



Rhyl Harbour

Environmental Report - Land Based
Maintenance Dredging
November 2021

Denbighshire County Council

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1 Introduction

Denbighshire County Council operates Rhyl Harbour which is used by local fishing boats and for recreational use. The harbour is maintained as an operational facility and managed by the Harbour Master's office. Routine dredging of the harbour navigational channel and moorings is required which is subject to a marine licence issued by Natural Resources Wales. This licence is due for renewal.

This report has been prepared to support the marine licence renewal application and provides a summary of the development history of the harbour area (this chapter) and describes the proposed dredging operations (Chapter 2). Chapter 3 screens the project against the criteria set out in the Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017. Each of the chapters scoped into the 2011 ES for the construction of the harbour development has been reviewed in light of the reduced scale of maintenance dredging to be undertaken.

1.2 Site Location and Description

Rhyl Harbour (formerly known as Foryd Harbour) lies at the mouth of the estuary of the Afon Clwyd, which is located at the western gateway into Rhyl on the north Wales coast, at approximate NGR SH 995 810. The centre of the Afon Clwyd forms the administrative boundary between the unitary authorities of Conwy and Denbighshire and the harbour area is located within both administrative areas, with Rhyl to the east and Kinnel Bay to the west. Although nearly all the land within the proposed project area is owned by Denbighshire County Council (DCC), including the harbour basin, the west side of the site comes under the jurisdiction of the Conwy County Borough Council (CCBC). Rhyl Harbour provides a base for (amongst others) The Rhyl Fisherman's Association, Rhyl Charter Skippers Association, Rhyl Yacht Club and Rhyl Water Ski Club.

The northern boundary of the harbour area (from west to east) comprises the Rhyl Yacht Club building and boat yard, the Rhyl Harbour boat yard, car park and quay wall, the completed harbour building and public square and the extended quay wall. Horton Nose Lane serves the northern area of the harbour. The southern boundary (from west to east) is formed by the inner and outer sea walls (West Parade road runs beyond and parallel to the sea walls), and the training wall guiding the navigable channel out to the north-east. The western boundary of the harbour basin is formed by the Rhyl Harbour Bridge (the Blue Bridge) and a recently constructed sustainable transport bridge (Pont y Ddraig) spans the harbour from the public square to the junction of West Parade and Quay Street for pedestrians and cyclists.

The wider site surroundings comprise:

- North: Remainder of Horton's Nose comprising dunes, shingle, intertidal sands and boardwalk;
- East: Rhyl West Promenade (a business park and a car park beyond the road);
- South: The remainder of Rhyl Harbour and the estuarine Clwyd beyond Rhyl Harbour Bridge; and
- West: Sunnyvale Caravan Park is present beyond the boat yard (static caravans).

The site location is shown in Figure 1 below.

Figure 1: Site Location



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1.3 Development Works to Rhyll Harbour

The development of the Rhyll Harbour area, including the West Rhyll Coastal Defence Scheme and the sustainable transport bridge (Pont y Ddraig) is all part of DCC's long term plans to stimulate investment and growth in the west Rhyll area.

The major works which have occurred within the Rhyll Harbour area to date are summarised in Table 1.1 to aid understanding of the development history of the harbour. The environmental assessment completed at the harbour to date is also provided for information.

Since development was completed in 2014 the harbour has been subject to maintenance dredging. The first marine licence (BUML1472) for dredging the harbour was issued in 2014 for the dredging of 22,000 tonnes of sediment a year. This was renewed in 2018 (licence DML1840) for 17,000 tonnes per year. The application to renew the licence for a further period is for 16,000 tonnes per year (to be removed over two periods, March and October, with up to 8,000 tonnes removed during each period).

Table 1.1: Rhyl Harbour Work Summary

Project	Works Included	Environmental Impact Assessment (EIA) Required	Status
Rhyl Harbour Scheme – Initial Works	- Boat storage compound. - Car parking improvements. - Raising of original quay wall to 6.1 m. - Floating pontoon. - Boat hoist. - Environmental improvements at Horton's Nose: Footpath modifications, a boardwalk, viewing area and information boards.	No. Environmental Report produced for moorings works November 2010.	Complete (August 2009, moorings March 2011)
West Rhyl Coastal Defence Scheme	- Phase 1 – Upgrading the River Clwyd training wall. - Phase 2 – Improvements to the existing harbour wall, from the Foryd (Blue) Bridge to the intersection with the training wall. - Phase 3 – Precast concrete wall / sloped revetment, to the east of the training wall.	- Yes – Annex II - Screened under: - Town and Country Planning (EIA) (England and Wales) Regs 1999 (as amended). Part 2 Para 5. - Marine Works (EIA) Regs 2007. Schedule 2 Para 1. (Also required FEPA licence and CPA Consent). - Environmental Statement (ES) completed October 2010. - ES Addendum for Phase 3 completed June 2014.	Phase 1 Complete Phase 2: Complete (Phases 1 & 2 completed September 2013) Phase 3: Complete (Phase 3 completed June 2015)
Sustainable Transport Bridge	Bascule Type Bridge spanning the Clwyd Estuary from the promenade at the junction of Quay Street and West Parade extending to the northern bank of the River Clwyd.	- No - Screened under: - Town and Country Planning (EIA) (England and Wales) Regs 1999 (as amended). Part 2 Para 5. - Marine Works (EIA) Regs 2007. Schedule 2 Para 1. - Non-statutory Environmental Report produced December 2010.	Complete (opened October 2013)
Rhyl Harbour Public Square and Extended Quay Wall Scheme	Construction of a new public square; Construction of an extended quay wall with associated floating pontoon; Construction of a multi-use harbour building; Boat yard and car park Improvements; Moorings reconfiguration and additional moorings creation; Dredging of the deep-water channel and harbour area; Dune restoration and habitat creation; Improvements to navigation aids in the harbour area; and Addition of 10 pontoon moorings in the centre of the river to the north-east of the Sustainable Transport Bridge.	- Yes – Annex II - Screened under: - Town and Country Planning (EIA) (England and Wales) Regs 1999 (as amended). Part 2 Para 5. - Marine Works (EIA) Regs 2007. Schedule 2 Para 1. - Also required Marine Licence. - ES Completed December 2011	Complete (all facilities were completed by May 2014)

1.4 Previous Environmental Impact Assessments

The harbour development completed in 2011 was supported by an Environmental Statement issued by Denbighshire County Council in December 2011¹. Subsequent applications for a marine license were accompanied by addenda to this Statement². This environmental report has been prepared to support the application for a license renewal to continue dredging.

1.5 Dredging Proposals

The proposed maintenance dredging area is outlined on the drawing in Appendix A.4 with details on the methodology to be used provided within Section 2.

Note: While the term 'dredging' is used within this report, it should be noted that the sand/silt excavation process that will take place will be small-scale and highly localised in nature and will be completed by land-based excavator at low tide. No marine dredging equipment such as barges will be used, and the vast majority of material will be dredged above low water level. The exception will be the dredging of the main navigable channel which will require some limited excavation below the low water level.

1.6 Habitats Regulations Assessment

As the competent Authority under the Conservation of Habitats and Species Regulations 2017 (as amended), DCC undertook a Habitats Regulations Assessment (HRA) Screening of the project on the Dee Estuary Special Area of Conservation (SAC); Special Protection Area (SPA) and Ramsar site) and Liverpool Bay SPA.

The original HRA screening exercise concluded that the Rhyl Harbour scheme would have no significant affects either alone or in combination with other projects and that no Appropriate Assessment of the project would therefore be required.

The HRA Screening report has been re-visited to determine whether the maintenance dredging would trigger the requirement for Appropriate Assessment. The revised HRA Screening letter report is included within Appendix B and concludes that further assessment under the Habitats Regulations would not be required for the continued dredging.

¹ Foryd Harbour Public Square and Extended Quay Wall Environmental Statement H4/10401/R/01A

² Rhyl Harbour Public Square and Extended Quay Wall Environmental Statement Addendum - Land Based Maintenance Dredging 2018

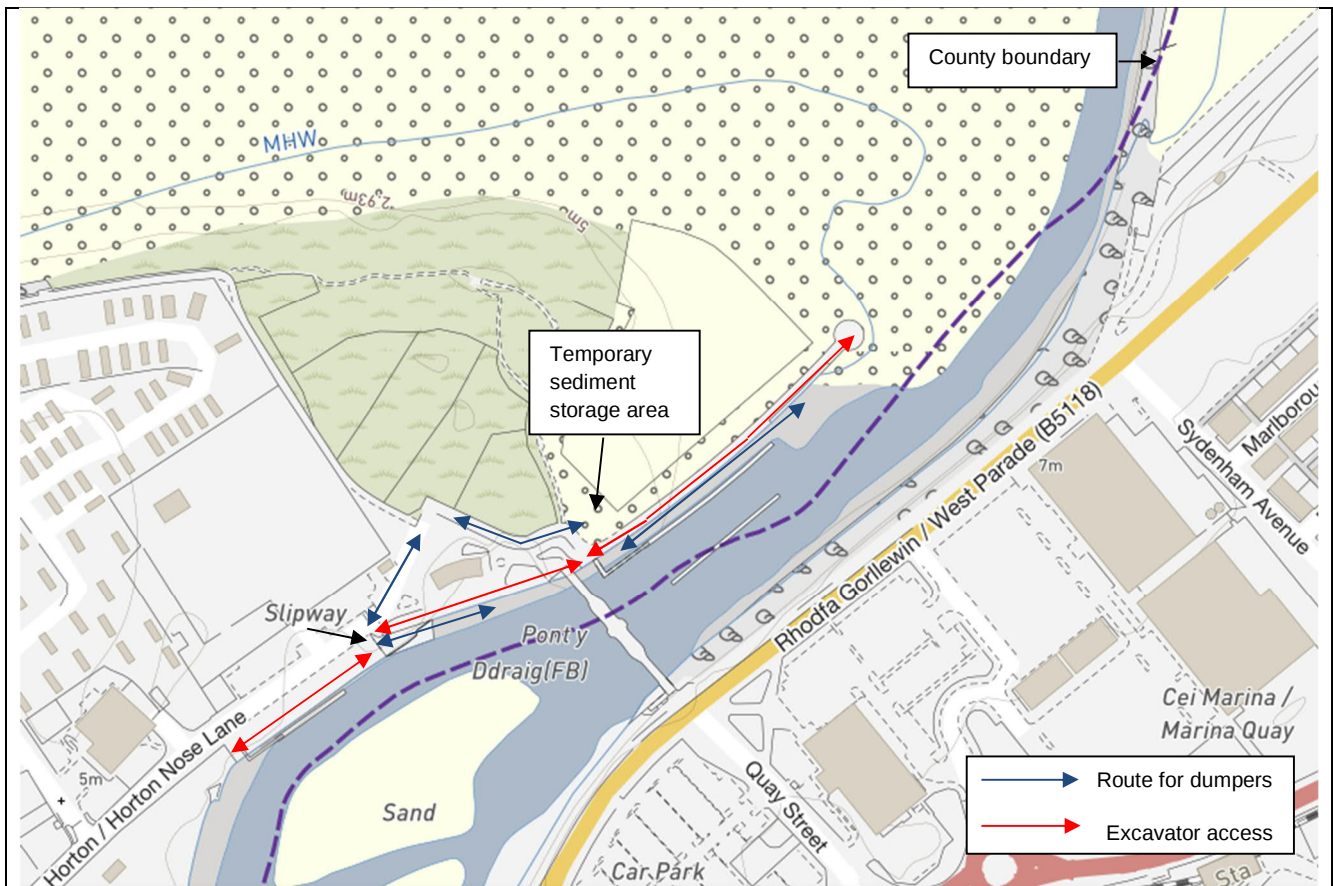
2 Proposed Dredging Methodology

2.1 Introduction

Maintenance dredging of Rhyl Harbour is required to be undertaken on an annual basis in order to maintain both navigable channels and a suitable working depth for the remainder of the harbour area. The extent of the area to be dredged along with estimated quantities is detailed in the drawing provided within Appendix A. It is expected that this work will be undertaken annually in March, with additional dredging activities occurring as required in October if siltation problems are encountered in specific areas. In applying for this licence, lessons learned during the dredging over the course of the current licence have been taken into account with timings changed to minimise ecological impacts. The extent and areas of sand removal have also been reduced given that seasonal river flows remove some sediment from the inner harbour. Monitoring and consultation have identified where dredging works are required.

The site layout displaying proposed vehicle movements and the temporary stockpile area is shown in Figure 2.

Figure 2: Site Layout



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2.2 Methodology

It is anticipated that approximately 16,000 tonnes ($\approx 7200\text{m}^3$) of material will require removal from the harbour and approach channel every year, based on the amount of dredging undertaken during the previous licence period. The volume of material needed to be dredged has reduced from 22,000 tonnes in the original licence issued in 2015; likely due to changes in the flow of sediment through the harbour.

The proposed finished levels for the area have not been altered from the original 2011 ES these being:

- In the vicinity of the quay wall, the finished level is to be +0.5mAOD to allow for the exposure of mud habitat at low tide (ecological requirements);
- In the area of the outer channel adjacent to the training wall, the finished level is to be -1.8mAOD;
- In the inner area between the floating pontoon and West Rhyl Defences it is to be at -1.5mAOD;
- In the vicinity of the slipways and the inner harbour the finished level is to be -0.5mAOD; and
- Trimming of banks will be undertaken to a 1 in 3 slope with no trimming undertaken within the vicinity of the Clwyd Flood Embankments.

The works will be undertaken at low tide using a 30t long reach 360° excavator operating from the adjacent quay. This will minimise the risks associated with potential for surface water contamination and disruption to existing harbour users. All plant will be stored in the secure site compound when not in use. Careful consideration and planning will be given to timings of high and low tide each day.

The excavated material will be loaded into 10t dumper trucks which will access the harbour via the beach adjacent to the quay wall.

Depending on the height and timing of low tide it is anticipated that up to 1,000t will be removed per day with works lasting between 8 and 10 days. Dumpers will be filled to their full capacity to ensure maximum effectiveness. Banksmen will be employed to make sure the operation is run safely and efficiently.

Material will be removed by excavating in cells to reduce the generation of suspended sediments resulting in minimum disturbance to the marine environment. The material will then be temporarily stored at the picnic area (shown on the drawing in Appendix A.5). It is expected that the maximum stockpile size at any one time will be 1,000 tonnes and will spend a maximum of two days in the stockpile before transportation off-site.

Prior to each dredging operation taking place testing of the sediment will be undertaken as per the OSPAR (Oslo and Paris Conventions) 'Guideline for the Management of Dredged Material Agreement 2014-16' and also Agreement 2015-06, 'Detailing the interpretation of paragraphs 5.5 and 5.6 'Testing'. Material stored temporarily in the picnic area will be collected and road transported off-site by HGVs. This will be organised in order to avoid peak traffic periods to minimise disruption to the local population and reduce emissions. Anticipated future use of the excavated material will be for processing as construction material.

2.3 Timing and Frequency

It is expected that this work will be undertaken in March 2022 and then annually each year, with additional dredging activities occurring as required in October if siltation problems are encountered in specific areas.

2.4 Monitoring

Monitoring of bed levels is carried out by level survey. Sections presented in Appendix E show the variation of bed levels across the harbour with time. The purpose of the monitoring is to ensure that the bed levels are not reduced too much and to ensure the dredging does not have effects within the rest of the harbour area where sediment levels should remain unaltered.

3 EIA Screening

The project has been screened against the activities presented in Schedules A1 and A2 of The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017.

The project is not listed in Schedule A1.

The project can be considered under Schedule A2 paragraph 89;

“89. Any change to or extension of development of a description listed in paragraphs 1 to 87 of this Schedule where that development is already authorised, executed or in the process of being executed.”

The harbour would be considered under paragraph 63, Construction of harbours and has already been completed.

Schedule 2 of the Marine EIA Regulations 2017 sets out matters relevant to consideration of whether or not a Schedule A2 project is likely to have significant effects on the environment. These are:

Characteristics of the project

1. The characteristics of the project, with particular regard to—

- (a) the size and design of the whole project;
- (b) cumulation with other existing or approved projects ;
- (c) the use of natural resources, in particular land, soil, water and biodiversity;
- (d) the production of waste;
- (e) pollution and nuisances;
- (f) the risk of major accidents or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; and
- (g) the risks to human health (for example due to water contamination or air pollution).

Location of the project

2. The environmental sensitivity of geographical areas likely to be affected by the project, with particular regard to—

- (a) the existing and approved land use;
- (b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and below ground in that area;
- (c) the absorption capacity of the natural environment, paying particular attention to the following areas—
 - (i) wetlands, riparian areas, river mouths;
 - (ii) coastal zones and the marine environment;
 - (iii) mountain and forest areas;
 - (iv) nature reserves and parks;
 - (v) areas classified or protected under national legislation, Natura 2000 areas designated or classified by member States pursuant to the Habitats Directive or the Wild Birds Directive;
 - (vi) areas in which there has already been a failure to meet the environmental quality standards laid down in EU legislation and relevant to the project, or in which it is considered that there is such a failure;
 - (vii) densely populated areas; and
 - (viii) landscapes and sites of historical, cultural or archaeological significance.

