



# **Water Framework Directive Assessment**

## **Maintenance Dredging at Deganwy Marina**

October 2019

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## Document history

Report reference	Date	Comments
P2018-14-WFD-R1	12 September 2019	Draft issued for client review
P2018-14-WFD-R2	2 October 2019	Final issue

## 1. Introduction

Deganwy Marina on the Conwy River in Wales is operated by Lakeland and Leisure Estates. Maintenance dredging has been carried out within the marina for several years using a cutter suction dredger. The current proposal is to dredge the same volume of material using a water injection dredger.

This report presents the results of the Water Framework Directive (WFD) Assessment for the dredging operation. It updates the previous WFD Assessment that was submitted with the previous application and accepted by Natural Resources Wales (NRW).

## 2. The Water Framework Directive

The Water Framework Directive (WFD) establishes a river basin planning system which enables water resources to be managed and protected in a sustainable manner. The WFD aims to protect and enhance water bodies within Europe and covers all estuarine and coastal waters out to 1 nautical mile. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 implement the WFD in relation to England and Wales.

The Environment Agency is the competent authority for monitoring water bodies in England and Wales. The Environment Agency has produced river basin management plans (RBMPs) setting out environmental objectives for water bodies. These include programmes of measures to meet these objectives.

In 2016, the Environment Agency issued guidance on how to assess the impact of activities in estuarine and coastal waters for the WFD, called Clearing the Waters for All, which has been adopted by NRW. A WFD assessment can have up to 3 stages:

- Screening – excludes any activities that do not need to go through the scoping or impact assessment stages
- Scoping – identifies the receptors that are potentially at risk from the activity and need impact assessment
- Impact assessment – considers the potential impacts of the activity, identifies ways to avoid or minimise impacts, and shows if the activity may cause deterioration or jeopardise the water body achieving good status.

## 3. Water Framework Directive Assessment

This section presents the findings of the WFD Assessment in the screening, scoping and assessment stages.

### 3.1. *Water body information*

The dredge area is within the Conwy water body (ID: GB541006614800), a heavily modified transitional water body at moderate status. The water body is 15.57 km<sup>2</sup> in size and is classified as heavily modified for flood protection.

### 3.2. Screening

In accordance with the Clearing the Waters for All guidance, if an activity was carried out during 2009 to 2014 (when evidence was collected for the 2015 RBMPs) and a WFD Assessment has been carried out, it does not need to be repeated unless:

- The activity has changed (method, size or scale, volume, depth, location or timings); or
- There has been a pollution incident since the activity was last carried out.

As the dredging method has changed from cutter suction to water injection, the activity cannot be screened out.

### 3.3. Scoping

The scoping stage identifies all the activities' potential risks to each receptor. The receptors to be considered are Hydromorphology, Biology – habitats, Biology – fish, Water quality and Protected areas and invasive non-native species (INNS).

The Clearing the Waters for All scoping template for the Conwy water is provided in Appendix A. The following receptors were scoped into the WFD assessment, which is presented in Section 3.4:

- Biology – habitats
- Water quality
- Protected areas

### 3.4. Assessment

#### 3.4.1. Biology: Habitats

Biology: Habitats is scoped into the assessment because the higher sensitivity habitat saltmarsh is present within 500 m of the dredge area. There is no saltmarsh habitat within the marina itself, which is bounded by vertical walls with a narrow entrance channel to the south west. Saltmarsh habitat is present to the south east of the marina, separated by a breakwater.

The water injection dredging technique involves high-volume low-pressure water being injected into the sediments on the bed of the marina. The low pressure injection fluidises the sediments which will then flow as a dense fluid via natural seabed gradients out of the marina towards lower bed levels within the Conwy River. Once it enters the river, material is expected to disperse quickly and widely, as occurs at present when material is pumped to a designated area just outside the marina. Adverse effects on the saltmarsh are not anticipated: the water injection dredging process retains sediment within the system, which is generally considered to be beneficial to mudflat and saltmarsh habitats.

The risk of the maintenance dredging activity adversely affecting saltmarsh within the Conwy water body is low.

### 3.4.2. Water quality

Water quality is scoped into the assessment because the most recent sediment samples collected from the dredge area are elevated above Cefas Action Level 1 for some heavy metals.

On 26<sup>th</sup> April 2019, sediment samples were collected at two locations within the dredge area, both at the surface and at 1.5 m below the surface. Samples were analysed for heavy metals, organotins and total hydrocarbons, in accordance with NRW's requirements. The results are presented in Appendix B and summarised in Table 1.

