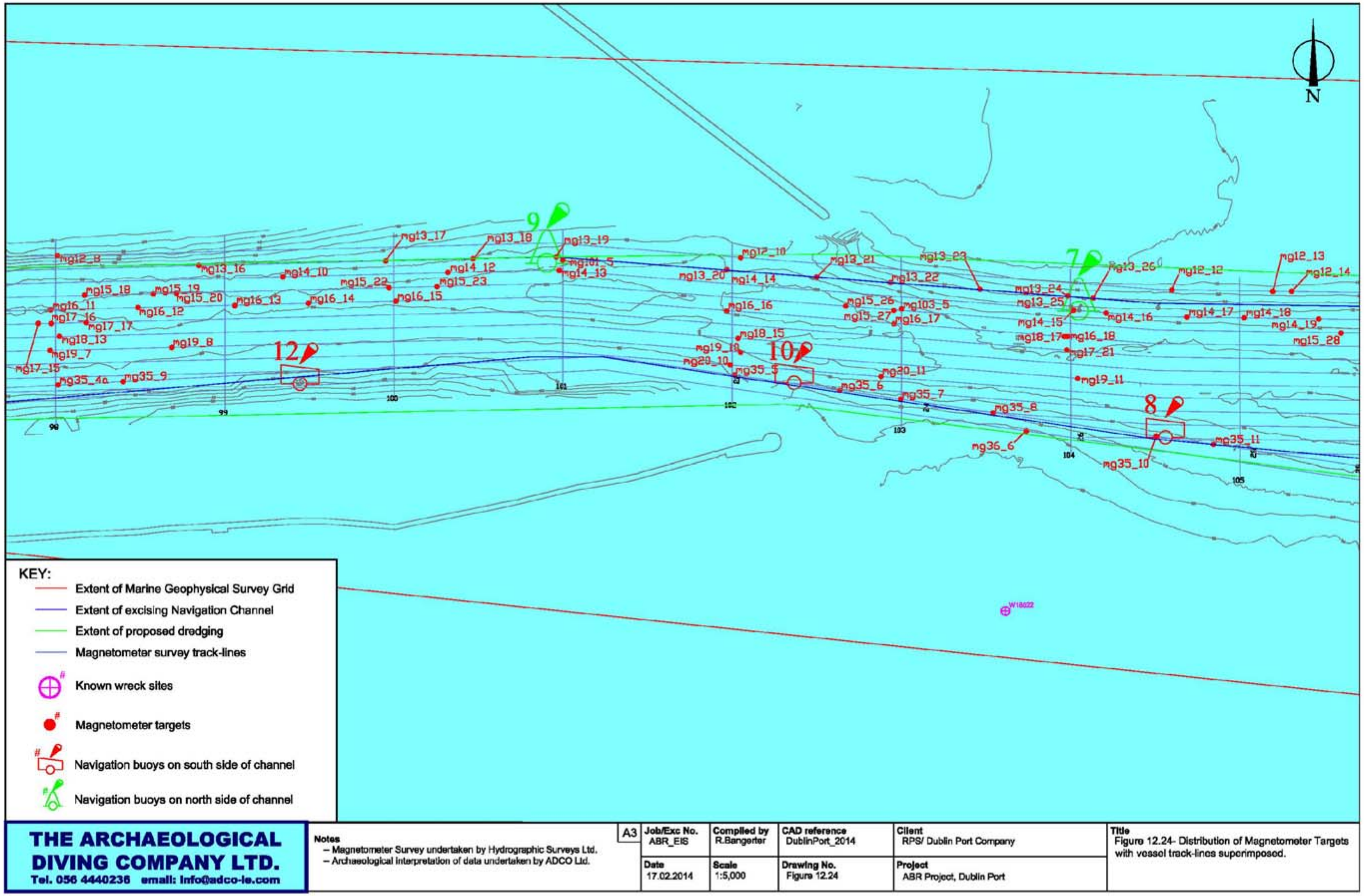
Title Figure 12.20- Distribution of Side-scan Sonar Targets.