Types and characteristics of the potential impact

3. The likely significant effects of projects on the environment in relation to the matters set out in paragraphs 1 and 2, with regard to the impact of the project on the factors specified in regulation 21A(2)(a) to (e) and with regard to—

- (a) the magnitude and spatial extent of the impact (for example the geographical area and the size of the population likely to be affected);
- (b) the nature of the impact;
- (c) the transboundary nature of the impact;
- (d) the intensity and complexity of the impact;
- (e) the probability of the impact;
- (f) the expected onset, duration, frequency and reversibility of the impact;
- (g) the cumulation of the impact with the impact of other existing or approved projects; and
- (h) the possibility of effectively reducing the impact.

3.1 Characteristics of the Project

The maintenance dredging project has been significantly scaled back since its inception in 2014 when the first marine licence was for the removal of 22,000t of material. The current licence application is for 16,000 tonnes per year. The dredging activity will take place over a limited time frame each year of up to four weeks (two periods of two weeks).

There are coastal defence projects taking place in central Rhyl and more are planned for Kinmel Bay in the near future. The scale of the maintenance dredging is much smaller than those projects and has previously been assessed as not presenting a significant cumulative impact whilst the Rhyl west coastal defence works were under construction adjacent to the harbour. It is considered reasonable to conclude that the future dredging would not present a significant cumulative impact.

The project will remove sand and silt from the harbour which will be reused within the construction industry. The use of natural resources is therefore considered to be a positive effect and no significant waste will be produced.

There is a risk of pollution arising from the dredging activities. This risk has been reduced through the design of the works with the excavator operating from the adjacent quay wall and dumper trucks accessing the inter tidal area during low tide via an existing ramp. These measures have been taken to prevent the need to operate machinery within the harbour water, except the excavator bucket. The contractor undertaking the work will ensure that all machinery is checked for leaks and cleaned prior to use and will maintain the vehicles. Dredging during low tide will reduce the potential for sediment to become suspended in the water column.

The project is of short duration and will require use of a limited number of vehicles. The potential for nuisance is considered to be low, the works will be undertaken following consultation with harbour users. The purpose of the works is to maintain the amenity value of the harbour.

There is no scope for a major accident to occur as a result of this project.

There are no risks to human health arising from the excavation of the sediment and its subsequent reuse in construction.

3.2 Location of the project

The project is wholly within the existing harbour. The harbour is a tightly managed environment, constrained by the quay walls on both banks. The estuary bed is exposed at low tide offering opportunities for birds to forage; however the surrounding built up area of the harbour, the road crossing and adjacent development provides a background level of disturbance throughout the year. The short duration of the dredging operation each year, at the end of the over-wintering bird season, is not considered to present a significant impact on this resource and would not significantly affect any birds using the area which would be habituated to the levels of disturbance likely to be encountered.

The site is not located within an internationally designated site. The nearest designated site is the Liverpool Bay Special Protection Area 800m to the northwest. A Habitats Regulations screening assessment has previously determined that there would be no significant effect on any of the qualifying features of the Liverpool Bay SPA or the Dee Estuary Ramsar site some 8km to the east.

3.3 Types and characteristics of the potential impact

The spatial extent and magnitude of the project is small, being constrained to the harbour itself and over a limited time period each year. Any impacts arising would be limited in extent given the short duration of the project each year. Impacts will be highly localised to the harbour itself and there are no trans-boundary effects. Given the reducing scope of the project over time any impacts the dredging has are reduced in scale. Previous assessments for the initial harbour and the subsequent maintenance dredging have determined there would be no significant impact from the dredging operation.

The following sections discuss the potential for significant effects on each of the topic areas discussed in the previous environmental statement and addenda.

3.4 Coastal Processes

The hydrodynamic and sediment regime within the harbour was assessed during completion of the main harbour regeneration works and reported in the 2011 ES. This assessment concluded that a minor adverse impact on coastal processes was likely from changes in current velocities resulting in deposition of sediment which would require ongoing management. The original assessment considered the removal of 22,000 tonnes of sediment per year which was reduced to 17,000 tonnes per year for the last licence renewal and has been reduced further to 16,000 tonnes per year for the next renewal. The potential impact on coastal processes from the proposed maintenance dredging is likely to be less severe than previously assessed due to the significant reduction in the amount of material to be removed.

Monitoring during the dredging undertaken under the 2014 marine licence has identified there is no significant change to the coastal processes operating along the coast in this area. The reduction in volumes to be dredged in this licence period reduces the scale of all impacts.

3.5 Hydrology

A Water Framework Directive Regulations assessment has been prepared³ which identifies the waterbodies likely to be affected by the proposed maintenance dredging. The harbour is located within the Clwyd Estuary transitional waterbody with the north Wales coastal waterbody immediately adjacent. Both of these waterbodies were screened for potential effects. The following quality elements were considered:

- Hydromorphology;
- Biology – habitats;
- Biology – fish;
- Water quality; and
- Protected areas.

Biology-habitats, biology-fish, water quality and protected areas were screened in, requiring further assessment.

Several discrete areas of saltmarsh are recorded within the harbour area and some limited areas of mussel beds are recorded along the eastern boundary of the harbour and along the training wall, with additional clusters to the east and west of the Clwyd Estuary mouth. None of the saltmarsh areas or mussel beds are directly affected by the dredging proposals and no deterioration in the quality of these habitats as a consequence of the dredging is anticipated.

The harbour supports several fish species including Atlantic salmon, sea trout and European eel. Dredging works will not be undertaken during the fish migration period and consequently no deterioration of this quality

³ Rhyl Harbour Maintenance Dredging WFD Assessment October 2021

element is anticipated.

Dredging has the potential to cause a deterioration in water quality through suspension of sediment and mobilisation of pollutants. The dredging will be undertaken at low tide with little potential for causing suspension of sediment. Previous testing of the sediment has not indicated the presence of any contamination and so no deterioration of this quality element is anticipated.

There are designated bathing waters along the seafront either side of the harbour and within Marine Lake. Dredging activities will take place outside the bathing waters period and so no deterioration in this quality element is anticipated.

On the basis that previous assessments have determined no significant effects on hydrology and the current proposals are for a reduced volume of material to be dredged, is it considered unlikely that there would be any significant effects from these proposals.

3.6 Water and Sediment Quality

Previous samples of sediment have been taken for laboratory analysis. The results of this testing indicate the sediment is not contaminated, with low concentrations of metals and hydrocarbons. Testing results are presented in Appendix C and Appendix D.

The dredging operations may result in increased disturbance of sediment within the water column leading to a temporary increase in the suspended solids and turbidity and reduced dissolved oxygen in the Clwyd Estuary affecting the ability of the waterbody to meet targets and has the potential to impact on local bathing waters. The dredging will be undertaken during low tide, reducing the potential for disturbance of saturated sediment and so reducing the possibility of entraining sediment into the water column. Testing of the sediment has shown low concentrations of contaminants to be present which will limit the potential water quality impacts as will the timing of the dredging (to occur prior to the main bathing water season each year).

The operation of the excavator from the quay wall will reduce the risk to water quality from spills and leaks from machinery, only the excavator bucket will come into contact with the estuary sediment. Dumpers will be filled from the excavator using the access ramp to gain access to the intertidal area adjacent to the quay wall. The Contractor will undertake vehicle checks during construction works to include frequent vehicle washing and checks for drips or fuel leakage and also to ensure that all reasonable and practicable steps have been taken to prevent the pollution of the water environment. This will be covered within the Contractor's environmental management plan.

Dredged sediment will be re-used in other local schemes subject to compliance with Environmental Permitting requirements. The reuse of the sediment will prevent the use of other virgin materials.

Supplementary geotechnical and geochemical sediment testing prior to each annual event is recommended to ensure that there is no change in sediment quality and to monitor baseline water quality. This data will also be required by the Contractor excavating, transporting, and receiving the dredged sediments for onwards recycling.

On the basis that previous assessments have determined no significant effects on water and sediment quality and the current proposals are for a reduced volume of material to be dredged, is it considered unlikely that there would be any significant effects from these proposals.

3.7 Navigation

Rhyl Harbour has undergone extensive remodelling to improve access and moorings for both commercial boats and leisure craft and to provide an emergency landing stage for the RNLI. The main remodelling of the harbour and approach channel was undertaken as part of the construction of the public square and Foryd bridge. These works were undertaken under two separate marine licences with ongoing annual dredging under a separate licence. As part of the planning and marine licence applications, consent was sought to dredge the harbour in order for it to remain safe over its lifetime. The plan in Appendix A.6 is the plan which was submitted for planning and the marine licence as part of the 2011 ES for the construction works. This plan was based on deep water channels providing access 3 hours each side of high tide. Following discussion with harbour users and the Harbour Master the plan has been amended slightly to suit the actual problems encountered on site. The revised plan is also attached in Appendix A.6.

The dredging will be undertaken at low water and therefore will have no effect on the navigation of the harbour as no boat traffic can pass through the channel during low tide. Boats moored in the area to be dredged will need to be moved in advance. Boat owners will have to remove their boats from the dredge area whilst work is undertaken, however this is mitigated by communicating the dredge periods well enough in advance to allow boats to moved elsewhere in the harbour.

On the basis that previous assessments have determined no significant effects on navigation and the current proposals are for a reduced volume of material to be dredged over a shorter time period, is it considered unlikely that there would be any significant effects from these proposals.

3.8 Biodiversity

The existing baseline for statutory and non-statutory designated nature conservations sites and species is summarised in Table 3.1.

Table 3.1: Biodiversity Baseline Summary

Ecological Feature	Description	Distance from Construction/Operational Footprint	Importance and Value
Statutory Nature Conservation Site			
Liverpool Special Protected Area (SPA)	The SPA extends from Moelfre in north-east Anglesey, to the west of the proposed Scheme, to Rossall Point near Fleetwood, to the east of the proposed Scheme. The SPA lies entirely within the 12-mile limit of English and Welsh Territorial Waters and the landward boundary is formed by the mean low water mark. The SPA is designated for its over-wintering populations of red-throated diver (<i>Gavia stellata</i>) and common scoter (<i>Melanitta nigra</i>) that it supports.	In the vicinity of the proposed dredging area	International
Dee Estuary European Marine Site	The Dee Estuary is designated as a SAC, SPA, Ramsar site and SSSI. Together these designated sites make up the Dee Estuary European Marine Site. The primary reasons for the selection of the estuary as a European Marine Site are the habitats it supports, including intertidal mudflats and sandflats, glassworts (<i>Salicornia</i> sp.) and other annuals colonising mud and sand, and Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>).	Approximately 8km east of Rhyl,	International

Ecological Feature	Description	Distance from Construction/Operational Footprint	Importance and Value
Non-Statutory Designated Nature Conservation Sites			
North Wales Coast Important Bird Area (IBA)11,	Site stretches from Little Ormes Head to Rhyl, extending approximately 6km out into the sea. This IBA has been selected by BirdLife International because of the over-wintering bird use of the area. Common scoter is included in the designation.	Adjacent to proposed Scheme	Higher
Clwyd Estuary and Floodplain Wildlife Site.	This includes the sand bars and intertidal mudflats at the river's mouth, the lower sections of the river and its flood meadows, and Brickfield Pond and Marine Lake. The site is designated for its populations of wildfowl and wading birds, with lapwing (<i>Vanellus vanellus</i>) and curlew (<i>Numenius arquata</i>) being of primary interest.	In the vicinity of the proposed dredging area	County
Kinmel Dunes Local Nature Reserve	The site is a rare habitat in the locality and supports a variety of native maritime plants and bird species including skylark (<i>Alauda arvensis</i>), kestrel (<i>Falco tinnunculus</i>) and ringed plover (<i>Charadrius hiaticula</i>).	Approximately 500m west of the Clwyd Estuary.	County
Horton's Nose Wildlife Site	A Local Priority Habitat within Conwy (coastal sand dunes and vegetated shingle).	In the vicinity of the proposed dredging area	County
The Dee Estuary IBA and RSPB reserve	Supports wintering and passage wildfowl it spans a large area along the North Wales coast	Approximately 8km east of Rhyl	Regional
River Clwyd	Otters are known to be widespread along the River Clwyd and the River Dee to the east. River Clwyd supports populations of salmonids and other fish and shellfish species of value to Foraging otter. No evidence of otter activity was found within the survey area. Habitats within the survey area offer little in the way of cover for otter to remain undetected with the exposed sandy/muddy banks and the built-up nature of the area. Notable fish species recorded in the River Clwyd are Atlantic salmon, sea trout and European eel.	Passes through the proposed dredging area	Otter: within the study area, Parish value. The migratory populations of Atlantic salmon within the Clwyd Estuary are considered to be of International importance. The populations of sea trout and European eel are considered to be of national importance.

Due to the presence of the Liverpool Bay SPA just offshore a Habitats Regulations Assessment screening report has been prepared and is presented in Appendix B. This screening has indicated no significant effects on any of the designated features of this protected area.

There is a potential for the project to impact water quality through sediment re-suspension and mobilisation, which in turn could have impacts on aquatic ecology causing a temporary increase in water turbidity. The likelihood of this happening is significantly reduced by undertaking the work during low tide using land-based plant.

Dredging will take place in March each year, outside the peak adult migration of salmon which is between June and September and at the end of the wintering bird season (October-March) hence no likely impacts are anticipated.

To minimise disturbance to the marine environment the following mitigation will be put in place:

- The unnecessary revving of engines is to be avoided and equipment not in use is to be switched off;
- Plant and vehicles are to be properly maintained to meet the manufacturers' noise levels and any silencers or bearings which become defective must be replaced as soon as possible; and
- Vehicles are to manoeuvre in a circular manner wherever possible to minimise the use of reversing alarms.

On the basis that previous assessments have determined no significant effects on biodiversity and the current proposals for a reduced volume of material to be dredged over a shorter time period, it is considered unlikely that there would be any significant effects from these proposals.

3.9 Cultural Heritage

There are no world heritage sites, scheduled monuments, registered battlefields or landscapes, parks and gardens of special interest within the harbour area. River Street Conservation Area will have no view of the proposed dredging area although the Grade II listed Foryd Bridge is located immediately adjacent to the scheme but will be unaffected by the proposals.

Within 500m of the proposed scheme there are a number of sites relating to maritime losses and wrecking events, harbour structures, buildings and find spots. Two wrecks are located within the tidal river – *The Alice* and the *City of Ottawa*. The hull of the *City of Ottawa* is located within the harbour area and is only visible at low to mid tide when the wreck can be viewed from several vantage points along the quayside. The works will not impact on the understanding, character and appreciation of this wreck. The Alice is located further upstream on the western shore.

On the basis that previous assessments have determined no significant effects on cultural heritage and the current proposals for a reduced volume of material to be dredged over a shorter time period from the same areas of the harbour, it is considered unlikely that there would be any significant effects from these proposals.

3.10 Landscape

During the operation of the dredging activity there will be a minor adverse impact on the landscape and visual aspect owing to the material that will be temporarily stockpiled at the picnic area adjacent the dunes and quay wall. The presence of the stockpile may have the potential to obscure the view from the public square and the closure of a section of boardwalk will temporarily reduce access to the dunes.

The decision to stockpile at the picnic area means boats held within the boatyard will not have to be relocated in order to ensure adequate space for the stockpile of dredged material.

The impacts listed above only affect the site for the duration of the dredging operation which is expected to be no more than 2 weeks.

On the basis that previous assessments have determined no significant effects on landscape and the current proposals for a reduced volume of material to be dredged over a shorter time period, it is considered unlikely that there would be any significant effects from these proposals.

3.11 Community

Any temporary adverse impacts relating to the dredging activities will be far outweighed by the long-term beneficial impacts of improved harbour maintenance and management. Harbour users themselves have requested dredging of the harbour as sediment build-up directly affects commercial boat services.

On the basis that previous assessments have determined no significant effects on community and the current proposals for a reduced volume of material to be dredged over a shorter time period, it is considered unlikely that there would be any significant effects from these proposals.

3.12 Traffic and Access

The total estimated amount of material to be dredged is 16,000 tonnes per year. Depending on the height and timing of low tide it is anticipated approximately 1,000 tonnes of excavated material will be removed at each low tide. Dumper truck movements will be limited to the route from the intertidal zone, up the access ramp and into the area used to store the sediment. There will be disruption to the businesses currently operating in this area, The Bike Hub and Harbour Hub Café caused by the vehicle movements over both two-week periods the operation is expected to last.

Dredged sediment will be removed by lorry via Horton Nose Lane and the A548.

On the basis that the previous impact assessments have determined no significant effects from vehicle movements during the dredging period based on removal of 17,000 tonnes of sediment per year and the current proposals to dredge 16,000 tonnes per year over the next licence period, it is considered unlikely that there would be any significant effects from these proposals.

3.13 Noise and Vibration

Noise will be generated by the excavation activities (360° excavator and dumpers) and from loading the sediment onto road lorries for off-site disposal. The surrounding area is subject to noise from road traffic using the A548 which is the main road connecting Kinmel Bay with Rhyl and other coastal towns and the B5118 West Parade which runs alongside the eastern bank of the estuary. The harbour itself will also contribute some noise.