*Table 1 Sediment sampling results (units: mg/kg)*

Sample reference	Arsenic	Cadmium	Chromium	Copper	Mercury	Lead	Nickel	Zinc	Dibutyl tin	Tributyl tin	Total hydrocarbons
<b>Cefas Action Level 1</b>	<b>20</b>	<b>0.4</b>	<b>40</b>	<b>40</b>	<b>0.3</b>	<b>20</b>	<b>50</b>	<b>130</b>	<b>0.1</b>	<b>0.1</b>	
<b>Cefas Action Level 2</b>	<b>100</b>	<b>5</b>	<b>400</b>	<b>400</b>	<b>3</b>	<b>200</b>	<b>500</b>	<b>800</b>	<b>1</b>	<b>1</b>	
Site A 0m	16.3	0.56	56.9	25.3	0.15	46.4	30.6	228	<0.1	<0.1	322
Site A 1.5m	18.4	0.64	66.1	29	0.16	49.7	35	246	<0.1	<0.1	254
Site B 0m	12	0.60	36.5	15.7	0.08	32.8	20.3	185	<0.1	<0.1	234
Site B 1.5m	11.9	0.49	42.1	17.5	0.11	30.7	21.5	169	<0.1	<0.1	169

Cefas Action Levels for the disposal of dredged material are used as part of a weight of evidence approach to decision-making on the disposal of dredged material to sea. These values are used in conjunction with a range of other assessment methods, for example, bioassays, as well as historical data and knowledge regarding the dredging site, the material's physical characteristics, the disposal site characteristics and other relevant data, to make management decisions regarding the fate of dredged material.

The action levels are therefore not 'pass/fail' criteria but triggers for further assessment. In general, contaminant levels in dredged material below Action Level 1 are of no concern, and dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal. Dredged material with contaminant levels between Action Levels 1 and 2 requires further consideration and testing before a decision can be made.

The samples reveal no exceedances of Action Level 2 for any parameters tested. Elevations above Action Level 1 were observed for some heavy metals but well below Action Level 2 in all cases. There were no elevations above Action Level 1 for organotins.



The chemical quality of the dredged material is regularly tested and has been deemed suitable for sea disposal by NRW and Cefas for many years. The most recent samples collected in 2019 are deemed suitable for disposal at sea. The risk of the maintenance dredging activity affecting the water quality of the Conwy water body is extremely low.

### 3.4.3. Protected Areas

Protected Areas is scoped in because the dredge area is approximately 800 m from the Menai Strait and Conwy Bay Special Area of Conservation (SAC). In the outer Conwy Estuary, the Llandudno West Shore Bathing Water is present. In addition, the Conwy River is designated as shellfish waters.

A Habitats Regulations Assessment has been carried out (Harris Holden, 2019), which predicts that there will be no likely significant effects on the SAC due to the maintenance dredging.

The Llandudno West Shore Bathing Water is at excellent quality. Pollution risk to the bathing water is caused by heavy rainfall washing faecal material into the sea from livestock, sewage and urban drainage via rivers and streams (NRW, 2019). The chemical quality of the dredged material is regularly tested and has been deemed suitable for sea disposal by NRW and Cefas for many years. The most recent samples collected in 2019 are deemed suitable for disposal at sea, as described in Section 3.4.2. The risk of the dredging activity affecting bathing water quality is negligible. As a precautionary measure, dredging is not carried out between 1 May and 30 September to avoid impacts to the bathing water during bathing water season.

The Conwy Shellfish Waters cover a large area of the Conwy River and Estuary. The chemical quality of the dredged material is regularly tested and has been deemed suitable for sea disposal by NRW and Cefas for many years. The continued dredging at Deganwy Marina is highly unlikely to adversely affect the status of this large shellfish water.

## 4. Conclusion

A WFD Assessment has been undertaken in accordance with the Environment Agency's Clearing the Waters for All guidance, for continued maintenance dredging at Deganwy Marina in Wales. The assessment has concluded that the risk of deterioration is very low for all receptors within the Conwy water body.

It is concluded that the continued maintenance dredging and disposal will not cause or contribute to deterioration of status, or jeopardise achieving good status, for the Conwy water body.

## 5. References

Harris Holden (2019) Habitats Regulations Assessment: Maintenance Dredging at Deganwy Marina.

NRW (2019) 2019 Bathing Water Profile for Llandudno West Shore. <https://environment.data.gov.uk/wales/bathing-waters/profiles/profile.html?site=ukl1301-40200> [accessed 12<sup>th</sup> September 2019].

## Appendix A: WFD Scoping Template

## Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The [WFD assessment guidance for estuarine and coastal waters](#) will help you complete the table.