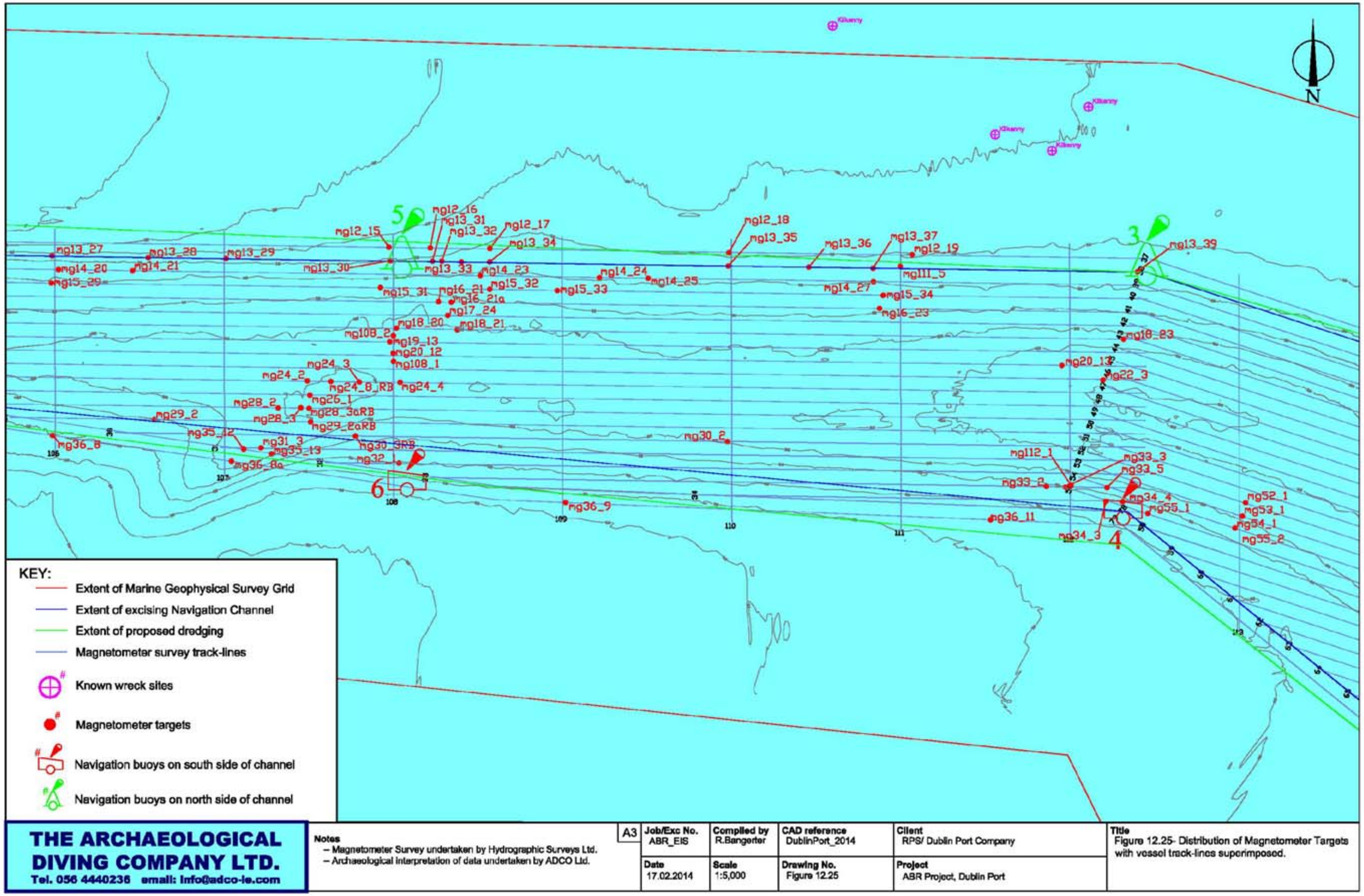


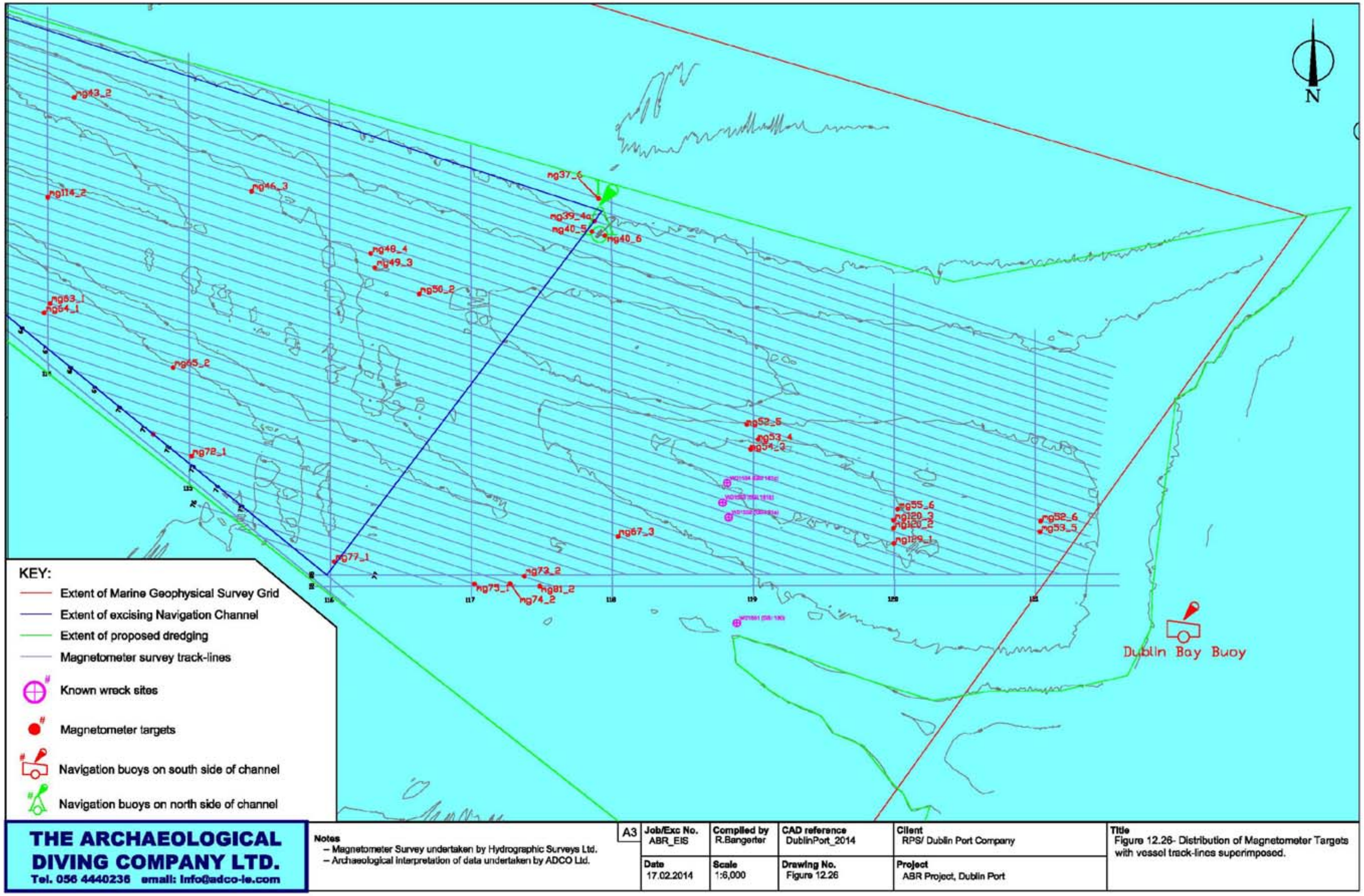
THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** – Geophysical Survey undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd. A3	**Job/Exc No.** ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company.	**Title** Figure 12.21- Distribution of Magnetometer Targets across Marine Geophysical Survey Area.
		Date 17.02.2014	**Scale** 1:27,000	**Drawing No.** Figure 12.21	**Project** ABR Project, Dublin Port	[see Figures 12.22-12.26 for detail views]