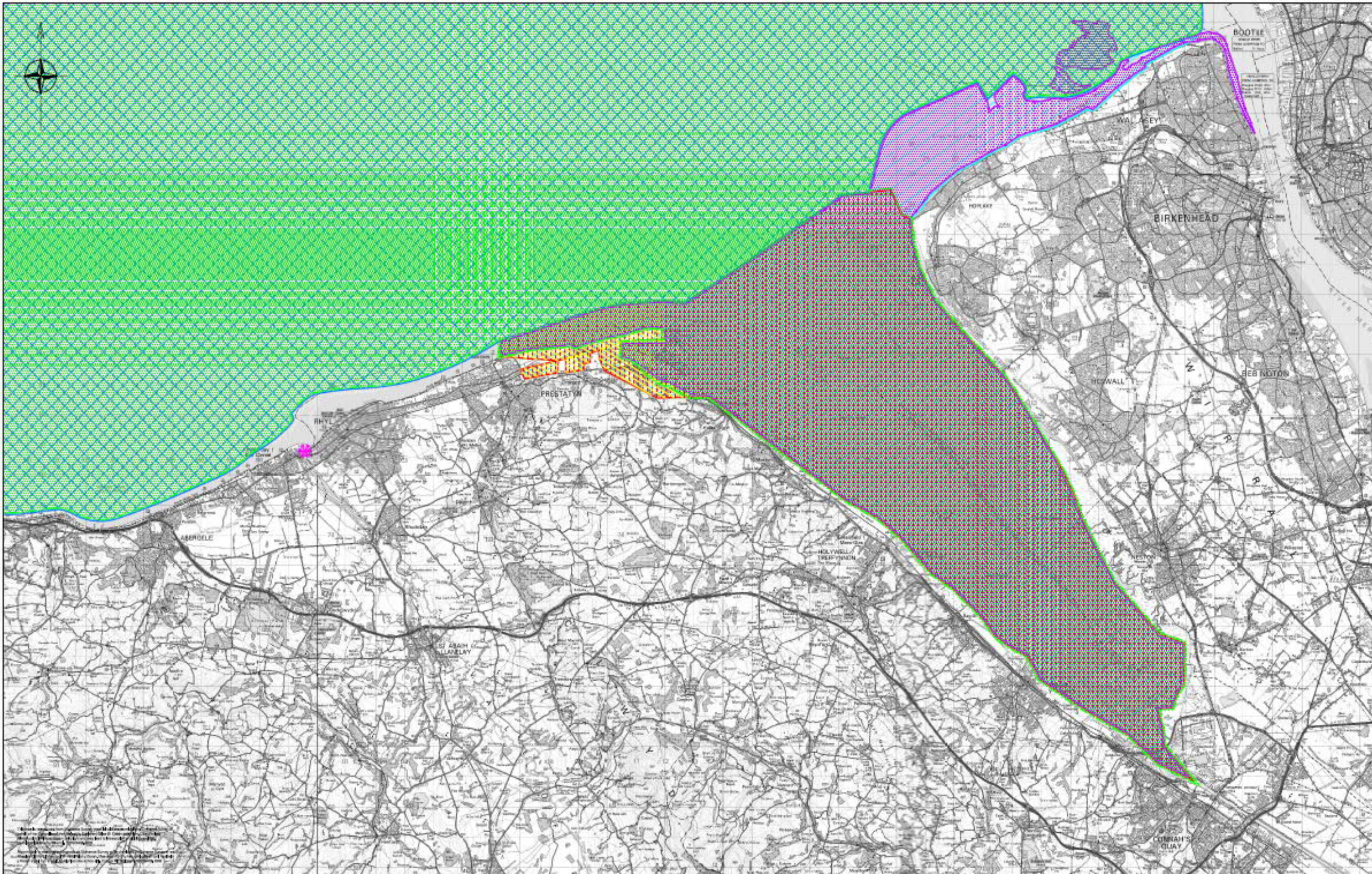
To minimise the noise and vibration caused by traffic the plant will be delivered to site at the start of the operation and removed from site at the end during the day between 09.30 and 15.00 to avoid peak traffic periods. The arrival of delivery vehicles to the site will be co-ordinated to prevent backing up on local streets, while awaiting access to the site. Vehicle movements both on the site and during the dredging activities will be managed to avoid excessive reversing movements whenever possible, by optimising the site layout and working methodologies.

There will be no significant noise generated within the marine environment. Most of the dredging will be above the water level and where dredging of saturated sediment is required the bucket will not be generating pulses of noise, the sediments are soft and easily excavated.

On the basis that previous assessments have determined no significant effects from noise and vibration and the current proposals for a reduced volume of material to be dredged, it is considered unlikely that there would be any significant effects from these proposals.

Appendix A - Figures

A.1 Location in Context of Wider Area and Protected Sites



10401/EI/09/01A	 CYNGOR Sir Ddinbych Denbighshire COUNTY COUNCIL Penndeth Prifffyrdd ac Isadeiledd Conwy a Sir Ddinbych Head of Highways & Infrastructure Conwy & Denbighshire ADRAN PRIFFYRDD AC ISADEILEDD DEPARTMENT OF HIGHWAYS AND INFRASTRUCTURE	 Proposed Foryd Harbour Public Square  Unrouted fly SPA  Breast Down & Talarns Warren SSSI  One Estuary Riasier  One Estuary SAC  One Estuary SSSI One Estuary SPA	JOB NUMBER 10401 DRAWING SCALE NTS NATIONAL GRID REFERENCE SH9980 DRAWN BY APS APPROVED BY EP	<table><tr><th>REVISION</th><th>DESCRIPTION</th><th>DATE</th></tr><tr><td>A</td><td>Original Drawing</td><td>07.12.12</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table> DRAWING STATUS ISSUE DATE SENT DATE 07.12.12	REVISION	DESCRIPTION	DATE	A	Original Drawing	07.12.12										SCHEME FORYD HARBOUR PHASE 2 RHYL DRAWING TITLE ENVIRONMENTAL IMPACT ASSESSMENT STATUTORY DESIGNATED NATURE CONSERVATION SITES (FIGURE 9.1) DRAWING NUMBER 10401/EI/09/01A
			REVISION	DESCRIPTION	DATE															
A	Original Drawing	07.12.12																		



10401/EI/09/02A



Graddfaeth Cychwyn
Head of Highways
Client Services
in Partnership



Pennaeth Prifffyrdd ac Isadeiledd Conwy a Sir Ddinbych
Head of Highways & Infrastructure Conwy & Denbighshire
ADRAN PRIFFFYRDD AC ISADEILEDD
DEPARTMENT OF HIGHWAYS AND INFRASTRUCTURE

- SYN**
- Proposed Foryd Harbour Public Square & Quay Wall
 - North Wales International Bird Area
 - Sea Industry International Bird Area
 - Marine Reserve Candidate Wildlife Site
 - Dwyd Eiddalydd a Rhuddlan Wildlife Site
 - Rhuddlan Local Nature Reserve
 - County Boundary

PROJ NUMBER
10401

DRAWING SCALES
NTS

NATIONAL GRID REFERENCE
SH9980

DRAWN BY
APS

APPROVED BY
EP

REVISIONS

NO.	DESCRIPTION	DATE
1	Original Drawing	07.12.12

DRAWING STATUS
ISSUE

LAST EDIT DATE
07.12.12

SCHEME
FORYD HARBOUR PHASE 2
RHYL

DRAWING TITLE
ENVIRONMENTAL IMPACT ASSESSMENT
NON STATUTORY DESIGNATED
NATURE CONSERVATION SITES
(FIGURE 9.2)

DRAWING NUMBER
10401/EI/09/02A

Rhyl Harbour Public Square and Extended Quay Wall

Environmental Statement Addendum - Maintenance Land Based Dredging

A.2 Site Location Plan

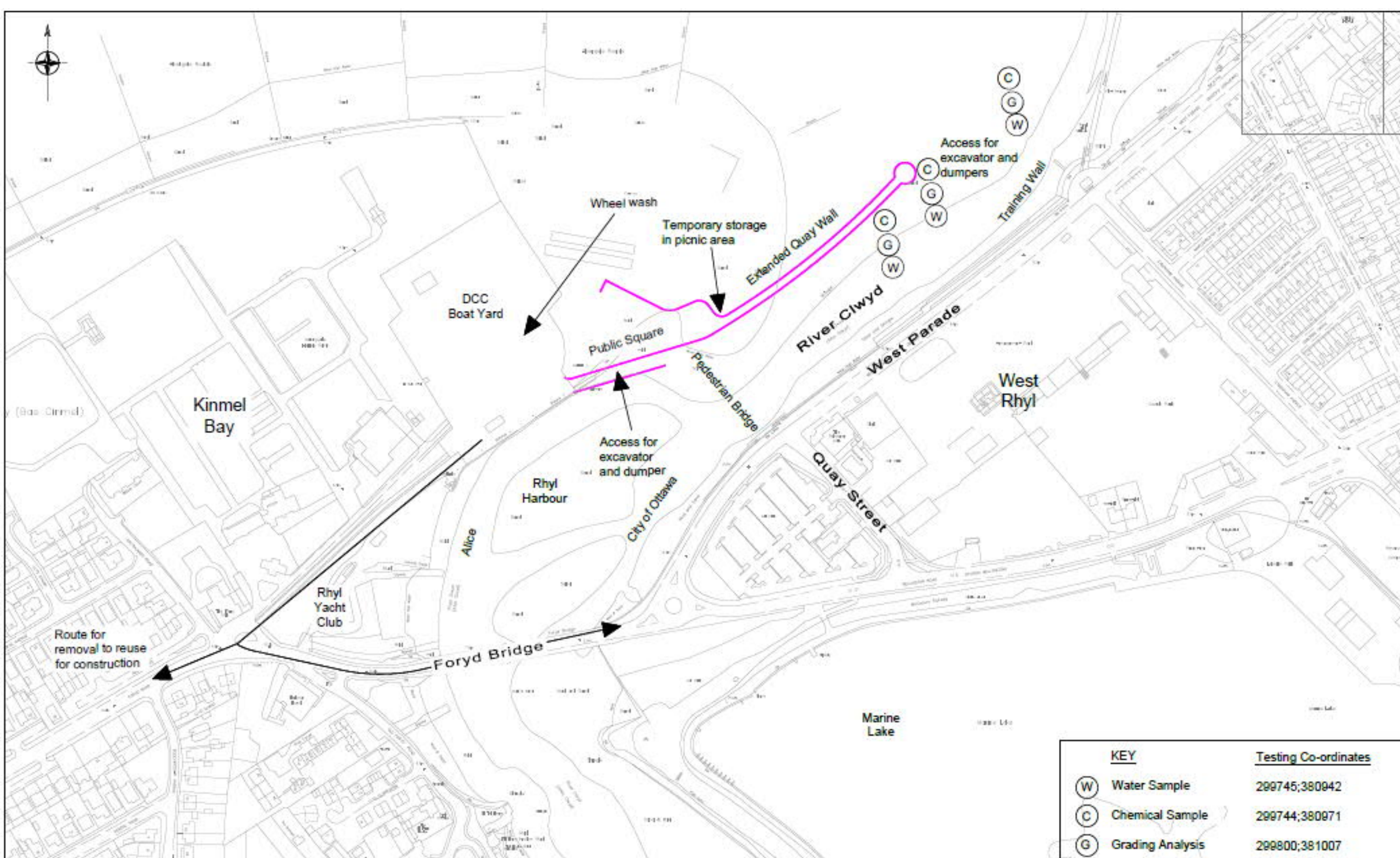
A.3 Original Rhyl Harbour Dredging Proposals

Rhyl Harbour Public Square and Extended Quay Wall

Environmental Statement Addendum - Maintenance Land Based Dredging

A.4 Revised Rhyl Harbour Dredging Proposals

A.5 Proposed Site Layout displaying Vehicle Movements, Stockpile Area



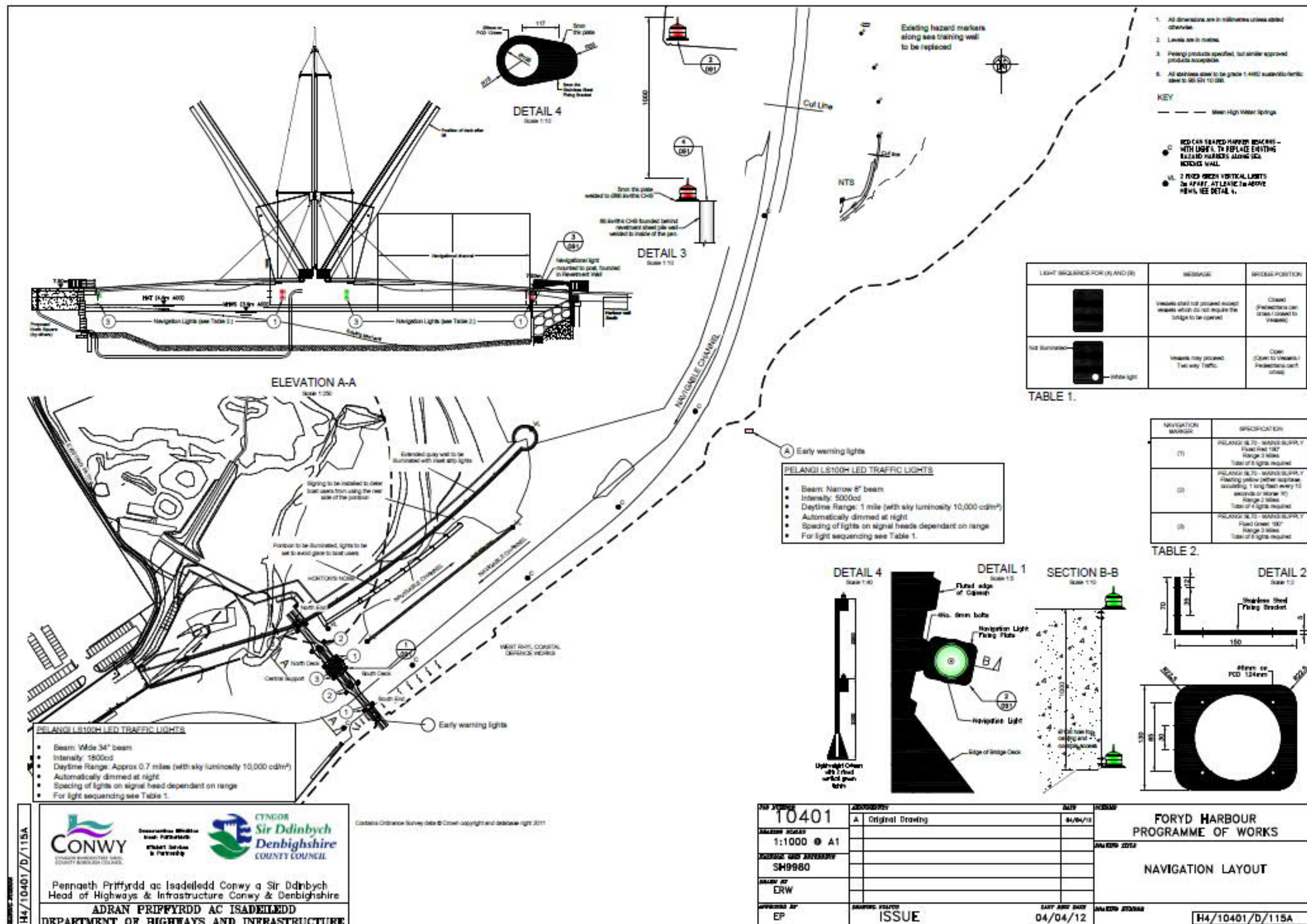
KEY		Testing Co-ordinates
(W)	Water Sample	299745;380942
(C)	Chemical Sample	299744;380971
(G)	Grading Analysis	299800;381007

H4/14409/D/03C	Cyngor sir ddinbych denbighshire County Council PENNAEH PRIFYRDD A GWASANAETHAU AMGYLCHEDDOL HEAD OF HIGHWAYS AND ENVIRONMENTAL SERVICES ADRAN PRIFYRDD A GWASANAETHAU AMGYLCHEDDOL DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES	This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Denbighshire County Council, 100033408, 2012 Allymyrthir y map hwn o ddwydddi yr Ordnance Survey gyda chartered yr Ordnance Survey ar ran Rheolwr Llyfrfa G. Meirnyddi © Hawthorn y Gorn. Mae allymyrthir hwn ganeddi yn tiri hawthorn y Gorn a gall hyn arwain at wneud neu achos all. Cyngor Sir Ddinbych, 100033408, 2012	14409 1:2500 A3 SJ0682 SB EP	ISSUE 01/02/18	RHYLL HARBOUR EMPOWERMENT ORDER, MARINE LICENCE TO DREDGING MARINE LICENCE AND SAND EXCAVATION

Rhyl Harbour Public Square and Extended Quay Wall

Environmental Statement Addendum - Maintenance Land Based Dredging

A.6 Navigation Plans



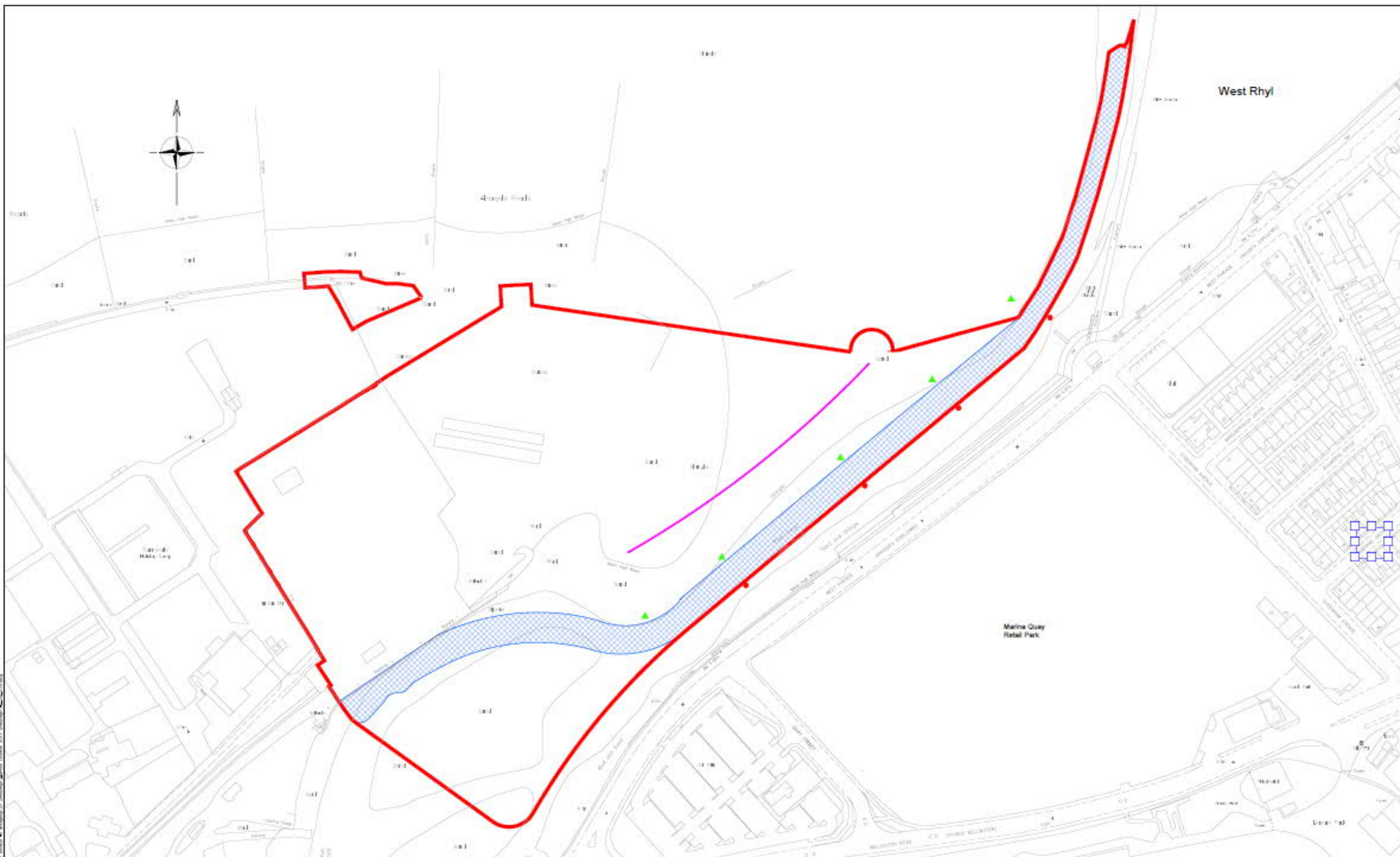
H4/10401/D/115A



Pennaeth Prifffyrdd ac Isadeiledd Conwy a Sir Ddinbych
Head of Highways & Infrastructure Conwy & Denbighshire
ADRAN PRIFFFYRDD AC ISADEILEDD
DEPARTMENT OF HIGHWAYS AND INFRASTRUCTURE

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10401 DRAWING SCALE 1:1000 @ A1 DRAWING AND APPROVAL SH9980 DRAWN BY ERW APPROVED BY EP	ADDRESSES A Original Drawing DATE 04/04/12 DRAWING REVISION ISSUE DATE AND TIME 04/04/12	PROJECT FORYD HARBOUR PROGRAMME OF WORKS NAVIGATION LAYOUT DRAWING NUMBER H4/10401/D/115A
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10401/EI/08/01A	CONWY CYNGOR SWYDDESTRY SŴOL COUNTY BOROUGH COUNCIL Penrhodri Prifffordd ac Isadeiledd Conwy a Sir Ddinbych Head of Highways & Infrastructure Conwy & Denbighshire ADRIAN PRIFFFORDD AC ISADEILEDD DEPARTMENT OF HIGHWAYS AND INFRASTRUCTURE	CYNGOR Sir Ddinbych Denbighshire COUNTY COUNCIL LEGEND - RED LINE: FORDYD HARBOUR PHASE 2 - GREEN TRIANGLE: GREEN ONE - FORDYD HARBOUR PHASE 2 - BLUE HATCHED: GREEN TWO - FORDYD HARBOUR PHASE 2 - PURPLE LINE: FORDYD HARBOUR PHASE 2 - FORDYD HARBOUR PHASE 2 - RED LINE: FORDYD HARBOUR PHASE 2 - FORDYD HARBOUR PHASE 2	10401 Scale: 1:1000 @ A1 SH9980 SB EP	10401 Original Drawing ISSUE 02/02/18	FORYD HARBOUR PHASE 2 RHYL ENVIRONMENTAL IMPACT ASSESSMENT NAVIGATION LAYOUT 10401/EI/08/01A
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Appendix B - HRA Screening Letter Report

Habitat Regulations Assessment

Introduction

A 'Habitats Regulation Assessment' was produced to support the 2011 ES in November 2011 by Jane Walsh Ltd. The findings of this report concluded that there would be no likely significant effects on European Sites. The report has been summarised below to reflect changes in the volume of dredged sediment over time.

A Habitats Regulations Assessment (HRA) refers to the assessment of the potential effects of a development on one or more Designated sites or their key features (species or habitats), which include Special Protection Areas (SPAs); Special Areas of Conservation (SACs), along with potential SPAs (pSPAs), candidate SACs (cSACs) and Ramsar sites, which are described below;

- SPAs are classified under the European Council Directive on the conservation of wild birds, for the protection of wild birds (including those listed in Annex 1) and their habitats;
- SACs are designated under the Habitats Directive, targeting particular habitats (Annex 1) and/or species (Annex II), identified as being of European importance; and
- Ramsar sites support important wetland habitats and are listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention 1971).

There are two European sites within the vicinity of the proposed dredging area; Liverpool Bay SPA and the Dee Estuary SAC, SPA and Ramsar Site.

Liverpool Bay SPA:

Liverpool Bay SPA qualifying species in the vicinity of the proposed scheme are red throated diver and common scoter. The main area for both of these species is known to be around Colwyn Bay which is located approximately 5.0km west.

The site is designated for the populations of non-breeding red-throated diver (*Gavia stellata*), migratory non-breeding population of common scoter (*Melanitta nigra*); and non-breeding assemblage of over 20,000 waterfowl. The SPA is approximately 0.8km from the scheme at its closest approach. The site extends from Moelfre on the north-east Anglesey coast (to the west of the proposed scheme), to Rossall Point near Fleetwood (to the east of the proposed scheme).

Dee Estuary SAC, SPA, Ramsar Site:

The Dee Estuary site lies approximately 8km east of Rhyl, and is designated as a SAC, SPA, Ramsar Site and Site of Special Scientific Interest (SSSI). The areas of these designated sites which are subject to tidal influence form the Dee Estuary European Marine Site.

The Dee Estuary SPA has the following qualifying features:

- Wintering bar-tailed godwit;
- Breeding common tern;
- Breeding little tern;
- Passage of the sandwich tern;
- Passage of redshank;
- Wintering shelduck;
- Wintering teal;
- Wintering pintail;
- Wintering oystercatcher;
- Wintering grey plover;

- Wintering knot
- Wintering dunlin;
- Wintering black-tailed godwit;
- Wintering grey plover;
- Wintering curlew; and
- Internationally important assemblage of regularly occurring waterbirds.

Legislative Background

In accordance with Article 6(3) of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('Habitats Directive'); 'Article 6 Assessments' are required where a plan (or project), not directly connected with or necessary to the management of a Natura 2000 site(s), may give rise to significant effects upon a Natura 2000 site(s). The requirement for Article 6 Assessments has been transposed into UK law under Regulation 61(2) of the Conservation of Habitats and Species Regulations 2010 ('Habitats Regulations') (S.I. 2010/490) and is commonly referred to as an 'Appropriate Assessment' or 'Habitats Regulations Assessment'. 'Appropriate Assessment' is taken to mean an assessment which is "appropriate to its purpose under the Habitats Directive and Habitats Regulations" and is not to be confused with the second of the Article 6 Assessments with the same name (Department for Communities and Local Government (DCLG), 2006).

Dredging Proposals

It is anticipated approximately 16,000 tonnes of sediment will require removal from the harbour and approach channel per year. It is expected that this work will be undertaken in March. The areas to be dredged are detailed on Drawing No. H4/14409/D/04. The works will be undertaken at low tide to avoid any contamination of the water.

Dredging will be completed by using 10t dumper trucks that will access the harbour via the boat slipway. These will be loaded by a 30t 'long reach' 360° excavator which will be located on the adjacent quay.

Sand will be removed by area and excavating in cells to reduce sediment plumes. Depending on the height and timing of low tide it is anticipated in the region of 1000 tonnes will be removed per tide equating to 30 vehicle movements per tide. The sand will be stored at the picnic area prior to being loaded onto HGV's to be taken to a recycling centre.

Water Quality Issues

There is potential for hydrocarbons to enter the Clwyd Estuary as a result of the dumpers using the inter tidal area during low tide. In order to reduce the likelihood of any spills or leaks all vehicles would be re-fuelled in the contractor's compound away from the shoreline. In addition, daily vehicle checks and maintenance would be completed to identify any leaks or damage to machinery. Work will be undertaken at low tide therefore minimising the potential impacts for hydrocarbons from excavation plant to enter the water. The contractor will prepare and follow an environmental management plan which will contain procedures for dealing with any spills with provision for deployment of absorbent pads or booms in the event of a spill and removal of affected sediment. The contractor will operate in accordance with relevant guidance for pollution prevention.

With the implementation of the above measures the residual impacts are likely to be negligible; therefore, no likely significant effects on European sites are anticipated in relation to pollution.

Effects of sediment re-suspension through dredging may be experienced however these will be temporary and very localised and therefore unlikely to have an impact on the key features of the Natura 2000 sites.

Dredging will take place in March and October should a specific need arise. This is outside the peak adult migration of salmon which is between June and September and at the end of the wintering bird season (October-March) hence no likely impacts are anticipated.

Disturbance

The British Trust for Ornithology (BTO) found that noise from construction does impact on some species of wildfowl and waders. Evidence generally suggests that birds adjust to noise levels and habituation of birds to noise, light and traffic disturbance is reported to be considerable, becoming tolerant over a relatively short period of time.

The site of the proposed works is located within a broad scale spawning area for mackerel, sand eel, whiting, sole, plaice, cod and sprat and a potential nursery area for cod, tope shark, anglerfish, plaice, sand eel, spotted ray, sole, thornback ray and whiting.

The noise and disturbance from machinery may affect fish movements in and out of the harbour. Many species of fish rely on sound for navigation/feeding and have highly sensitive hearing apparatus. These organisms are large enough to enable them to swim away from troublesome background dredging noises, but sudden high noise level blasts may affect them if they are in close proximity. The dredging operations will not generate high level blasts as there are no hard strata requiring breaking. There will be very limited undersea noise generation as the dredging work will be undertaken at low tide with no excavation beneath the water surface.

Provided that works are conducted outside of the spawning period, the significance of the effect on fish is anticipated to be low and short term. The extent of the impact will be site specific as fish are generally very mobile and could avoid the area with ease.

Another potential effect caused by the dredging activity is the possibility if turbidity is high in the area of dredging; benthic communities have the potential to become smothered. When turbidity is high, suspended sediment can clog gills and filter feeding organisms impairing respiration and food gathering. Small and recently settled life stages are especially vulnerable to smothering as organisms must maintain contact with the sediment water interface. The original sand/silt modelling was carried out by ABPmer and Hyder. Although these models do not contain this extended dredged area the results can be interpolated to identify how the area will be altered. It should also be noted that the proposed depths of dredging of the extended site are relatively small and these are unlikely to be seen in the model owing to the vertical accuracies. This addendum will assess the changes to the hydrodynamics and sediment regimes in relation to the impacts of the extended dredging area only.

Changes in sedimentation regime and characteristics (including the increased settlement of fine material and changes in grain size), may result in changes in benthic community structure. Shifts to finer sediments could be accompanied by a shift in benthic food webs from suspension to deposit feeding species. Fine silt and clay particles have slow fall velocities and are therefore transported much further than sand particles. If 'clean' sandy sediments are dredged the turbidity plume will be spatially confined and will cease once the dredging operation is complete.

Benthic impacts are usually confined to areas affected by dense plumes, with the extent and severity of impact most pronounced at low energy locations when water exchange and wave actions are limited. The potential for plumes of suspended sediment to form will be controlled by undertaking the dredging during low tide when the estuary sediments are exposed.

Bird feeding could be disrupted if suspended sediments become deposited and impact on benthic species that form their main prey hence why the dredging works will be carried out in March and October in order to minimise impact on bird species. Similarly, localised feeding by fish on benthic organisms could be

affected by the smothering of benthic species in the intertidal and subtidal zones.

Conclusions

The proposed extent of the maintenance dredging in Rhyl Harbour has significantly reduced since the first marine licence (BUML1472) was issued for dredging 22,000t of sediment per year. The renewal of that licence (DML1840) was issued for dredging 17,000t per year and this new renewal application is for 16,000t per year. Any effects from the continuing maintenance dredging of the harbour are considered unlikely to have significant effects on any European sites or their qualifying features.

Works are programmed for the end of the over wintering bird season and sedimentation is anticipated to have balanced itself prior to the time they return from migration.

Below is an extract from a letter received from the Marine Management Organisation (MMO) dated 3 November 2014 with regards to the screening opinion for the Proposed Harbour Empowerment Order relating to Habitat Regulations Assessment Screening:

'In addition to giving notice under the Act you also requested the MMO provide an indication of likely significant effect on Liverpool Bay SPA for the purposes of the Conservation of Habitats and Species Regulations 2010.

The MMO has considered the information provided and is of the opinion that the works are unlikely to have a significant effect on the Liverpool Bay Special Protection Area provided the mitigation described in the scoping report is adopted' [The mitigation described consists of undertaking the dredging using land-based excavators and dumpers to remove the sediment during low tide].

The application to renew the licence in 2018 was accompanied by a HRA report prepared by NRW which concluded that the project was not likely to have a significant effect on any Natura2000/Ramsar site, either alone or in combination. Given the reduced scale of the project with only half the volume of sediment to be dredged each year it is considered that this assessment remains valid. That assessment has been appended to this report.

NRW Screening Assessment

Appendix C – Monitoring Survey Results

C.1 Location 1 – Sand / Gravel Results



Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581126

Order No: PO2168703

Page 1 of 2

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the chemical analysis of a sample as per client request.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 1 Water
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	05/03/2018
Sampling Location:	Location 1
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Water
Target Specification:	N/A

Results:

See Attached

Comments:

The work was carried out by our competent, sub contracted laboratory.