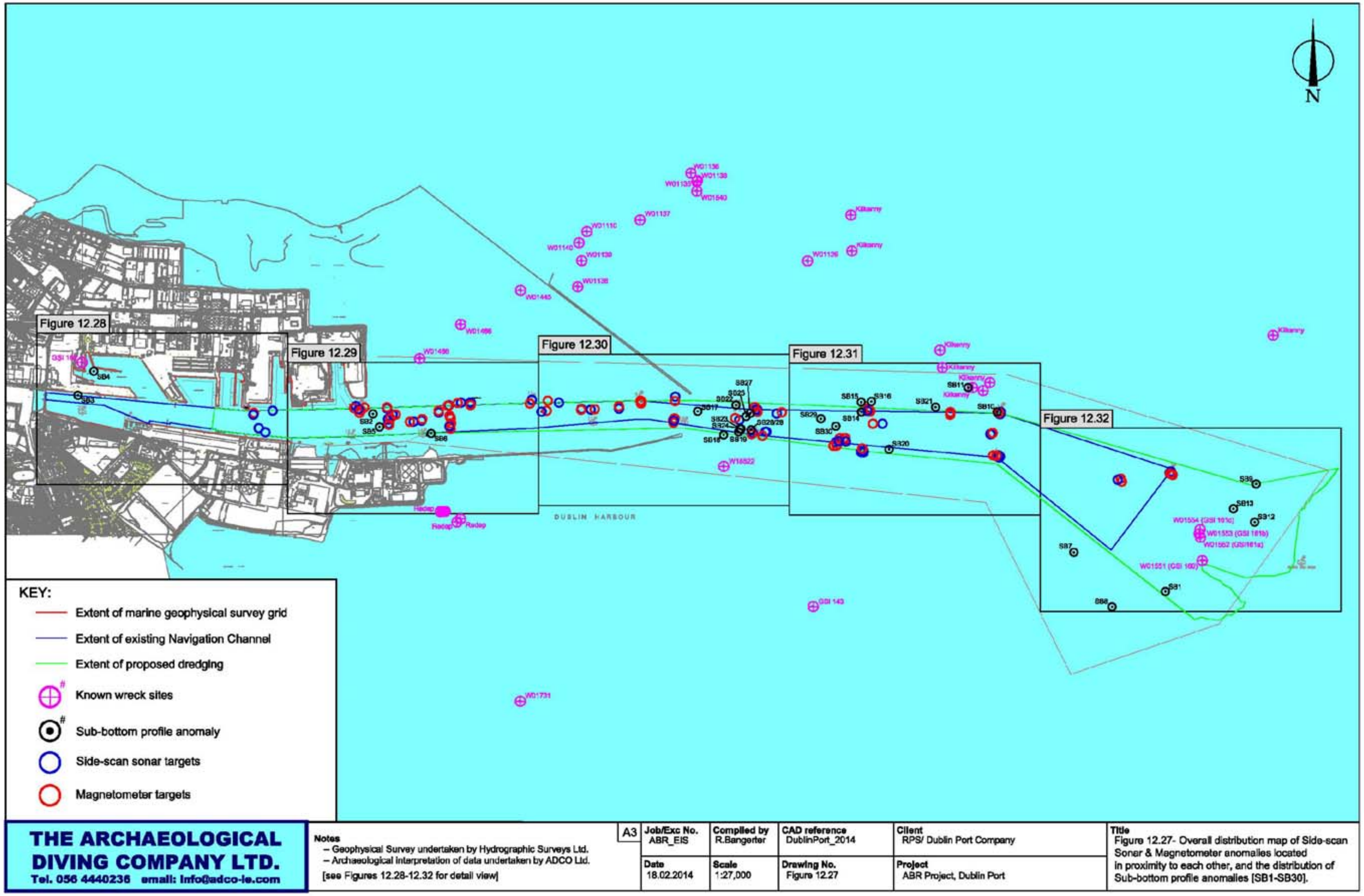

KEY:
Extent of Marine Geophysical Survey Grid
Extent of excising Navigation Channel
Extent of proposed dredging
Magnetometer survey track-lines
Known wreck sites
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
20
18
mg14_1
mg14_2a
mg17_1
mg18_1
mg20_2
mg88_2
N
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company.
Title Figure 12.22- Distribution of Magnetometer Targets with vessel track-lines superimposed.
Date 17.02.2014
Scale 1:5,000
Drawing No. Figure 12.22
Project ABR Project, Dublin Port

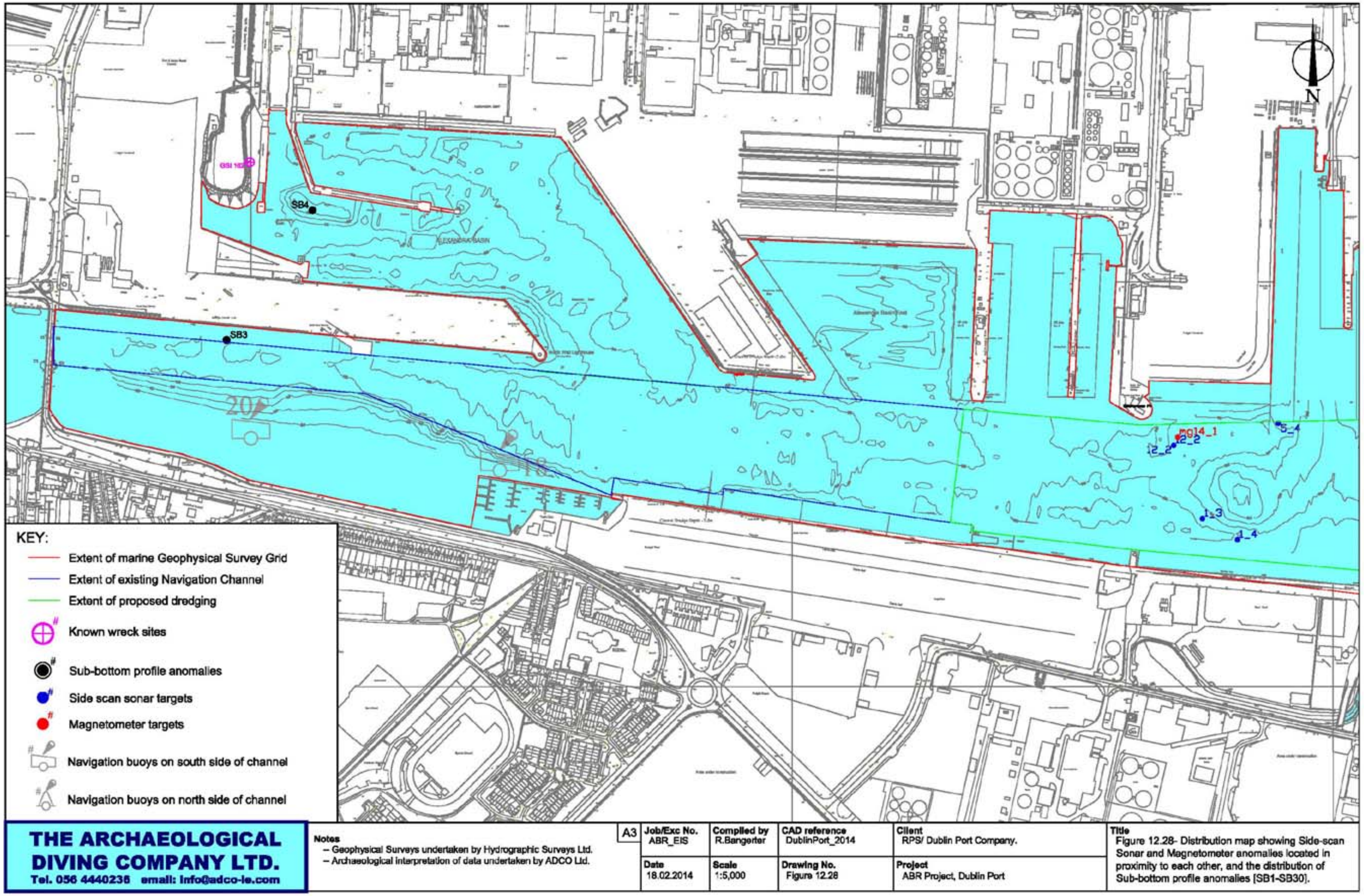

Lighthouse
N
KEY:
Extent of Marine Geophysical Survey Grid
Extent of excising Navigation Channel
Extent of proposed dredging
Magnetometer survey track-lines
Known wreck sites
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company.
Title Figure 12.23- Distribution of Magnetometer Targets with vessel track-lines superimposed.
Date 17.02.2014
Scale 1:5,000
Drawing No. Figure 12.23
Project ABR Project, Dublin Port


N
KEY:
Extent of Marine Geophysical Survey Grid
Extent of excising Navigation Channel
Extent of proposed dredging
Magnetometer survey track-lines
Known wreck sites
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Date 17.02.2014
Scale 1:5,000
Drawing No. Figure 12.24
Project ABR Project, Dublin Port
Title Figure 12.24- Distribution of Magnetometer Targets with vessel track-lines superimposed.