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

STR Ref: Test Report Ref: STR 581126Page 2 of 2

Total Metals		
Iron	ug/l	2100
Dissolved Metals		
Arsenic	ug/l	< 5
Cadmium	ug/l	< 1
Chromium	ug/l	< 5
Copper	ug/l	< 5
Mercury	ug/l	< 0.1
Nickel	ug/l	< 5
Lead	ug/l	< 1
Selenium	ug/l	7
Zinc	ug/l	6
Anions		
Chloride	mg/l	1370
Inorganics		
Ammoniacal Nitrogen as N	mg/l	0.3
Miscellaneous		
pH	pH units	7.7
Phenols		
Total Phenols	ug/l	< 1
Polyaromatic hydrocarbons		
Naphthalene GCMS	ug/l	0.02
Acenaphthylene GCMS	ug/l	0.01
Acenaphthene GCMS	ug/l	0.02
Fluorene GCMS	ug/l	0.01
Phenanthrene GCMS	ug/l	0.04
Anthracene GCMS	ug/l	< 0.01
Fluoranthene GCMS	ug/l	0.07
Pyrene GCMS	ug/l	0.06
Benzo (a) anthracene GCMS	ug/l	0.03
Chrysene GCMS	ug/l	0.04
Benzo (b) fluoranthene GCMS	ug/l	0.05
Benzo (k) fluoranthene GCMS	ug/l	0.05
Benzo (a) pyrene GCMS	ug/l	0.05
Indeno (1,2,3-cd) pyrene GCMS	ug/l	0.04
Dibenzo(a,h)anthracene GCMS	ug/l	0.02
Benzo(ghi)perylene GCMS	ug/l	0.05
Total PAH(16) GCMS	ug/l	0.58
BTEX		
Benzene	ug/l	< 1.00
Toluene	ug/l	< 1.00
Ethylbenzene	ug/l	< 1.00
Xylenes	ug/l	< 1.00
MTBE	ug/l	< 1.00

STR REF - Test Report Ref: STR 581126 Page 3 of 3

TPH CWG		
>C5-C6 Aliphatic	ug/l	< 1.0
>C6-C8 Aliphatic	ug/l	< 1.0
>C8-C10 Aliphatic	ug/l	< 5.0
>C10-C12 Aliphatic	ug/l	< 5.0
>C12-C16 Aliphatic	ug/l	< 5.0
>C16-C21 Aliphatic	ug/l	< 5.0
>C21-C35 Aliphatic	ug/l	< 5.0
>C35-C40 Aliphatic	ug/l	< 5.0
Total (>C5-C40) Aliphatic	ug/l	< 5.0
>C5-C7 Aromatic	ug/l	< 1.0
>C7-C8 Aromatic	ug/l	< 1.0
>C8-C10 Aromatic	ug/l	< 5.0
>C10-C12 Aromatic	ug/l	< 5.0
>C12-C16 Aromatic	ug/l	< 5.0
>C16-C21 Aromatic	ug/l	< 5.0
>C21-C35 Aromatic	ug/l	< 5.0
>C35-C40 Aromatic	ug/l	< 5.0
Total (>C5-C40) Aromatic	ug/l	< 5.0
Total (>C5-C40) Ali/Aro	ug/l	< 5.0

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 06 March 2018
Test Report Ref: STR 581127

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

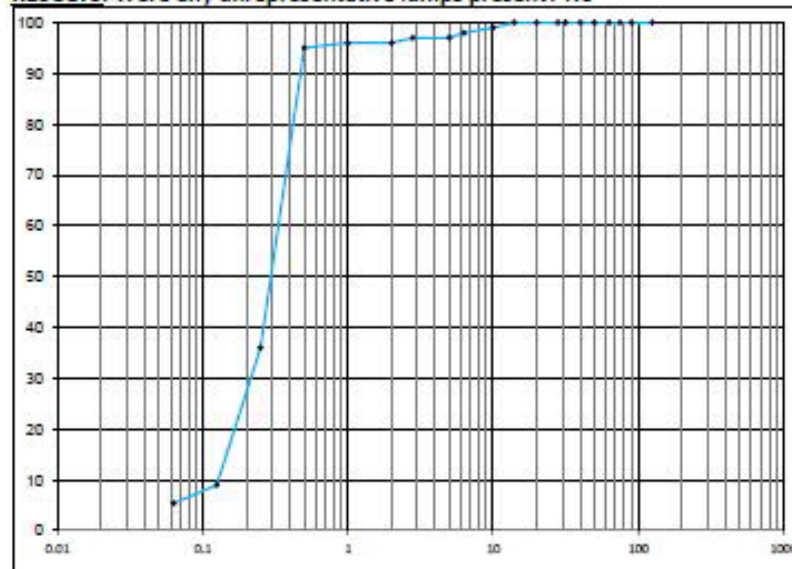
TEST REQUIREMENTS:

To determine the Particle Size Distribution (PSD) of a aggregate sample- washing and sieving method in accordance with BS EN 933-1: 2012.

SAMPLE DETAILS:

Certificate of sampling received: No Name of Source: Foryd Harbour, Rhyl
Laboratory Ref. No: S71094 Method of Sampling: Unknown
Client Ref. No: Location 1 Sand / Sc Sampled By: Client
Date and Time of Sampling: Unknown
Date of Receipt at Lab: 14/02/2018
Date of Start of Test: 28/02/2018
Sampling Location: Location 1
Material Description: Sand / Soil

RESULTS: Were any unrepresentative lumps present? No



BS Test Sieve Size	Percentage By Mass Passing	Specification Limit
125.0 mm	100	
90.0 mm	100	
75.0 mm	100	
63.0 mm	100	
50.0 mm	100	
40.0 mm	100	
31.5 mm	100	
28.0 mm	100	
20.0 mm	100	
14.0 mm	100	
10.0 mm	99	
6.3 mm	98	
5.0 mm	97	
2.8 mm	97	
2.0 mm	96	
1.0 mm	96	
0.500 mm	95	
0.250 mm	36	
0.125 mm	9	
0.063 mm	5.4	

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581135

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Water Content of aggregates by – drying in a ventilated oven according to BS EN 1097-5: 2008

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 1 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	28/02/2018
Sampling Location:	Location 1
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

RESULTS:

Water Content (%) = 20.5

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581140

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Permeability of a sample by the Constant Head
Method in accordance with BS 1377: 1990: Part 5.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 1 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	07/03/2018
Sampling Location:	Location 1
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

RESULTS:

Diameter of Permeameter Cell:	115 mm
Height of Permeameter Cell:	450mm
De aerated water used?	Yes / No
Proportion and size of material removed before preparing test sample:	21% >10mm
Method of placing and compacting:	Hand tamping / Placing under water
Dry Density:	1.557Mg/m ³
Coefficient of Permeability k at 20°C:	2.780x10 ⁻⁰⁵ m/sec

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote
Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581141

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Dry Density and Moisture Content Relationship of soil
2.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.3

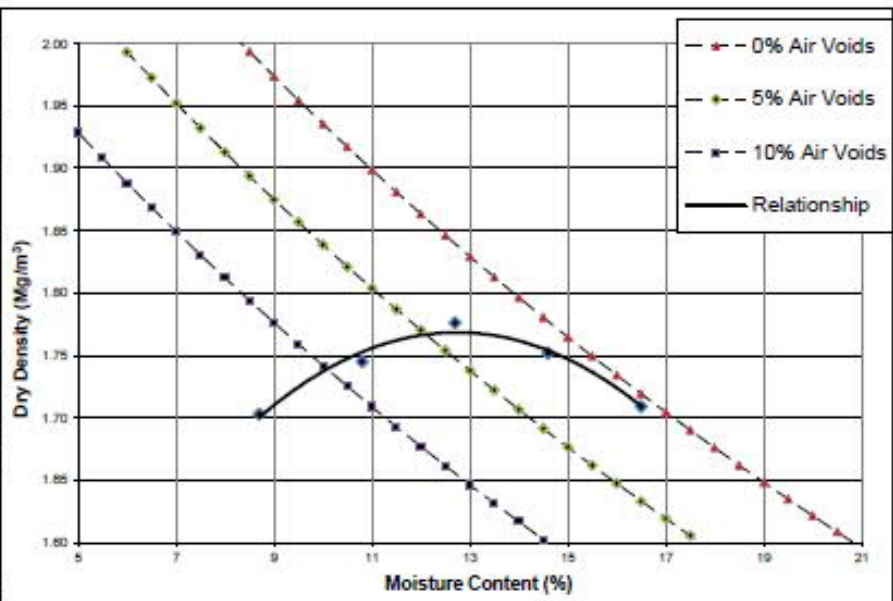
SAMPLE DETAILS:

Certificate of sampling received:	No	Name of Source:	Foryd Harbour, Rhyl
Laboratory Ref. No:	S71094	Method of Sampling:	Unknown
Client Ref. :	Location 1 Sand / Soil	Sampled By:	Client
Date and Time of Sampling:	Unknown	Unrepresentative lumps present?	No
Date of Receipt at Lab:	14/02/2018	Sample Preparation Procedure:	3.3.4.1
Date of Start of Test:	05/03/2018	Sample Preparation Method:	Single
Sampling Location:	Location 1		
Soil Description:	Sand / Soil		

RESULTS:

Particle Density: 2.4Mg/m³
(Assumed)

Retained on 37.5mm Sieve:	0 %
Retained on 20mm Sieve:	0 %
Moisture Content (%)	Dry Density Mg/m ³
8.7	1.70
10.8	1.75
12.7	1.78
14.6	1.75
16.5	1.71
Optimum Moisture Content (%)	Maximum Dry Density Mg/m ³
13	1.78



Comments:

None

Report checked and approved by:

S Parry-Didcote
Sharon Parry-Didcote
Aggregate Team Coordinator

C.2 Location 1 – Water Results



Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581123

Order No: PO2168703

Page 1 of 2

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the chemical analysis of a sample as per client request.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 1 Sand/Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	05/03/2018
Sampling Location:	Location 1
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand/Soil
Target Specification:	N/A

Results:

See Attached

Comments:

The work was carried out by our competent, sub contracted laboratory.

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote
Aggregate Team Coordinator

Metals		
Arsenic	mg/kg	10.6
Cadmium	mg/kg	< 0.5
Chromium	mg/kg	17.0
Copper	mg/kg	7.7
Lead	mg/kg	14.1
Mercury	mg/kg	< 0.5
Nickel	mg/kg	10.5
Selenium	mg/kg	< 1.0
Vanadium	mg/kg	31.9
Zinc	mg/kg	51.9
Anions		
Water Soluble Sulphate	mg/l	198
Inorganics		
Hexavalent Chromium	mg/kg	< 0.8
Total Sulphur	%	0.02
Total Potential Sulphate	%	0.06
Oxidisable sulphide (SO4)	% SO4	< 0.01
Acid Soluble Sulphate (SO4)	%	0.08
Water Soluble Boron	mg/kg	1.1
Miscellaneous		
Moisture Content	%	19.2
pH	pH units	8.5
Phenols		
Total Phenols	mg/kg	< 6
Polyaromatic hydrocarbons		
Naphthalene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Acenaphthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Phenanthrene	mg/kg	0.2
Anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	0.2
Chrysene	mg/kg	< 0.1
Benzo (b) fluoranthene	mg/kg	0.2
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo (a) pyrene	mg/kg	0.2
Indeno (1,2,3-cd) pyrene	mg/kg	< 0.1
Dibenzo[a,h]anthracene	mg/kg	< 0.1
Benzo[g,h,i]perylene	mg/kg	< 0.1
Total PAH(16)	mg/kg	1.3
BTEX		
Benzene	ug/kg	< 10.0
Toluene	ug/kg	< 10.0
Ethylbenzene	ug/kg	< 10.0
Xylenes	ug/kg	< 10.0
MTBE	ug/kg	< 10.0
TPH CWG		
>C5-C6 Aliphatic	mg/kg	< 0.01
>C6-C8 Aliphatic	mg/kg	< 0.01
>C8-C10 Aliphatic	mg/kg	< 1.0
>C10-C12 Aliphatic	mg/kg	< 1.0
>C12-C16 Aliphatic	mg/kg	< 1.0
>C16-C21 Aliphatic	mg/kg	< 1.0
>C21-C35 Aliphatic	mg/kg	< 1.0
>C35-C40 Aliphatic	mg/kg	< 1.0

[illegible]

C.3 Location 2 – Sand / Gravel Results



Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 06 March 2018
Test Report Ref: STR 581128

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

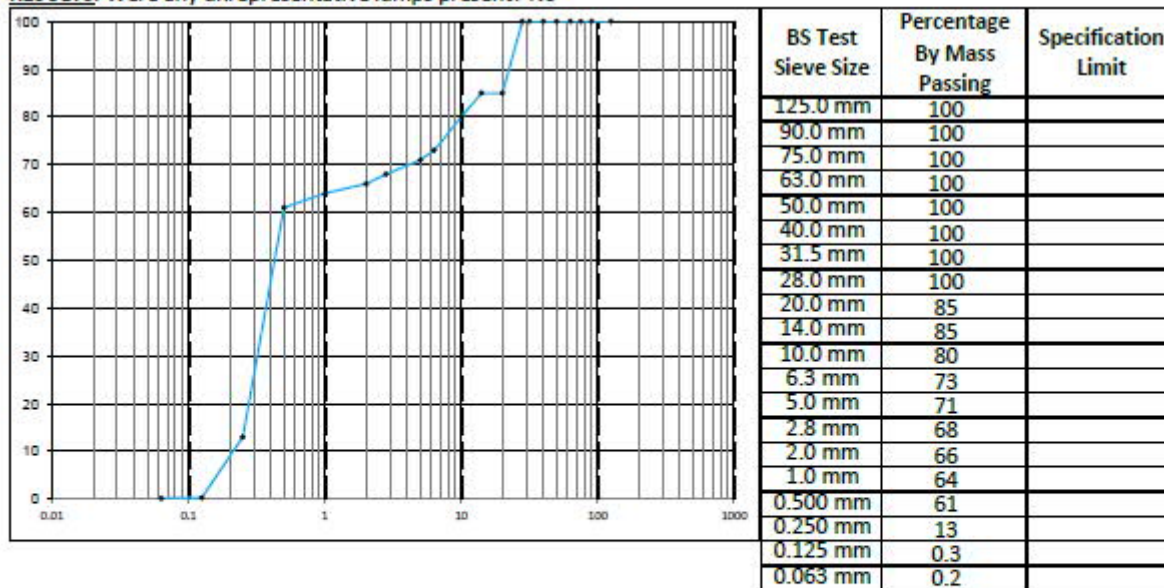
TEST REQUIREMENTS:

To determine the Particle Size Distribution (PSD) of a aggregate sample-
washing and sieving method in accordance with BS EN 933-1: 2012.

SAMPLE DETAILS:

Certificate of sampling received:	No	Name of Source:	Foryd Harbour, Rhyl
Laboratory Ref. No:	S71094	Method of Sampling:	Unknown
Client Ref. No:	Location 2 Sand / Sc	Sampled By:	Client
Date and Time of Sampling:	Unknown		
Date of Receipt at Lab:	14/02/2018		
Date of Start of Test:	28/02/2018		
Sampling Location:	Location 2		
Material Description	Sand / Soil		

RESULTS: Were any unrepresentative lumps present? No



Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581129

Order No: PO2168703

Page 1 of 3

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the chemical analysis of a sample as per client request.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	571094
Client Ref. No:	Location 2 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	05/03/2018
Sampling Location:	Location 2
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

Results:

See Attached

Comments:

The work was carried out by our competent, sub contracted laboratory.

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote
Aggregate Team Coordinator

STR Ref: Test Report Ref: STR 581129Page 2 of 3

Metals		
Arsenic	mg/kg	10.4
Cadmium	mg/kg	< 0.5
Chromium	mg/kg	12.7
Copper	mg/kg	< 5.0
Lead	mg/kg	8.2
Mercury	mg/kg	< 0.5
Nickel	mg/kg	6.2
Selenium	mg/kg	< 1.0
Vanadium	mg/kg	27.3
Zinc	mg/kg	28.3
Anions		
Water Soluble Sulphate	mg/l	49
Inorganics		
Hexavalent Chromium	mg/kg	< 0.8
Total Sulphur	%	< 0.01
Total Potential Sulphate	%	0.02
Oxidisable sulphide (SO4)	% SO4	< 0.01
Acid Soluble Sulphate (SO4)	%	0.03
Water Soluble Boron	mg/kg	< 0.5
Miscellaneous		
Moisture Content	%	10.5
pH	pH units	8.9
Phenols		
Total Phenols	mg/kg	< 6
Polyaromatic hydrocarbons		
Naphthalene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Acenaphthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Phenanthrene	mg/kg	< 0.1
Anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	< 0.1
Pyrene	mg/kg	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1
Chrysene	mg/kg	< 0.1
Benzo (b) fluoranthene	mg/kg	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo (a) pyrene	mg/kg	< 0.1
Indeno (1,2,3-cd) pyrene	mg/kg	< 0.1
Dibenzo(a,h)anthracene	mg/kg	< 0.1
Benzo(g,h,i)perylene	mg/kg	< 0.1
Total PAH(16)	mg/kg	< 0.4
BTEX		
Benzene	ug/kg	< 10.0
Toluene	ug/kg	< 10.0
Ethylbenzene	ug/kg	< 10.0
Xylenes	ug/kg	< 10.0
MTBE	ug/kg	< 10.0
TPH CWG		
>C5-C6 Aliphatic	mg/kg	< 0.01
>C6-C8 Aliphatic	mg/kg	< 0.01
>C8-C10 Aliphatic	mg/kg	< 1.0
>C10-C12 Aliphatic	mg/kg	< 1.0
>C12-C16 Aliphatic	mg/kg	< 1.0
>C16-C21 Aliphatic	mg/kg	< 1.0
>C21-C35 Aliphatic	mg/kg	< 1.0
>C35-C40 Aliphatic	mg/kg	< 1.0

STR REF - Test Report Ref: STR 581129 Page 3 of 3

[illegible]

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581142

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Water Content of aggregates by – drying in a ventilated oven according to BS EN 1097-5: 2008

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 2 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	28/02/2018
Sampling Location:	Location 2
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

RESULTS:

Water Content (%) = 7.9

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581147

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Permeability of a sample by the Constant Head
Method in accordance with BS 1377: 1990: Part 5.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 2 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	09/03/2018
Sampling Location:	Location 2
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

RESULTS:

Diameter of Permeameter Cell:	115 mm
Height of Permeameter Cell:	450mm
De aerated water used?	Yes / No
Proportion and size of material removed before preparing test sample:	14% >10mm
Method of placing and compacting:	Hand tamping / Placing under water
Dry Density:	1.592Mg/m ³
Coefficient of Permeability k at 20°C:	3.336x10 ⁻⁰⁵ m/sec

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581148

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Dry Density and Moisture Content Relationship of soil
2.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.3

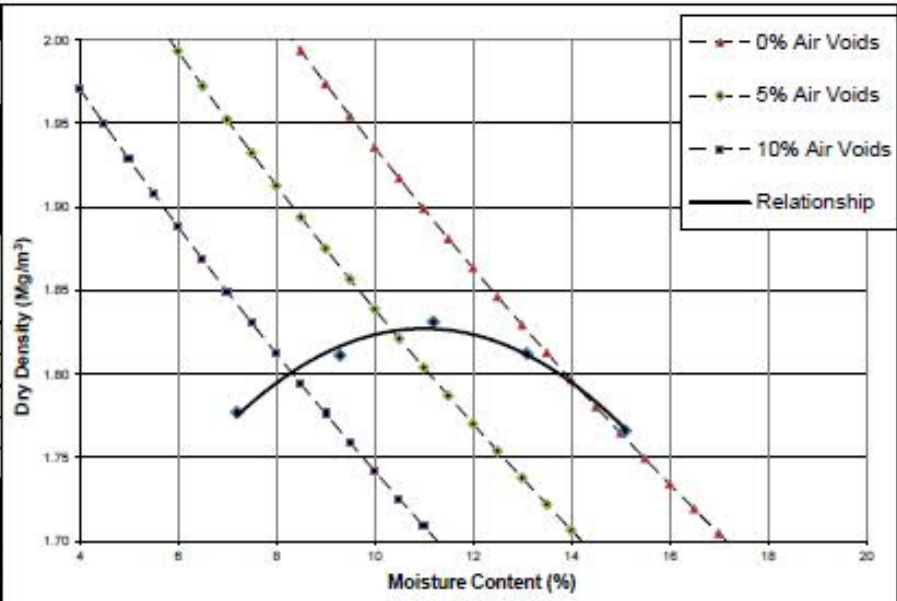
SAMPLE DETAILS:

Certificate of sampling received:	No	Name of Source:	Foryd Harbour, Rhyl
Laboratory Ref. No:	S71094	Method of Sampling:	Unknown
Client Ref. :	Location 2 Sand / Soil	Sampled By:	Client
Date and Time of Sampling:	Unknown	Unrepresentative lumps present?	No
Date of Receipt at Lab:	14/02/2018	Sample Preparation Procedure:	3.3.4.1
Date of Start of Test:	09/03/2018	Sample Preparation Method:	Single
Sampling Location:	Location 2		
Soil Description:	Sand / Soil		

RESULTS:

Particle Density: 2.4Mg/m³
(Assumed)

Retained on 37.5mm Sieve:	0 %
Retained on 20mm Sieve:	0 %
Moisture Content (%)	Dry Density Mg/m ³
7.2	1.78
9.3	1.81
11.2	1.83
13.1	1.81
15.1	1.77
Optimum Moisture Content (%)	Maximum Dry Density Mg/m ³
11	1.83



Comments:

None

Report checked and approved by:

S Parry-Didcote
Sharon Parry-Didcote
Aggregate Team Coordinator

C.4 Location 2 – Water Results



Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581124

Order No: PO2168703

Page 1 of 3

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the chemical analysis of a sample as per client request.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	571094
Client Ref. No:	Location 2 Water
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	05/03/2018
Sampling Location:	Location 2
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Water
Target Specification:	N/A

Results:

See Attached

Comments:

The work was carried out by our competent, sub contracted laboratory.

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

STR Ref: Test Report Ref: STR 581124Page 2 of 3

Total Metals		
Iron	ug/l	3140
Dissolved Metals		
Arsenic	ug/l	< 5
Cadmium	ug/l	< 1
Chromium	ug/l	< 5
Copper	ug/l	< 5
Mercury	ug/l	< 0.1
Nickel	ug/l	< 5
Lead	ug/l	< 1
Selenium	ug/l	6
Zinc	ug/l	< 5
Anions		
Chloride	mg/l	1040
Inorganics		
Ammoniacal Nitrogen as N	mg/l	0.2
Miscellaneous		
pH	pH units	7.7
Phenols		
Total Phenols	ug/l	< 1
Polyaromatic hydrocarbons		
Naphthalene GCMS	ug/l	0.02
Acenaphthylene GCMS	ug/l	< 0.01
Acenaphthene GCMS	ug/l	0.02
Fluorene GCMS	ug/l	< 0.01
Phenanthrene GCMS	ug/l	0.04
Anthracene GCMS	ug/l	0.01
Fluoranthene GCMS	ug/l	0.06
Pyrene GCMS	ug/l	0.05
Benzo (a) anthracene GCMS	ug/l	0.02
Chrysene GCMS	ug/l	0.03
Benzo (b) fluoranthene GCMS	ug/l	0.03
Benzo (k) fluoranthene GCMS	ug/l	0.03
Benzo (a) pyrene GCMS	ug/l	0.02
Indeno (1,2,3-cd) pyrene GCMS	ug/l	0.02
Dibenzo(a,h)anthracene GCMS	ug/l	< 0.01
Benzo(ghi)perylene GCMS	ug/l	0.03
Total PAH(16) GCMS	ug/l	0.39
BTEX		
Benzene	ug/l	< 1.00
Toluene	ug/l	< 1.00
Ethylbenzene	ug/l	< 1.00
Xylenes	ug/l	< 1.00
MTBE	ug/l	< 1.00

STR REF - Test Report Ref: STR 581124 Page 3 of 3

[illegible]

C.5 Location 3 – Sand / Gravel Results



Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 06 March 2018
Test Report Ref: STR 581130

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

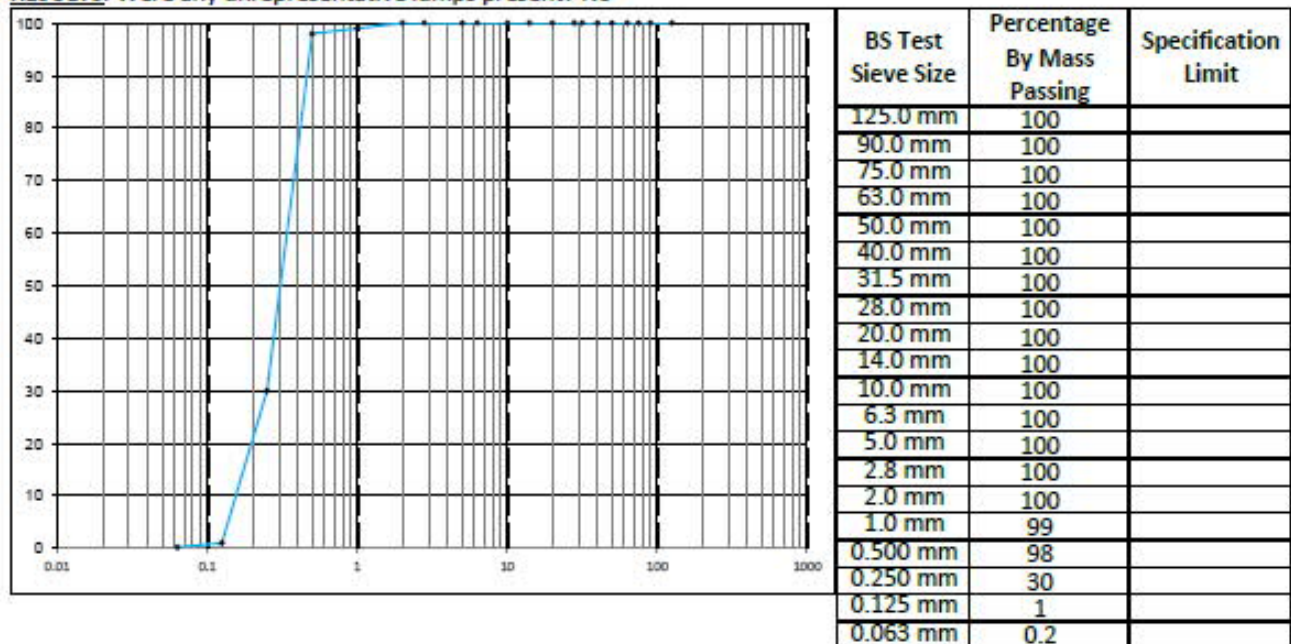
TEST REQUIREMENTS:

To determine the Particle Size Distribution (PSD) of a aggregate sample-
washing and sieving method in accordance with BS EN 933-1: 2012.

SAMPLE DETAILS:

Certificate of sampling received:	No	Name of Source:	Foryd Harbour, Rhyl
Laboratory Ref. No:	S71094	Method of Sampling:	Unknown
Client Ref. No:	Location 3 Sand / Sc	Sampled By:	Client
Date and Time of Sampling:	Unknown		
Date of Receipt at Lab:	14/02/2018		
Date of Start of Test:	28/02/2018		
Sampling Location:	Location 3		
Material Description	Sand / Soil		

RESULTS: Were any unrepresentative lumps present? No



Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581131

Order No: PO2168703

Page 1 of 3

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the chemical analysis of a sample as per client request.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	571094
Client Ref. No:	Location 3 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	05/03/2018
Sampling Location:	Location 3
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

Results:

See Attached

Comments:

The work was carried out by our competent, sub contracted laboratory.

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

STR Ref: Test Report Ref: STR 581131Page 2 of 3

Metals		
Arsenic	mg/kg	13.3
Cadmium	mg/kg	< 0.5
Chromium	mg/kg	16.9
Copper	mg/kg	< 5.0
Lead	mg/kg	10.2
Mercury	mg/kg	< 0.5
Nickel	mg/kg	7.8
Selenium	mg/kg	< 1.0
Vanadium	mg/kg	32.3
Zinc	mg/kg	40.5
Anions		
Water Soluble Sulphate	mg/l	60
Inorganics		
Hexavalent Chromium	mg/kg	< 0.8
Total Sulphur	%	0.01
Total Potential Sulphate	%	0.04
Oxidisable sulphide (SO ₄)	% SO ₄	< 0.01
Acid Soluble Sulphate (SO ₄)	%	0.04
Water Soluble Boron	mg/kg	< 0.5
Miscellaneous		
Moisture Content	%	19.0
pH	pH units	8.8
Phenols		
Total Phenols	mg/kg	< 6
Polyaromatic hydrocarbons		
Naphthalene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Acenaphthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Phenanthrene	mg/kg	< 0.1
Anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	< 0.1
Pyrene	mg/kg	< 0.1
Benzo[a]anthracene	mg/kg	< 0.1
Chrysene	mg/kg	< 0.1
Benzo (b) fluoranthene	mg/kg	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo (a) pyrene	mg/kg	< 0.1
Indeno (1,2,3-cd) pyrene	mg/kg	< 0.1
Dibenzo(a,h)anthracene	mg/kg	< 0.1
Benzo[g,h,i]perylene	mg/kg	< 0.1
Total PAH(16)	mg/kg	< 0.4
BTEX		
Benzene	ug/kg	< 10.0
Toluene	ug/kg	< 10.0
Ethylbenzene	ug/kg	< 10.0
Xylenes	ug/kg	< 10.0
MTBE	ug/kg	< 10.0
TPH CWG		
>C5-C6 Aliphatic	mg/kg	< 0.01
>C6-C8 Aliphatic	mg/kg	< 0.01
>C8-C10 Aliphatic	mg/kg	< 1.0
>C10-C12 Aliphatic	mg/kg	< 1.0
>C12-C16 Aliphatic	mg/kg	< 1.0
>C16-C21 Aliphatic	mg/kg	< 1.0
>C21-C35 Aliphatic	mg/kg	< 1.0
>C35-C40 Aliphatic	mg/kg	< 1.0

[illegible]

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581149

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Water Content of aggregates by – drying in a ventilated oven according to BS EN 1097-5: 2008

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S71094
Client Ref. No:	Location 3 Sand / Soil
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	28/02/2018
Sampling Location:	Location 3
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Sand / Soil
Target Specification:	N/A

RESULTS:

Water Content (%) = 23.5

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote

Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581154

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Permeability of a sample by the Constant Head
Method in accordance with BS 1377: 1990: Part 5.

SAMPLE DETAILS:

Certificate of sampling received: No
Laboratory Ref. No: S71094
Client Ref. No: Location 3 Sand / Soil
Date and Time of Sampling: Unknown
Date of Receipt at Lab: 14/02/2018
Date of Start of Test: 09/03/2018
Sampling Location: Location 3
Name of Source: Foryd Harbour, Rhyl
Method of Sampling: Unknown
Sampled By: Client
Material Description: Sand / Soil
Target Specification: N/A

RESULTS:

Diameter of Permeameter Cell:	115 mm
Height of Permeameter Cell:	450mm
De aerated water used?	Yes / No
Proportion and size of material removed before preparing test sample:	1% >10mm
Method of placing and compacting:	Hand tamping / Placing under water
Dry Density:	1.545Mg/m ³
Coefficient of Permeability k at 20°C:	2.224x10 ⁻⁰⁵ m/sec

Comments:

None

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote
Aggregate Team Coordinator

Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581155

Order No: PO2168703

Page 1 of 1

Contract: Foryd Harbour, Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Dry Density and Moisture Content Relationship of soil
2.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.3

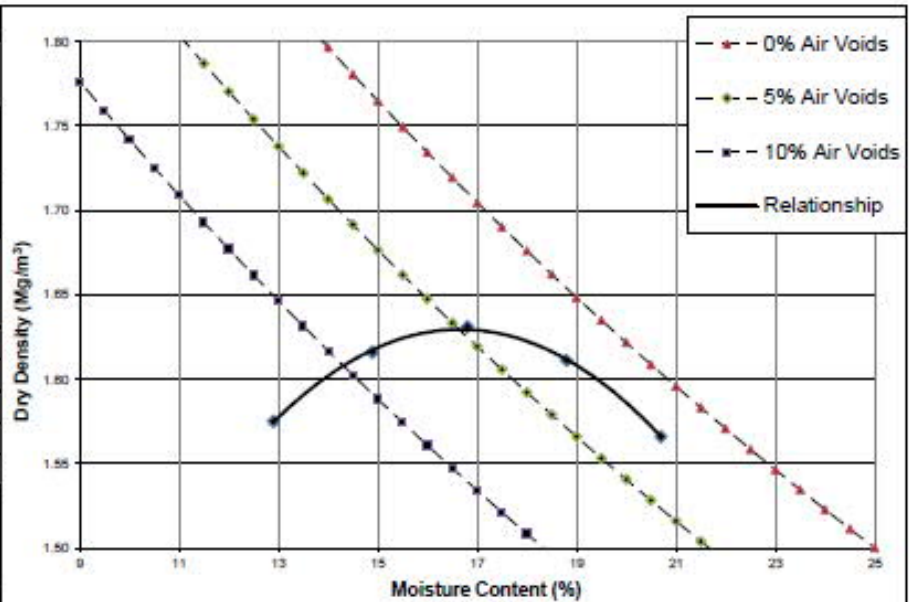
SAMPLE DETAILS:

Certificate of sampling received:	No	Name of Source:	Foryd Harbour, Rhyl
Laboratory Ref. No:	S71094	Method of Sampling:	Unknown
Client Ref. :	Location 3 Sand / Soil	Sampled By:	Client
Date and Time of Sampling:	Unknown	Unrepresentative lumps present?	No
Date of Receipt at Lab:	14/02/2018	Sample Preparation Procedure:	3.3.4.1
Date of Start of Test:	09/03/2018	Sample Preparation Method:	Single
Sampling Location:	Location 3		
Soil Description:	Sand / Soil		

RESULTS:

Particle Density: 2.4Mg/m³
(Assumed)

Retained on 37.5mm Sieve:	0 %
Retained on 20mm Sieve:	0 %
Moisture Content (%)	Dry Density Mg/m ³
12.9	1.58
14.9	1.62
16.8	1.63
18.8	1.61
20.7	1.57
Optimum Moisture Content (%)	Maximum Dry Density Mg/m ³
17	1.63



Comments:

None

Report checked and approved by:

S Parry-Didcote
Sharon Parry-Didcote
Aggregate Team Coordinator

C.6 Location 3 – Water Results



Denbighshire County Council
County Offices
Wynnstay Road
Ruthin
LL15 1YN

Date: 15 March 2018
Test Report Ref: STR 581125

Order No: PO2168703

Page 1 of 3

Contract: Foryd Harbour , Rhyl

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the chemical analysis of a sample as per client request.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	571094
Client Ref. No:	Location 3 Water
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/02/2018
Date of Start of Test:	05/03/2018
Sampling Location:	Location 3
Name of Source:	Foryd Harbour, Rhyl
Method of Sampling:	Unknown
Sampled By:	Client
Material Description:	Water
Target Specification:	N/A

Results:

See Attached

Comments:

The work was carried out by our competent, sub contracted laboratory.