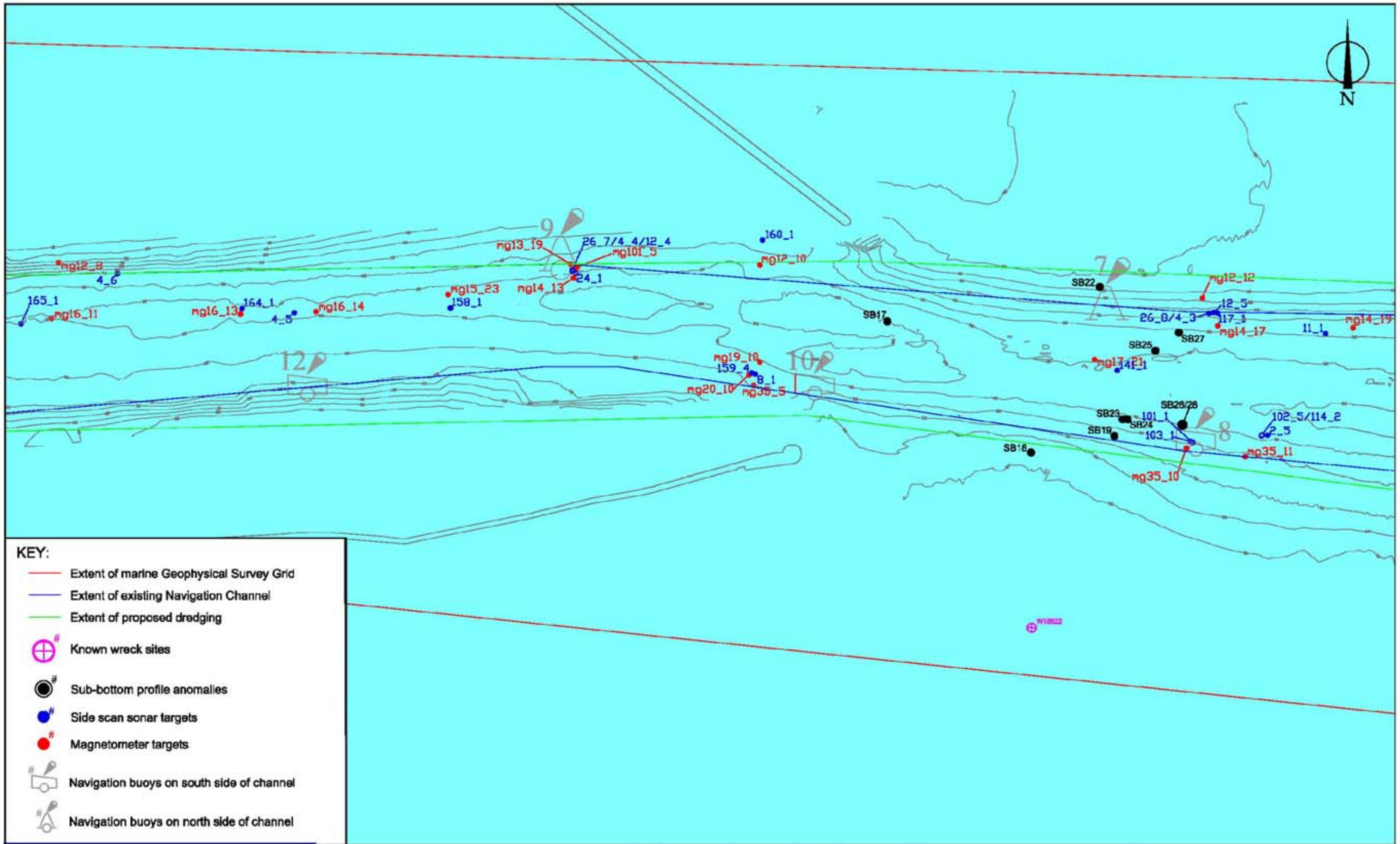

N
KEY:
Extent of Marine Geophysical Survey Grid
Extent of excising Navigation Channel
Extent of proposed dredging
Magnetometer survey track-lines
Known wreck sites
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Title Figure 12.25- Distribution of Magnetometer Targets with vessel track-lines superimposed.
Date 17.02.2014
Scale 1:5,000
Drawing No. Figure 12.25
Project ABR Project, Dublin Port


N
mg43_2
mg114_2
mg46_3
mg37_6
mg39_4a
mg40_5
mg40_6
mg48_4
mg49_3
mg56_2
mg63_1
mg64_1
mg65_2
mg72_1
mg77_1
mg73_2
mg75_1
mg74_2
mg81_2
mg67_3
mg52_5
mg53_4
mg54_3
mg55_6
mg120_3
mg120_2
mg129_1
mg52_6
mg53_5
Dublin Bay Buoy
KEY:
Extent of Marine Geophysical Survey Grid
Extent of excising Navigation Channel
Extent of proposed dredging
Magnetometer survey track-lines
Known wreck sites
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Magnetometer Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Title Figure 12.26- Distribution of Magnetometer Targets with vessel track-lines superimposed.
Date 17.02.2014
Scale 1:6,000
Drawing No. Figure 12.26
Project ABR Project, Dublin Port


N
Figure 12.28
Figure 12.29
Figure 12.30
Figure 12.31
Figure 12.32
DUBLIN HARBOUR
KEY:
Extent of marine geophysical survey grid
Extent of existing Navigation Channel
Extent of proposed dredging
Known wreck sites
Sub-bottom profile anomaly
Side-scan sonar targets
Magnetometer targets
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Geophysical Survey undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
[see Figures 12.28-12.32 for detail view]
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Date 18.02.2014
Scale 1:27,000
Drawing No. Figure 12.27
Project ABR Project, Dublin Port
Title
Figure 12.27- Overall distribution map of Side-scan Sonar & Magnetometer anomalies located in proximity to each other, and the distribution of Sub-bottom profile anomalies [SB1-SB30].


N
SB4
SB3
SB1 YEL
20
18
M014_1
12_2
12_2
5_4
1_3
1_4
KEY:
Extent of marine Geophysical Survey Grid
Extent of existing Navigation Channel
Extent of proposed dredging
Known wreck sites
Sub-bottom profile anomalies
Side scan sonar targets
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440238 email: info@adco-ie.com
Notes
– Geophysical Surveys undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company.
Date 18.02.2014
Scale 1:5,000
Drawing No. Figure 12.28
Project ABR Project, Dublin Port
Title Figure 12.28- Distribution map showing Side-scan Sonar and Magnetometer anomalies located in proximity to each other, and the distribution of Sub-bottom profile anomalies [SB1-SB30].

THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	Notes – Geophysical Surveys undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd.	A3	Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference DublinPort_2014	Client RPS/ Dublin Port Company	Title Figure 12.29- Distribution map showing Side-scan Sonar and Magnetometer anomalies located in proximity to each other, and the distribution of Sub-bottom profile anomalies [SB1-SB30].
			Date 18.02.2014	Scale 1:5,000	Drawing No. Figure 12.29	Project ABR Project, Dublin Port	



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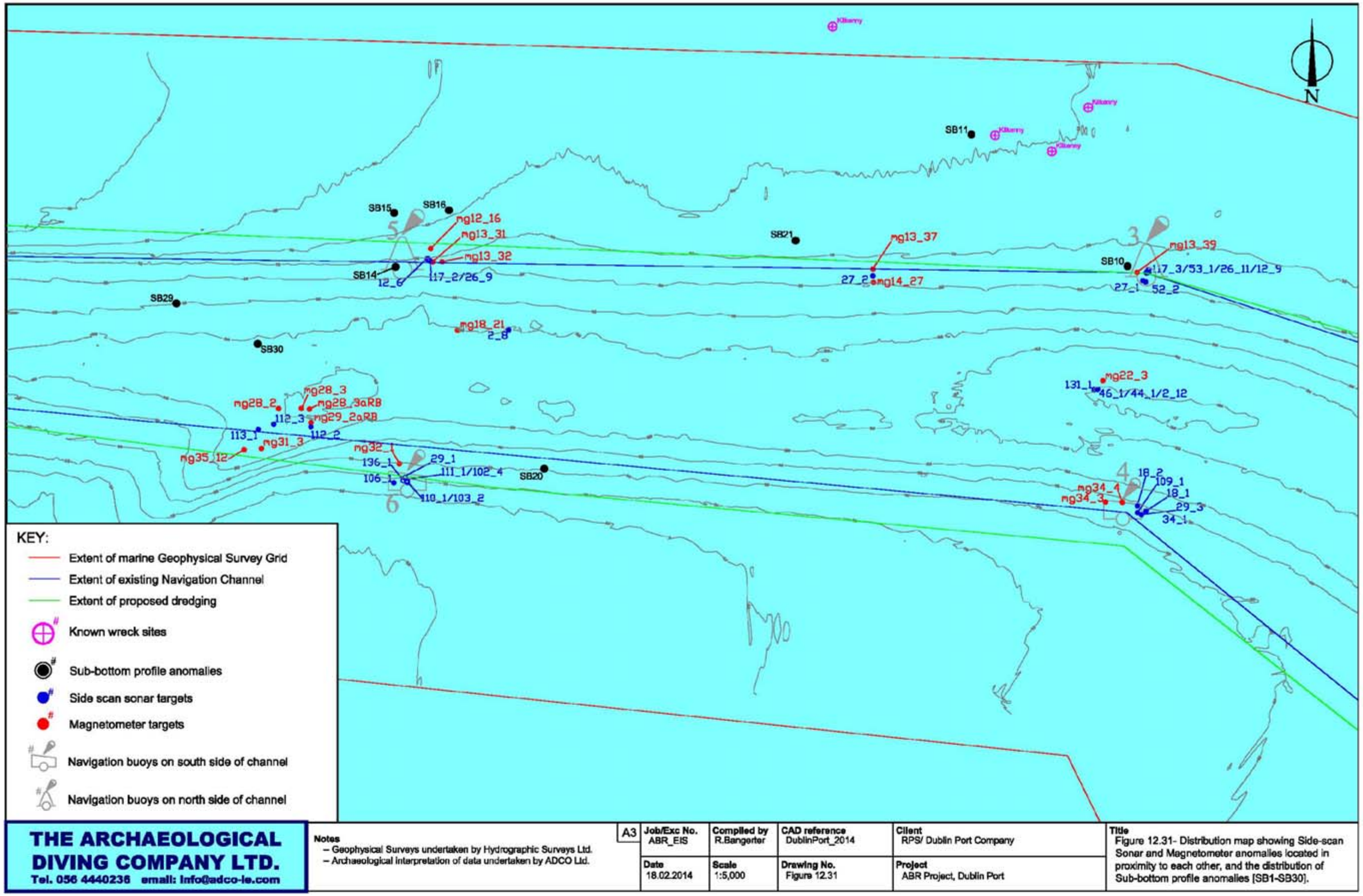
Tel. 056 4440236 email: info@adco-ie.com

Notes
– Geophysical Surveys undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.

A3	Job/Exc No. ABR_EIS	Compiled by R.Bangerter	CAD reference DublinPort_2014	Client RPS/ Dublin Port Company	Title Figure 12.30- Distribution map showing Side-scan Sonar and Magnetometer anomalies located in proximity to each other, and the distribution of Sub-bottom profile anomalies [SB1-SB30].
	Date 18.02.2014	Scale 1:5,000	Drawing No. Figure 12.30	Project ABR Project, Dublin Port	


N
SB10
SB11
SB14
SB15
SB16
SB20
SB21
SB29
SB30
mg12_16
mg13_31
mg13_32
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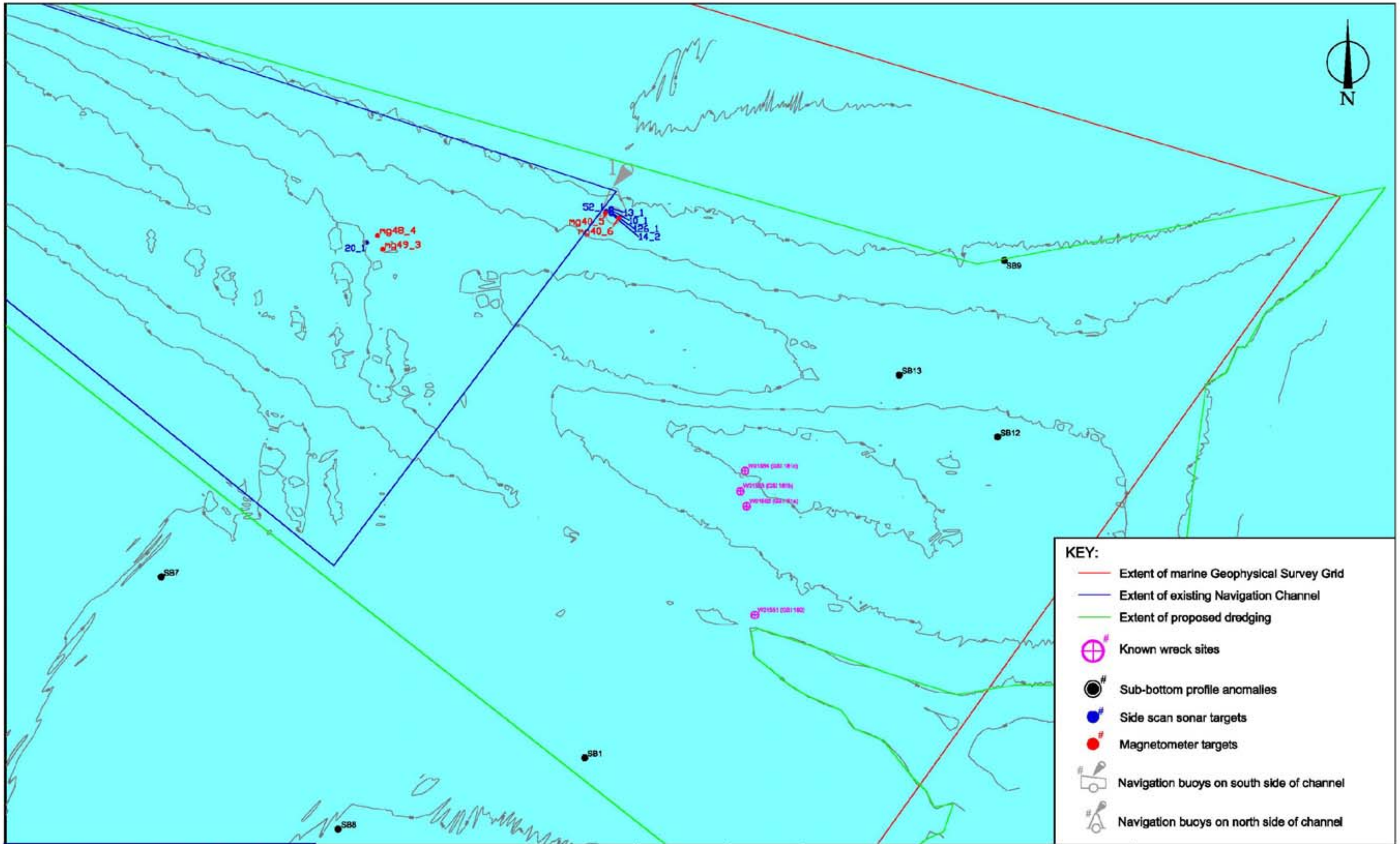
mg13_39
mg14_27
mg18_21
mg22_3
mg28_2
mg28_3
mg28_3aRB
mg29_2aRB
mg31_3
mg32_1
mg34_3
mg34_4
mg35_12
12_6
17_2/26_9
27_2
17_3/53_1/26_11/12_9
27_1
52_2
2_8
131_1
46_1/44_1/2_12
112_3
113_1
112_2
136_1
29_1
111_1/102_4
106_1
110_1/103_2
18_2
109_1
18_1
29_3
34_1
KEY:
Extent of marine Geophysical Survey Grid
Extent of existing Navigation Channel
Extent of proposed dredging
Known wreck sites
Sub-bottom profile anomalies
Side scan sonar targets
Magnetometer targets
Navigation buoys on south side of channel
Navigation buoys on north side of channel
THE ARCHAEOLOGICAL DIVING COMPANY LTD.
Tel. 056 4440236 email: info@adco-ie.com
Notes
– Geophysical Surveys undertaken by Hydrographic Surveys Ltd.
– Archaeological interpretation of data undertaken by ADCO Ltd.
A3
Job/Exc No. ABR_EIS
Compiled by R.Bangerter
CAD reference DublinPort_2014
Client RPS/ Dublin Port Company
Date 18.02.2014
Scale 1:5,000
Drawing No. Figure 12.31
Project ABR Project, Dublin Port
Title
Figure 12.31- Distribution map showing Side-scan Sonar and Magnetometer anomalies located in proximity to each other, and the distribution of Sub-bottom profile anomalies [SB1-SB30].