Report checked and approved by:

S Parry-Didcote

Sharon Parry-Didcote
Aggregate Team Coordinator

STR Ref: Test Report Ref: STR 581125Page 2 of 3

Total Metals		
Iron	ug/l	2270
Dissolved Metals		
Arsenic	ug/l	< 5
Cadmium	ug/l	< 1
Chromium	ug/l	< 5
Copper	ug/l	< 5
Mercury	ug/l	< 0.1
Nickel	ug/l	< 5
Lead	ug/l	< 1
Selenium	ug/l	< 5
Zinc	ug/l	< 5
Anions		
Chloride	mg/l	652
Inorganics		
Ammoniacal Nitrogen as N	mg/l	0.2
Miscellaneous		
pH	pH units	7.7
Phenols		
Total Phenols	ug/l	< 1
Polyaromatic hydrocarbons		
Naphthalene GCMS	ug/l	0.03
Acenaphthylene GCMS	ug/l	0.01
Acenaphthene GCMS	ug/l	0.03
Fluorene GCMS	ug/l	0.01
Phenanthrene GCMS	ug/l	0.05
Anthracene GCMS	ug/l	0.02
Fluoranthene GCMS	ug/l	0.05
Pyrene GCMS	ug/l	0.05
Benzo (a) anthracene GCMS	ug/l	0.03
Chrysene GCMS	ug/l	0.03
Benzo (b) fluoranthene GCMS	ug/l	0.04
Benzo (k) fluoranthene GCMS	ug/l	0.03
Benzo (a) pyrene GCMS	ug/l	0.04
Indeno (1,2,3-cd) pyrene GCMS	ug/l	0.02
Dibenzo(a,h)anthracene GCMS	ug/l	< 0.01
Benzo(ghi)perylene GCMS	ug/l	0.04
Total PAH(16) GCMS	ug/l	0.48
BTEX		
Benzene	ug/l	< 1.00
Toluene	ug/l	< 1.00
Ethylbenzene	ug/l	< 1.00
Xylenes	ug/l	< 1.00
MTBE	ug/l	< 1.00

STR REF - Test Report Ref: STR 581125 Page 3 of 3

[illegible]

Appendix D - Water and Sediment Quality Supplementary Data



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JACOBS

**CERTIFICATE OF TEST
TYSTYSGRIF PRAWF**

0888

Authorised signatories:

W.H. Gosling (Technical Director)
H.D.M. John (Principal Engineer)
C.P. Bradley (Materials Engineer) /
J.A. Evans (Principal Technician)

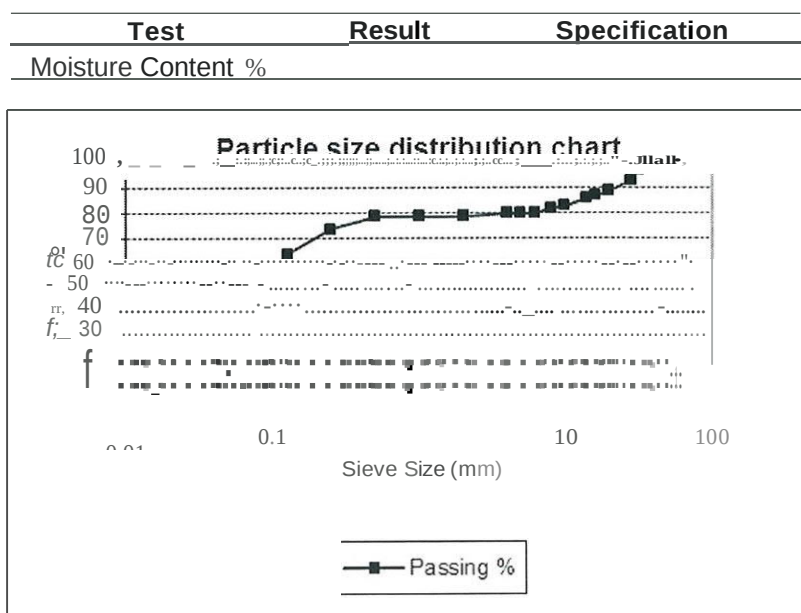
REPORT ON PARTICLE SIZE DISTRIBUTION

Page 1 of 1
Date 12/12/2014

J.A.Evans(Principal Technician)					
LabRef No.	14W5039	Test No.	1	Site / Client Ref.	1
Scheme/ Site	Forvd Harbour, Rhyl				
Location	Sample 1				
Material	General Aggregate Grading				
Specification	General Aggregate Grading				
Contractor	Not Applicable			Aggregate Type	Nat.Sand/Gravel
Source	On Site			Ticket No.	N/A
Date Sampled	N/K	Time Sampled		Date Received	28/11/2014
Sampled By	Client			Date Tested - From	02/12/2014
Sample Type	Bulk			Date Tested - To	11/12/2014

TEST RESULTS

Sieve	Passing %	Specification
75mm	100	-
63mm	100	-
50mm	100	-
40mm	100	-
31.5mm	97	-
28mm	93	-
20mm	89	-
16mm	87	-
14mm	86	-
10mm	83	-
8mm	82	-
6.3mm	80	-
5mm	80	-
4mm	80	-
2mm	79	-
1mm	79	-
0.5mm	79	-
0.25mm	74	-
0.125mm	64	-



Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
Remarks:

Result for Information.

Certificate of Sampling Not Available .

Sampling Method Not sampled by Jacobs Staff.
Preparation Method BS EN 932-2:1999
Test Method BS EN 933-1:1997 : (Wet Sieving)

Client Name BS EN 1097-5:1999 (Moisture Content)
Denbighshire County Council
Environment Directorate
Caledfryn
Smithfield Road
Denbigh
Postcode **LL16 3RJ**
FAO **Claire Wyn-Jones**

Signed



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JACOe s

**CERTIFICATE OF TEST
TYSTYSGRIF PRAWF**

Authorised signatories:

W H Gosling (Technical Director)
H D M. John (Principal Engineer)
C P Bradley (Materials Engineer)
J.A. Evans (Principal Technician)

REPORT ON PARTICLE SIZE DISTRIBUTION

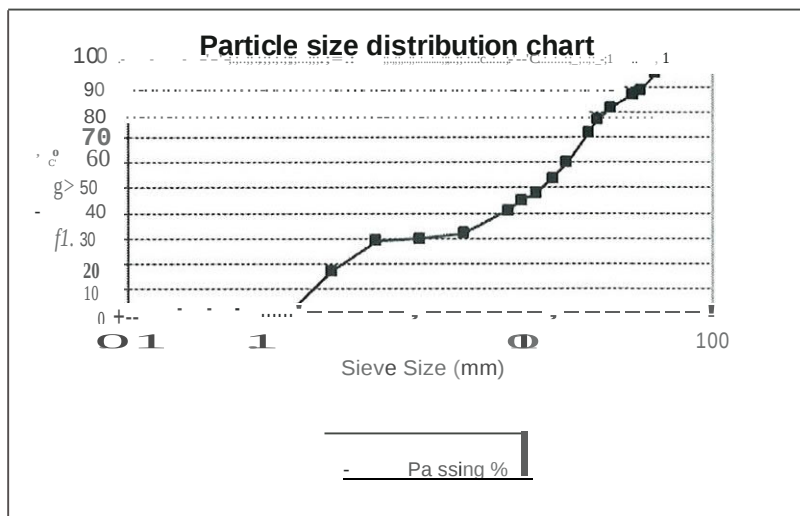
Page 1 of 1
Date 12/12/2014

LabRef No.	14W5040	Test No.	1	Site / Client Ref.	2
Scheme / Site	Foryd Harbour, Rhyl				
Location	Sample 2				
Material	General Am:iregate Grading				
Specification	General Aggregate Grading				
Contractor	Not Applicable	Aaareate Tvoe		Nat.Sand/Gravel	
Source	On Site	Ticket No.		N/A	
Date Sampled	N/K	Time Sampled		Date Received	28/11/2014
Sampled By	Client	Date Tested - From		02/12/2014	
Sample Type	Bulk	Date Tested - To		11/12/2014	

TEST RESULTS

Sieve	Passino %	Specification
75mm	100	-
63mm	100	-
50mm	100	-
40mm	96	-
31.5mm	89	-
28mm	87	-
20mm	82	-
16mm	77	-
14mm	72	-
10mm	60	-
8mm	54	-
6.3mm	48	-
5mm	45	-
4mm	41	-
2mm	32	-
1mm	30	-
0.5mm	29	-
0.25mm	17	-
0.125mm	0	-
0.063mm	0.3	-

Test	Result	Specification
Moisture Content %		



Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Remarks:

Result for Information.

Certificate of Sampling Not Available.

Sampling Method Not sampled by Jacobs Staff.
Preparation Method BS EN 932-2:1999
Test Method BS EN 933-1:1997: (Wet Sieving)
BS EN 1097-5:1999 (Moisture Content)

Client Name Denbighshire County Council
Environment Directorate
Caledfryn
Smithfield Road

Postcode LL16 3RJ
FAO Claire Wyn-Jones

Signed

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JACOes

CERTIFICATE OF TEST
TYSTYSGRIF PRAWF

Authorised signatories:

W H Gosling (Technical Director)
H D M. John (Principal Engineer)
C P Bradley (Materials Engineer) /
J A Evans (Principal Technician)

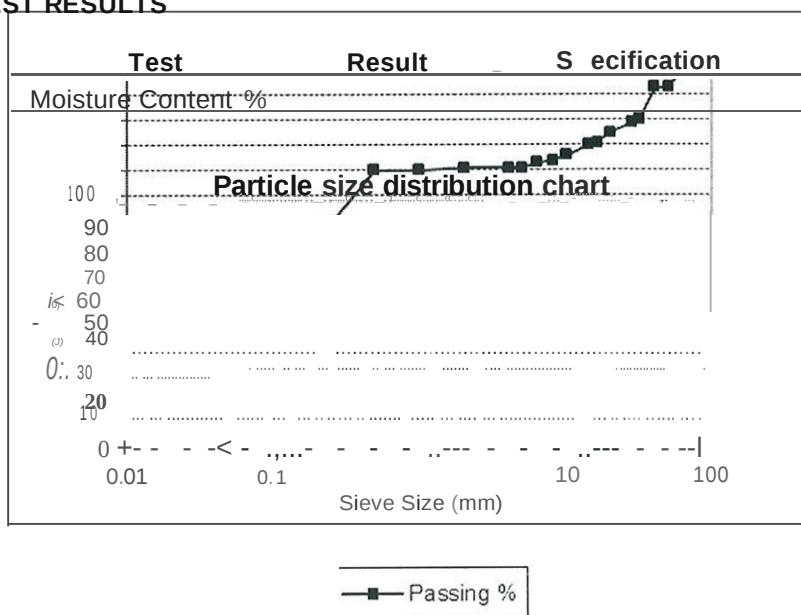
**REPORT ON PARTICLE SIZE
DISTRIBUTION**

Page 1 of 1
Date 12/12/2014

J A Evans (Principal Technician)					
LabRef No.	14W5041	Test No.	1	Site/ Client Ref.	3
Scheme / Site	Forvd Harbour. Rhyl				
Location	Sample 3				
Material	General Aaareaate Gradina				
Specification	General Aaareaate Gradina				
Contractor	Not Applicable			Aaareaate Tvoe	Nat.Sand/Gravel
Source	On Site			Ticket No.	N/A
Date Sampled	N/K	Time Sampled	Date Received	28/11/2014	
Sampled By	Client		Date Tested - From	02/12/2014	
Sample Type	Bulk		Date Tested - To	11/12/2014	

TEST RESULTS

Sieve	Passing %	Specification
75mm	100	-
63mm	100	-
50mm	93	-
40mm	93	-
31.5mm	80	-
28mm	79	-
20mm	75	-
16mm	71	-
14mm	70	-
10mm	66	-
8mm	64	-
6.3mm	63	-
5mm	61	-
4mm	61	-
2mm	61	-
1mm	61	-
0.5mm	61	-
0.25mm	60	-
0.125mm	60	-
0.063mm	39	-



Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Remarks:

Result for Information.

Certificate of Sampling Not Available.

Sampling Method Not sampled by Jacobs Staff.
Preparation Method BS EN 932-2:1999
Test Method BS EN 933-1:1997 : (Wet Sieving)
BS EN 1097-5:1999 (Moisture Content)

Client Name **Denbighshire County Council**
Environment Directorate
Caledfryn
Smithfield Road
Denbigh

Postcode
FAO

LL163RJ
Claire Wyn-Jones

Signed

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Final Report

Report Number: 14-15683 Issue-1

Initial Date of Issue: 09-Dec-14

Client: Denbighshire County Council

Client Address: Caledfryn
Smithfield Road
Denbigh
Denbighshire
LL16 3RJ

Contact(s): Claire Wyn-Jones

Project: Foryd Harbour Rhyl

Quotation No.: **Date Received:** 02-Dec-14

Order No.: **Date Instructed:** 02-Dec-14

No. of Samples: 2 **Results Due:** 08-Dec-14

Turnaround:
(Weekdays) 5

Date Approved: 09-Dec-14

Approved By:

Details: Darrell Hall, Laboratory Director

Results Summary - Soil

Project: Foryd Harbour Rhyl

Client: Denbighshire County Council	Chemtest Job No.:		14-15683		
Quotation No.:	Chemtest Sample ID.:		76487		
Order No.:	Client Sample Ref.:		Soil		
	Client Sample ID.:		Foryd Harbour		
	Sample Type:		SOIL		
	Top Depth (m):				
	Bottom Depth(m):				
	Date Sampled:		28-Nov-14		
Determinand	Accred.	SOP	Units	LOD	
Moisture	N	2030	%	0.02	3.7
pH	U	2010			9.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4	0.81
Sulphate (Total)	U	2430	%	0.01	0.027
Arsenic	U	2450	mg/kg	1	9.1
Cadmium	U	2450	mg/kg	0.1	0.10
Chromium	U	2450	mg/kg	1	9.1
Copper	U	2450	mg/kg	0.5	15
Nickel	U	2450	mg/kg	0.5	13
Lead	U	2450	mg/kg	0.5	38
Selenium	U	2450	mg/kg	0.2	< 0.20
Vanadium	U	2450	mg/kg	5	23
Zinc	U	2450	mg/kg	0.5	43
Mercury (Elemental)	N	2460	mg/kg	0.1	< 0.10
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1	< 0.10
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1	< 0.10
Aliphatic TPH >C8-C10	U	2675	mg/kg	0.1	< 0.10
Aliphatic TPH >C10-C12	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C21-C35	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C35-C44	U	2675	mg/kg	1	< 1.0
Total Aliphatic Hydrocarbons	U	2675	mg/kg	5	< 5.0
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1	< 0.10
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1	< 0.10
Aromatic TPH >C8-C10	U	2675	mg/kg	0.1	< 0.10
Aromatic TPH >C10-C12	N	2675	mg/kg	1	< 1.0
Aromatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0
Aromatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0
Aromatic TPH >C21-C35	N	2675	mg/kg	1	< 1.0
Aromatic TPH >C35-C44	N	2675	mg/kg	1	< 1.0

Results Summary - Soil

Project: Foryd Harbour Rhyll

Client: Denbighshire County Council	Chemtest Job No.:		14-15683		
Quotation No.:	Chemtest Sample ID.:		76487		
Order No.:	Client Sample Ref.:		Soil		
	Client Sample ID.:		Foryd Harbour		
	Sample Type:		SOIL		
	Top Depth (m):				
	Bottom Depth(m):				
	Date Sampled:		28-Nov-14		
Determinand	Accred.	SOP	Units	LOD	
Total Aromatic Hydrocarbons	U	2675	mg/kg	5	< 5.0
Total Petroleum Hydrocarbons	U	2675	mg/kg	10	< 10
Naphthalene	U	2700	mg/kg	0.1	< 0.10
Acenaphthylene	U	2700	mg/kg	0.1	< 0.10
Acenaphthene	U	2700	mg/kg	0.1	< 0.10
Fluorene	U	2700	mg/kg	0.1	< 0.10
Phenanthrene	U	2700	mg/kg	0.1	< 0.10
Anthracene	U	2700	mg/kg	0.1	< 0.10
Fluoranthene	U	2700	mg/kg	0.1	< 0.10
Pyrene	U	2700	mg/kg	0.1	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.1	< 0.10
Chrysene	U	2700	mg/kg	0.1	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.1	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.1	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2	< 2.0
Organotin (total as TBTO)	N	2730	µg/kg	10	< 10
Benzene	U	2760	µg/kg	1	< 1.0
Toluene	U	2760	µg/kg	1	< 1.0
Ethylbenzene	U	2760	µg/kg	1	< 1.0
m & p-Xylene	U	2760	µg/kg	1	< 1.0
o-Xylene	U	2760	µg/kg	1	< 1.0
PCB 28	U	2810	mg/kg	0.01	< 0.010
PCB 52	U	2815	mg/kg	0.01	< 0.010
PCB 101	U	2815	mg/kg	0.01	< 0.010
PCB 118	U	2815	mg/kg	0.01	< 0.010
PCB 153	U	2815	mg/kg	0.01	< 0.010
PCB 138	U	2815	mg/kg	0.01	< 0.010
PCB 180	U	2810	mg/kg	0.01	< 0.010