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** – Geophysical Surveys undertaken by Hydrographic Surveys Ltd. – Archaeological interpretation of data undertaken by ADCO Ltd.	A3 **Job/Exc No.** ABR_EIS	**Compiled by** R.Bangerter	**CAD reference** DublinPort_2014	**Client** RPS/ Dublin Port Company	**Title** Figure 12.32- Distribution map showing Side-scan Sonar and Magnetometer anomalies located in proximity to each other, and the distribution of Sub-bottom profile anomalies [SB1-SB30].
		Date 18.02.2014	**Scale** 1:6,000	**Drawing No.** Figure 12.32	**Project** ABR Project, Dublin Port	

Appendix 12.5: Log of dive inspections conducted to assess the nature of the seabed and seabed anomalies for the Port of Dublin's ABR project.

Dive work was carried out on 26-29/11/2013 and 18/12/2013. The dive platform was the *Poolbeg*, provided and skippered by DPC personnel. The dive work was performed using Surface Supplied Diving Equipment, and all divers are certified commercial divers HSE Part III or higher, with in-date commercial diver medicals. The dive team included: Rex Bangerter, Niall Brady, Jimmy Lenehan and Fergal Morrissey. Sandra Henry assisted as diver tender.

Sea and weather conditions were good on 26-28/11, fair on 29/11, and poor on 18/11. The dive sites were selected to represent a sample of sites across the project area, and include locations within Alexandra Basin West, the approach channel at Poolbeg Marina, and locations eastwards to the furthest reaches of the survey area. Locations included the base of the approach channel and its side slopes, and include vessel turning areas along the channel, and particular berths such as the Stena Line terminal.

To relocate accurately on target locations, a Topcon DGPS GMS-2 handheld receiver was employed, supported by the *Poolbeg's* onboard GPS array. The dive location would be located, and a marker buoy dropped onto the location attached to a weighted base. The positioning system proved to be very accurate. The diver would descend the downline and conduct circular searches to locate the target and assess the wider seabed context. Circular searches would extend up to 15m radius from the downline. The diver would make a verbal report topside, where the data would be written down. The diver would take photographs where possible, and would conduct metal-detector searches. On completion of the dive, the surface marker buoy and weight would be retrieved to the support vessel. An inflatable boat was also used to assist when necessary.

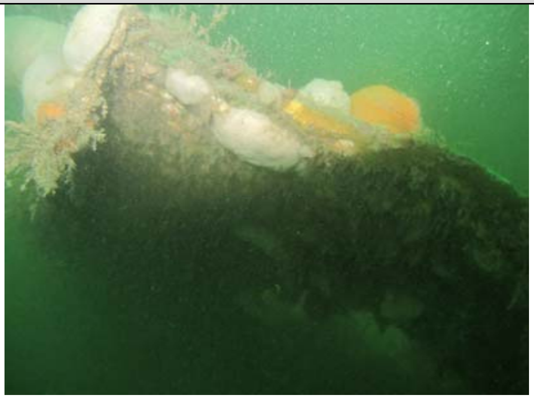
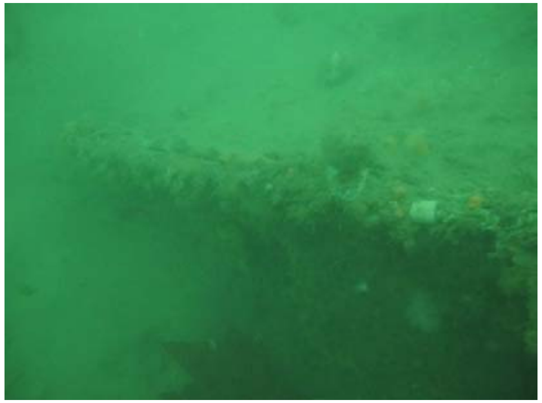
The working day ran from 08:30 hrs to 16:30 hrs and was subject to ship movements and Port activities.

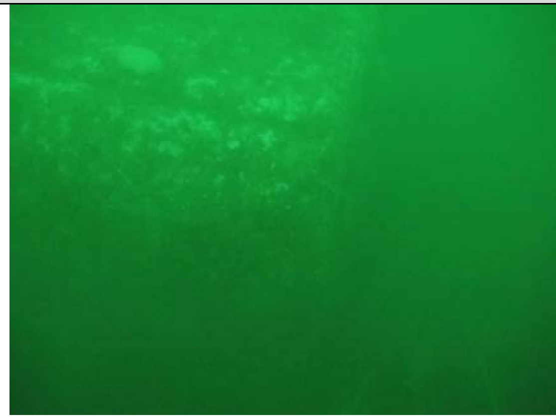
Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
01	25.11.13	177_1	R.B.	LS: 13:50 AS: 13:55	11m	Large Tractor Tyre, re-used as fender, located 60cm from SMB weight. Object lying at 30º angle on seabed. Scouring present on the side of target.	No image
02	25.11.13	25_1	R.B.	LS: 14:17 AS: 14:25	11.5m	No object encountered at target location. Seabed composed of silty-sand with penetration depth of 30cm. Navigation channel located 5m to north of SMB weight. Side of channel almost vertical, 80º slope, measuring 5-6m in height. Slope composed of compact clay.	No image
03	25.11.13	15_1	R.B.	LS: 14:40 AS: 14:47	9.5m	No object encountered at target location. Seabed flat and featureless; composed of a soft silty-clay with 80cm penetration. Deposit of fine silt, 5cm depth, overlying the seabed at this location. Seabed changes to silty-sand, 5m from SMB weight, and occasional patches of seaweed are present.	