Results Summary - Soil

Project: Foryd Harbour Rhyll

Client: Denbighshire County Council	Chemtest Job No.: 14-15683				
Quotation No.:	Chemtest Sample ID.: 76487				
Order No.:	Client Sample Ref.: Soil				
	Client Sample ID.: Foryd Harbour				
	Sample Type: SOIL				
	Top Depth (m):				
	Bottom Depth(m):				
	Date Sampled: 28-Nov-14				
Determinand	Accred.	SOP	Units	LOD	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.1	< 0.10
Alpha-Lindane	N	2840	mg/kg	0.2	< 0.20
Gamma-Lindane	N	2840	mg/kg	0.2	< 0.20
Beta-Lindane	N	2840	mg/kg	0.2	< 0.20
Delta-Lindane	N	2840	mg/kg	0.2	< 0.20
Heptachlor	N	2840	mg/kg	0.2	< 0.20
Aldrin	N	2840	mg/kg	0.2	< 0.20
Heptachlor Epoxide	N	2840	mg/kg	0.2	< 0.20
Gamma-Chlordane	N	2840	mg/kg	0.2	< 0.20
Alpha-Chlordane	N	2840	mg/kg	0.2	< 0.20
Endosulfan I	N	2840	mg/kg	0.2	< 0.20
4,4-DDE	N	2840	mg/kg	0.2	< 0.20
Dieldrin	N	2840	mg/kg	0.2	< 0.20
Endrin	N	2840	mg/kg	0.2	< 0.20
4,4-DDD	N	2840	mg/kg	0.2	< 0.20
Endosulfan II	N	2840	mg/kg	0.2	< 0.20
Endrin Aldehyde	N	2840	mg/kg	0.2	< 0.20
4,4-DDT	N	2840	mg/kg	0.2	< 0.20
Endosulfan Sulphate	N	2840	mg/kg	0.2	< 0.20
Methoxychlor	N	2840	mg/kg	0.2	< 0.20
Endrin Ketone	N	2840	mg/kg	0.2	< 0.20
Total Phenols	U	2920	mg/kg	0.3	< 0.30

Project: Foryd Harbour Rhyll

Client: Denbighshire County Council	Chemtest Job No.:		14-15683		
Quotation No.:	Chemtest Sample ID.:		76486		
Order No.:	Client Sample Ref.:		Water		
	Client Sample ID.:		Foryd Harbour		
	Sample Type:		WATER		
	Top Depth (m):				
	Bottom Depth(m):				
	Date Sampled:		28-Nov-14		
Determinand	Accred.	SOP	Units	LOD	
pH	U	1010			8.2
Chloride	U	1220	mg/l	1	1600
Ammoniacal Nitrogen	U	1220	mg/l	0.01	0.10
Sulphate	U	1220	mg/l	1	230
Arsenic (Dissolved)	U	1450	µg/l	1	4.8
Boron (Dissolved)	U	1450	µg/l	20	380
Cadmium (Dissolved)	U	1450	µg/l	0.08	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1	20
Copper (Dissolved)	U	1450	µg/l	1	10
Mercury (Dissolved)	U	1450	µg/l	0.5	2.9
Nickel (Dissolved)	U	1450	µg/l	1	< 1.0
Lead (Dissolved)	U	1450	µg/l	1	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1	11
Zinc (Dissolved)	U	1450	µg/l	1	8.4
Iron (Total)	N	1450	µg/l	20	240
TPH >C5-C10	N	1670	µg/l	0.1	< 0.10
TPH >C10-C20	N	1670	µg/l	0.1	< 0.10
TPH >C20-C30	N	1670	µg/l	0.1	< 0.10
TPH >C30-C40	N	1670	µg/l	0.1	< 0.10
Total TPH >C5-C40	N	1670	µg/l	10	< 10
Naphthalene	U	1700	µg/l	0.1	0.44
Acenaphthylene	U	1700	µg/l	0.1	< 0.10
Acenaphthene	U	1700	µg/l	0.1	< 0.10
Fluorene	U	1700	µg/l	0.1	< 0.10
Phenanthrene	U	1700	µg/l	0.1	< 0.10
Anthracene	U	1700	µg/l	0.1	< 0.10
Fluoranthene	U	1700	µg/l	0.1	< 0.10
Pyrene	U	1700	µg/l	0.1	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.1	< 0.10
Chrysene	U	1700	µg/l	0.1	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.1	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.1	< 0.10

Results Summary - Water

Project: Foryd Harbour Rhyll

Client: Denbighshire County Council	Chemtest Job No.:		14-15683		
Quotation No.:	Chemtest Sample ID.:		76486		
Order No.:	Client Sample Ref.:		Water		
	Client Sample ID.:		Foryd Harbour		
	Sample Type:		WATER		
	Top Depth (m):				
	Bottom Depth(m):				
	Date Sampled:		28-Nov-14		
Determinand	Accred.	SOP	Units	LOD	
Benzo[a]pyrene	U	1700	µg/l	0.1	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.1	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.1	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.1	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2	< 2.0
Benzene	U	1760	µg/l	1	C < 1.0
Toluene	U	1760	µg/l	1	C < 1.0
Ethylbenzene	U	1760	µg/l	1	C < 1.0
m & p-Xylene	U	1760	µg/l	1	C < 1.0
o-Xylene	U	1760	µg/l	1	C < 1.0
Total Phenols	U	1920	mg/l	0.03	< 0.030

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
76486	Water	Foryd Harbour	28-Nov-2014	Coloured Winchester 1000ml	C
76486	Water	Foryd Harbour	28-Nov-2014	Plastic Bottle 1000ml	C

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

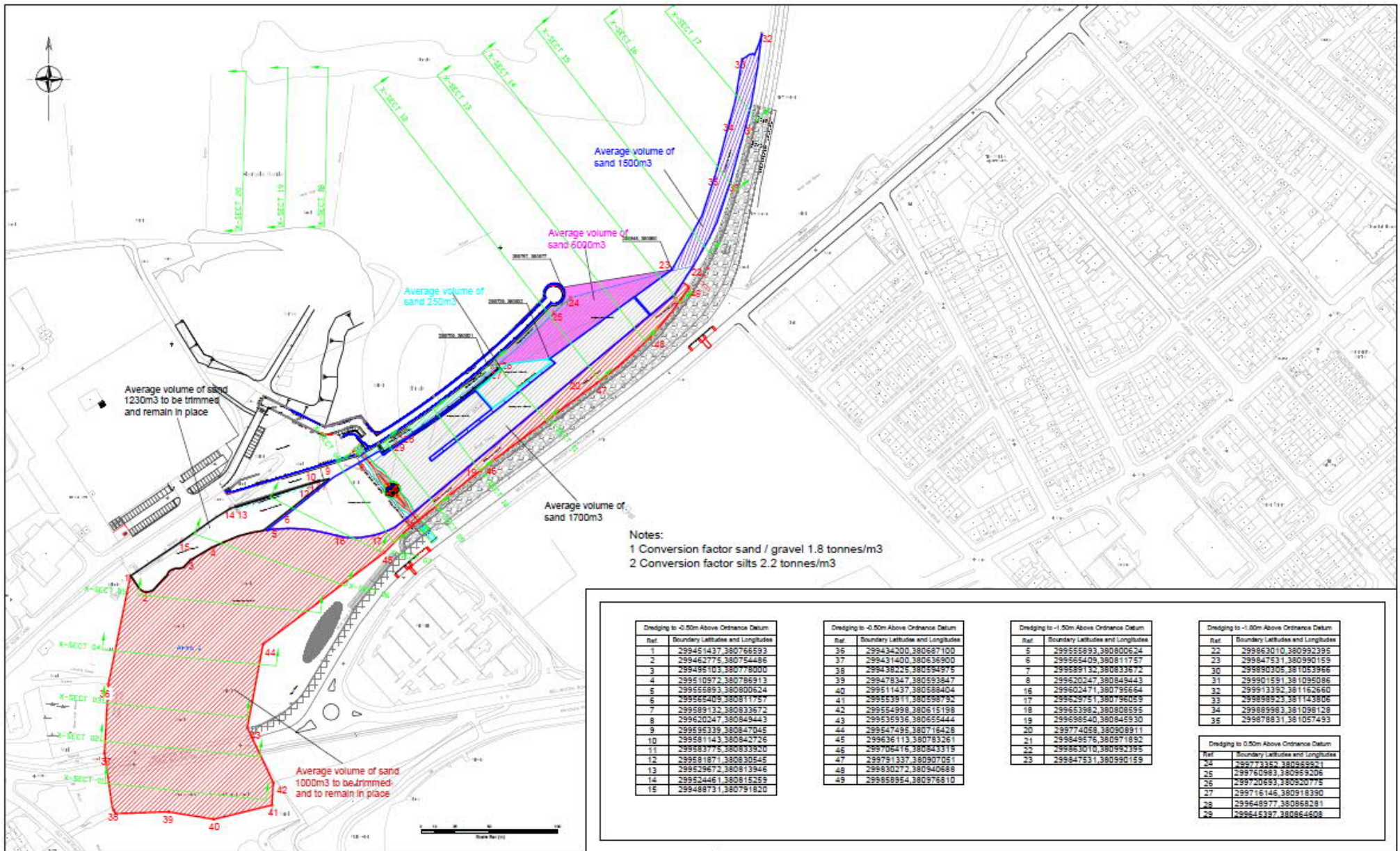
All soil samples will be retained for a period of 60 days from the date of receipt

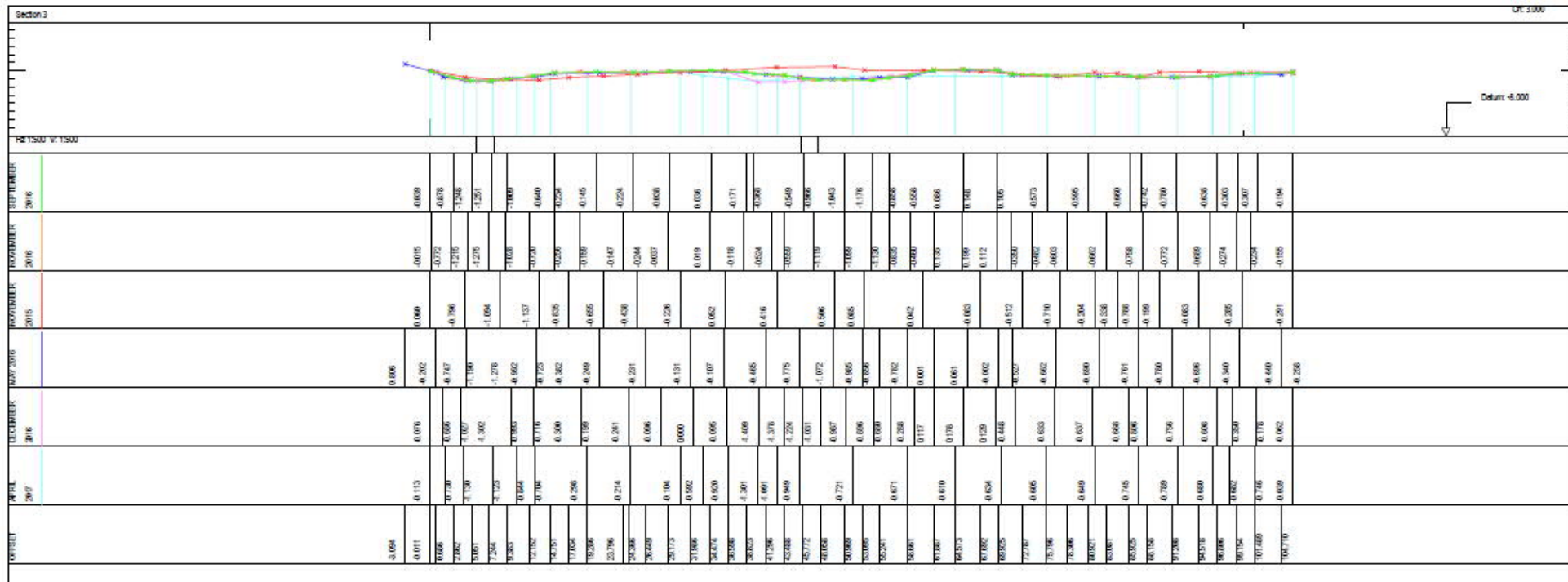
All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Appendix E – Monitoring Results





PENNAETH PRIFYRDD A GWASANARTHAI AMGYLCHREDDOL
HEAD OF HIGHWAYS AND ENVIRONMENTAL SERVICES
ADRAN PRIFYRDD A GWASANARTHAI AMGYLCHREDDOL
DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

14409

NTS

N/A

SB

EP

14409

NTS

N/A

SB

EP

14409

NTS

N/A

SB

EP

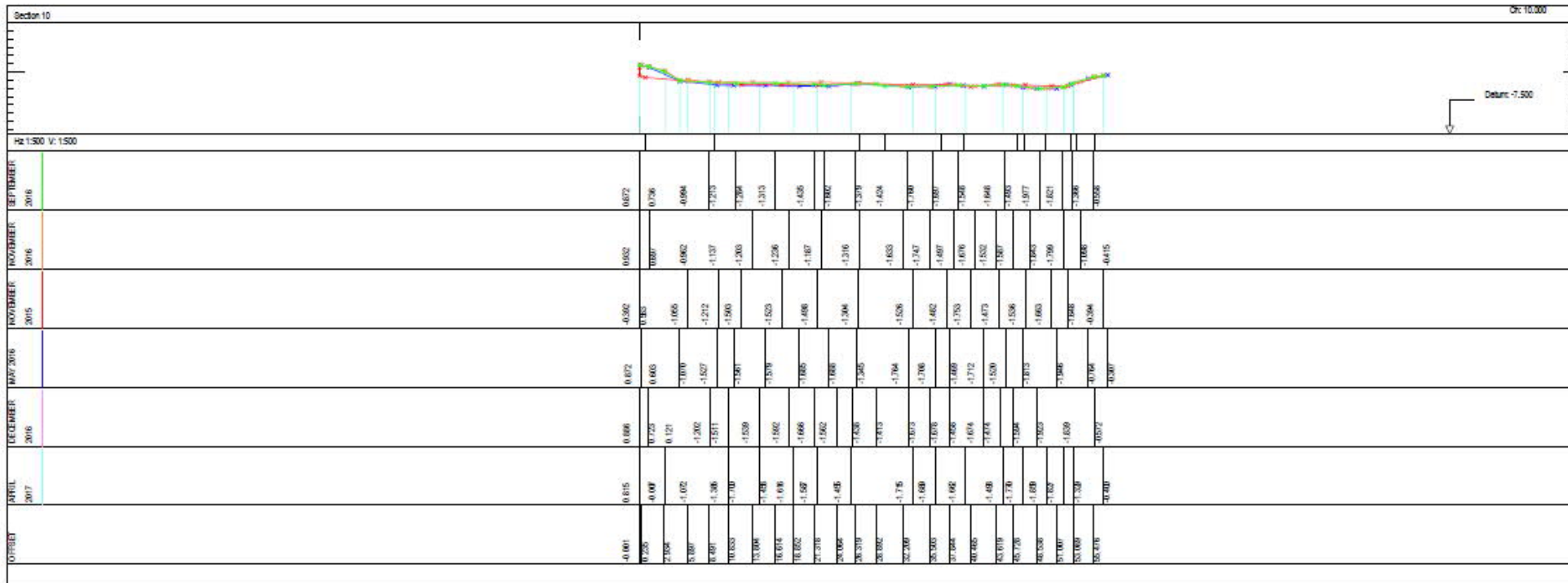
FORDD HARBOUR MONITORING

CROSS SECTIONAL MONITORING LEVELS SECTION 3

24/04/17

ISSUE

H4/14409/D/06



PENNAETH PRIFYRDD A GWASANARTHAU AMGYLCHEDDOL
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DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

14409		FORDD HARBOUR MONITORING	
SYNOPSIS/AMGYNWYBODAETH	Original Drawing	DATE: 24/04/17	
SYNOPSIS/AMGYNWYBODAETH		CROSS SECTIONAL MONITORING LEVELS SECTION 10	
SYNOPSIS/AMGYNWYBODAETH		ISSUE	
SYNOPSIS/AMGYNWYBODAETH		24/04/17	
SYNOPSIS/AMGYNWYBODAETH		H4/14409/D/06	



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HEAD OF HIGHWAYS AND ENVIRONMENTAL SERVICES
ADRAN PRIFYRDD A GWASANAETHAU AMGYLCHEDDOL
DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

REF CRATE/BOX NUMBER	14409
COMPOSITION/QUALITY GRADE	NTS
REF SIZE/FEATURES AND DIMENSIONS	N/A
REMARKS SEE/STATE OF	SB
TRANSFERRED OR ASSIGNED AT	EP

SYNOPSIS / SUMMARY	
A	Original Drawing
B	
C	
REMARKS / COMMENTS / DATA	

ISSUE

24/04/17

FOYD HARBOR MONITORING

CROSS SECTIONAL
MONITORING LEVELS
SECTION 12

7A	LEAD ATTACHMENT/GRADING ATTACHMENT
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H4/14409/D/06