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
04	25.11.13	152_1	R.B.	LS: 15:19 AS: 15:39	8m	Large Mooring Block located 2m west of SMB weight. Seabed composed of silty-clay of medium compaction.	No image
05	26.11.13	89_1	N.B.	LS: 10:05 AS: 10:11	9m	Length of double banded cable-rope, 6cm thickness, with 3m long x 50cm deep scour hole along one side.	No image
06	26.11.13	75_2	N.B.	LS: 10:28 AS: 10:35	9m	Modern Iron object measuring 1m in length x 20cm in width x 10cm in thickness. Located 1.5m from SMB weight. Seabed composed of silty-clay with occasional small, sub-rounded, stones.	No image
07	26.11.13	73_1	N.B.	LS: 10:41 AS: 10:49	9m	No object encountered at target location. Seabed composed of silty-clay with 0.30m penetration depth.	No image
08	26.11.13	1_9	R.B.	LS: 12:40 AS: 12:48	8m	The side-scan sonar image suggested a substantial rectangular target in this location, and the potential was reinforced by the fact that the anomaly was identified on several corresponding data traces. However, no target was identified when inspected. The seabed is a hard gravel bed in this location, and it appears that this is what the sonar trace has imaged.	No image.
09	26.11.13	170_1	R.B.	LS: 13:01	13m	Car tyre located 1m from SMB weight. Tyre lining within a large scour hole measuring 1.8m in	No image

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
				AS: 13:14		diameter with a slope of 45º.	
10	26.11.13	100_2	R.B.	LS: 13:47 AS: 13:55	10m	No object encountered at target location. Seabed composed of silty-sand, gently undulating, with occasional pockets of cobbles and rocks (sub-rounded).	No image
11	26.11.13	100_5	R.B.	LS: 14:39 AS: 14:45	9m	Two circular shaped pieces of iron (prob. part of old navigation marker), 1m+ diameter, upstanding 1.8m from the seabed. These objects lie directly north-south of each other, at a distance of 5m. The SMB weight was dropped directly between the two targets. A length of link chain (7m+ length) runs alongside the two objects and a separate pile of similar chain is located to the east of the southern object.	

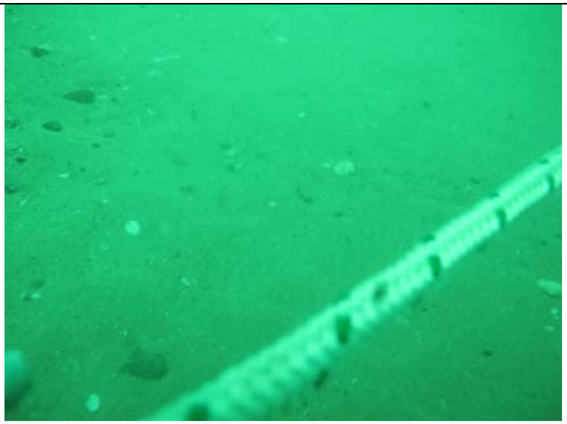
Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
							 

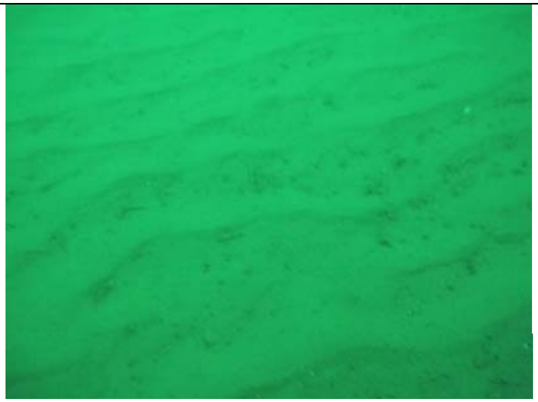
Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
12	26.11.13	26_3	R.B.	LS: 15:01 AS: 15:12	7m	Top of old Navigation marker, located on side of navigation channel. The object was located 2m from the SMB weight. The marker comprises of a square profile, box-section, and centre-piece measuring 40 cm x 40 cm x approx. 1.5m in length. Each corner has triangular-shaped wings that extend 30cm from the base of the object. The structure is 1.3m upstanding from the seabed and is surrounded by a large scour hole. Seabed composed of silty-sand with 5cm penetration.	 

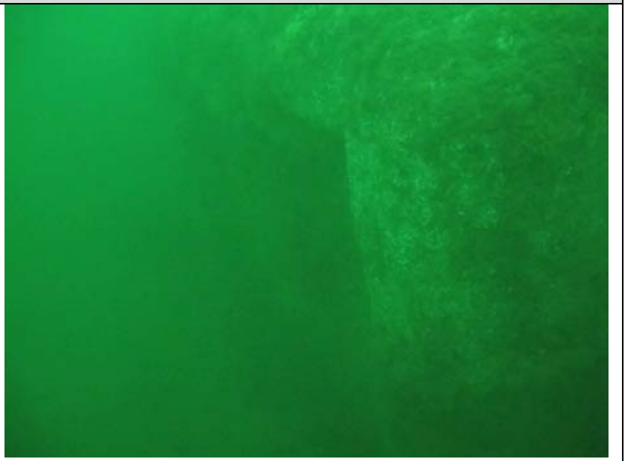
Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
13	26.11.13	15_2	R.B.	LS: 15:31 AS: 15:41	12m	Mooring block (1m x 1m) with large steel eye and chain attached, located 0.60m from SMB weight. Scouring located around base of object. Length of steel cable measuring 2m+ in length located close by. Seabed composed of compact clay; sub-rounded stones located 6m from SMB weight.	
14	27.11.13	4_8, 26_1	N.B.	LS: 09:21 AS: 09:38	5m	No object encountered at these target locations. Seabed composed of silty-sand. Seabed sloping towards navigations channel. Circular search extended 10m diameter at both locations.	No image

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
15	27.11.13, 18.12.13	158_2	N.B., R.B	LS: 09:46 AS: 10:05	9m	A car tyre (80cm diameter) was encountered 20cm from the SMB weight. In addition, a metal pipe was located 2m SE from the SMB mark. The pipe is octagonal in section and measures 1m in diameter, and protrudes from side of navigation channel; 3m from top of slope. A 2m wide flange extends from the pipe terminus. Seabed composed of silty-sand. A second inspection on 18.12 confirmed that the metal pipe protrudes from the side slope of the navigation channel, and determined that pipe has been damaged, having been grabbed previously and buckled. It remains possible that further remains are buried in the sands behind the side slope.	
16	27.11.13	26_6	N.B.	LS: 11:41 AS: 11:52	7m	No object encountered at the target location. Compact seabed composed of silty-sand with gentle rippling of the seabed.	No image

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
17	27.11.13	161_1	N.B.	LS: 12:05 AS: 12:24	9m	One mooring block, measuring 1m x 1m, on seabed. Recessed metal eyes, no chain attached. Scouring evident around base of block and a length of timber is exposed within the scour. Timber measures 1.5m in visible length and is heavily encrusted with marine growth. Timber measure 3cm in thickness. Timber appears to be isolated object.	
18	27.11.13	159_4	R.B.	LS: 12:42 AS: 12:52	10m	No object encountered at the target location. Compact seabed composed of silty-sand with gentle rippling of the seabed.	

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
19	27.11.13	102_5, 114_2	R.B.	LS: 13:28 AS: 13:35	11m	No object encountered at the target location. Survey extended to 10m from SMB weight. Flat, featureless, seabed composed of silty-sand forming crust-like deposit (1cm thick) over compact clay with little or no hand-penetration.	
20	27.11.13	11_1	R.B.	LS: 13:58 AS: 14:05	10m	No object encountered at the target location. Survey extended to 10m from SMB weight. Flat, featureless, seabed composed of silty-sand.	

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
21	27.11.13	01_3	R.B.	LS: 14:44 AS: 14:56	10m	Flat Featureless seabed composed of compact clay with deposit of overlying silt. A natural feature comprising a ridge of small sub-rounded stones, >5cm x 8cm in size, located within 1m if SMB weight [probable cause of side-scan shadow].	
22	28.11.13	27_2	R.B.	LS: 09:07 AS: 09:18	11m	No object encountered at the target location. Survey extended to 10m from SMB weight. Flat, featureless, seabed composed of gently rippling silty-sand.	

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
23	28.11.13	102_3, 103_3, 111_2	R.B.	LS: 09:40 AS: 09:53	11m	Mooring block located 0.40cm from SMB weight. Chain wrapped around mooring block, lying on its side. Recessed metal eye located on top side and metal bolt protrudes from exposed base of block. 40cm deep scour hole located extends around the object. Seabed is composed of a compact silty-sand.	
24	28.11.13	105_1	R.B.	LS: 10:05 AS: 10:17	10m	Hollow in seabed measuring 4m length x 2,5m width. Within this area a series of angular boulders and small stones are present. The boulders, measuring from 30cm x 15cm up to 40cm x 40cm size, form block like chunks of limestone that appear freshly broken. These appear to be ripped from a natural bedrock plane present beneath the seabed at this location. The surrounding seabed is composed of a compact, flat/ featureless, silty-sand.	No image
25	28.11.13	118_1	R.B.	LS: 10:44	11m	Two boulders protruding 25cm+ from seabed, 35cm length x 30xm width, with associated scouring (45cm wide scour hole). A section of exposed in-	No image

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
				AS: 10:53		situ bedrock located close by. Seabed composed of compact flat/ featureless, silty-sand.	
26	28.11.13	4_1	R.B.	LS: 11:13 AS: 11:33	11m	North-south depression in seabed that extends c.5m. This feature has almost vertical walls, 25cm deep, and measures 40cm in width. Small stones and clumps of slag like material present within this trench-like feature. Seabed at this location is composed of compact clay with frequent scarp marks visible.	
27	28.11.13	39_2	R.B.	LS: 13:46 AS: 13:56	11m	Ridge of stones and cobbles extending across the seabed at the target location. Stones measuring up to 30cm x 20cm in size present. Some scouring taking place along side of ridge. Seabed composed of flat, featureless, silty-sand.	No image

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
28	28.11.13	39_1	R.B.	LS: 14:05 AS: 14:12	11m	Large boulder , measuring 45cm length x 20cm width and upstanding 30cm from seabed. The boulder is surrounded by a scour hole measuring 15-20cm in depth.	
29	28.11.13	46_4, 36_2	R.B.	LS: 14:59 AS: 15:16	11m	Series of exposed sections of iron from a possible structure buried with the seabed at this location. Larges section measures 1.4m in length, 5cm width, and 8cm in thickness. The iron is covered in marine growth, however, the metal appear to be of modern origin. Surrounding seabed composed of compact clay.	

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
30	29.11.13	15_4	F.M.	LS: 09:21 AS: 09:32	12.5m	No target encountered at this location. Seabed composed of silty-clay with 40cm of hand-penetration. Occasional small stones present. At a distance of 3.5m from the SMB weight, the seabed composition changes to a compact clay with an overlying deposit of cobbles and small boulders measuring up to 25cm in length x 20cm in width.	No image
31	29.11.13	1_6, 1_5	F.M.	LS: 09:55 AS: 10:06	11m	No target encountered at this location, search lines extended to 10m from target locations. Seabed composed of silty-clay with 20cm of hand-penetration. Occasional cobbles and small boulders present.	No image
32	29.11.13	12_2	R.B.	LS: 11:06 AS: 11:16	11m	No target encountered at this location. Seabed composed of silty-clay with a hand-penetration of 15cm. A 1-2cm thick deposit of silt overlies the seabed at this location. An undulation in the seabed was visible, probably an old dredge scar.	No image

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
33	29.11.13	1_4	R.B.	LS: 11:29 AS: 11:42	11m	Ridge of water-sorted cobbles and gravel running east-west and sloping to the north; located 3m from the SMB weight. Cobbles similar to river cobbles and measure up to 15cm x 8cm in size. Surrounding seabed composed of silty-clay with a hand-penetration of 20cm. Some modern debris noted in this area, including miscellaneous iron objects and a length of 3inch pipe.	 

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
34	29.11.13	15_3	R.B.	LS: 11:55 AS: 12:10	12.5m	Area of water-sorted cobbles and gravel located within a depression in the seabed, approx. 30cm depth of scour. Compact clay located north of the cobble deposit.	
35	29.11.13	11_2	R.B.	LS: 12:27 AS: 12:43	10m	Large limestone block, possible masonry, measuring 80cm length x 50cm width, 45cm depth. The upper face has well defined edges suggesting that is have been lightly dressed, however the sides taper towards the seabed and the base appear un-shaped. Perhaps, block represents section of limestone bedrock that has been ripped from a bedding plane on the seabed. A 1.3m scour hole surrounds the block. The scour has 45º angle of slope and has acted as a catchment for modern debris. The seabed is compose of a compact clay with visible drag makes from anchors, etc.	

Dive Number	Date	Target Number	Diver	Dive Times	Depth	Description	U/W Photograph
36	29.11.13	4_9	R.B.	LS: 12:55 AS: 13:12	10m	No target encountered at this location. Seabed composed of silty-sand overlying a compact clay, hand-penetration of 2cm. This section of seabed is flat and featureless, no rippling of sand present.	No Image

APPENDIX 13
HUMAN BEINGS

There is no appendix for this chapter of the EIS

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Coastal and Marine Research Group	Marine Mammals
Natura Environmental Consultants	Birds
MacCabe Durney Barnes	Planning
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