Your activity	Description, notes or more information
Applicant name	<i>Lakeland and Leisure Estates</i>
Application reference number (where applicable)	<i>n/a</i>
Name of activity	<i>Maintenance dredging at Deganwy Marina</i>
Brief description of activity	<i>Maintenance dredging in a marina using a water injection dredger</i>
Location of activity (central point XY coordinates or national grid reference)	<i>National Grid Reference SH782787</i>
Footprint of activity (ha)	<i>Total footprint: 1.75 ha (0.02 km<sup>2</sup>)</i>
Timings of activity (including start and finish dates)	<i>Dredging is not carried out between 15 April and 30 June to avoid impacts to migratory Salmon smolts, Sea trout smolts, Lamprey and Smelt.</i> <i>Dredging is not carried out between 1 May and 30 September to avoid impacts to the bathing water at Llandudno West Shore during bathing water season.</i>
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	<i>See footprint and timings above.</i>
Use or release of chemicals (state which ones)	<i>None</i>



Water body <sup>1</sup>	Description, notes or more information
WFD water body name	<i>Conwy</i>
Water body ID	<i>GB541006614800</i>
River basin district name	<i>Western Wales</i>
Water body type (estuarine or coastal)	<i>Estuarine (Transitional)</i>
Water body total area (ha)	<i>1,575 ha (15.57 km<sup>2</sup>)</i>
Overall water body status	<i>Moderate</i>
Ecological status	<i>Moderate</i>
Chemical status	<i>Fail</i>
Target water body status and deadline	<i>Unknown</i>
Hydromorphology status of water body	<i>Not high</i>
Heavily modified water body and for what use	<i>Yes – for flood protection</i>
Higher sensitivity habitats present	<i>Yes – saltmarsh</i>
Lower sensitivity habitats present	<i>Yes – intertidal soft sediments and intertidal rock</i>
Phytoplankton status	<i>Good</i>
History of harmful algae	<i>Unknown</i>
WFD protected areas within 2km	<i>Yes – approximately 800m from the Menai Strait and Conwy Bay Special Area of Conservation</i>

<sup>1</sup> Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.

## Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

### Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		Impact assessment not required	<i>The waterbody is not at high status.</i>
Could significantly impact the hydromorphology of any water body		Impact assessment not required	<i>Dredging was carried out (using a different dredging technique) during 2009 to 2014 when evidence was collected for the 2015 RBMPs, so impacts on hydromorphology have already been taken into account.</i>
Is in a water body that is heavily modified for the same use as your activity		Impact assessment not required	<i>The waterbody is heavily modified for flood defence.</i>

Record the findings for hydromorphology and go to section 2: biology.

## Section 2: Biology

### Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats <sup>2</sup>	Lower sensitivity habitats <sup>3</sup>
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

<sup>2</sup> Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

<sup>3</sup> Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Consider if the footprint <sup>4</sup> of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km <sup>2</sup> or larger	Impact assessment required		No – total footprint: 0.02 km <sup>2</sup>
1% or more of the water body's area			No – total footprint is less than 0.1% of the water body's area
Within 500m of any higher sensitivity habitat			Yes – within 500m of saltmarsh habitat
1% or more of any lower sensitivity habitat			No – intertidal sediments will not be dredged

<sup>4</sup> Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.

## Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary		Impact assessment not required	<p><i>The dredging was carried out during 2009 to 2014 (when evidence was collected for the 2015 RBMPs) so impacts on fish have already been taken into account.</i></p> <p><i>The change from cutter suction to water injection dredging does not significantly affect the suspended sediment generated by the activity, so no effects are anticipated on fish migrating through the estuary.</i></p> <p><i>Dredging will not be carried out between 15 April and 30 June to avoid impacts to migratory Salmon smolts, Sea trout smolts, Lamprey and Smelt.</i></p>
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)		Impact assessment not required	<i>As above</i>
Could cause entrainment or impingement of fish		Impact assessment not required	<i>As above</i>

Record the findings for biology habitats and fish and go to section 3: water quality.

### Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)		Impact assessment not required	<i>The dredging was carried out during 2009 to 2014 (when evidence was collected for the 2015 RBMPs) so impacts on water quality have already been taken into account. The cutter suction dredger deposits material at a dispersive beneficial use site just outside the marina entrance. The change to water injection dredging is not predicted to result in additional effects on water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns.</i>
Is in a water body with a phytoplankton status of moderate, poor or bad		Impact assessment not required	<i>Phytoplankton status is good.</i>
Is in a water body with a history of harmful algae		Impact assessment not required	<i>No known history of harmful algae.</i>

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

<b>If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:</b>	<b>Yes</b>	<b>No</b>	<b>Water quality risk issue(s)</b>
The chemicals are on the Environmental Quality Standards Directive (EQSD) list		Impact assessment not required	<i>Chemicals will not be released.</i>
It disturbs sediment with contaminants above Cefas Action Level 1	Impact assessment required		<i>Exceedances of Action Level 1 for cadmium, chromium, lead and zinc.</i>

<b>If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:</b>	<b>Yes</b>	<b>No</b>	<b>Water quality risk issue(s)</b>
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list		Impact assessment not required	<i>n/a</i>

<sup>5</sup> Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

Record the findings for water quality go on to section 4: WFD protected areas.



## Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area <sup>6</sup>	Impact assessment required		<i>Menai Strait and Conwy Bay Special Area of Conservation; Llandudno West Shore Bathing Water; Conwy Shellfish Waters</i>

<sup>6</sup> Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

## Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity could introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS		Impact assessment not required	<i>Dredging vessels will travel through adjacent water bodies to reach the site but the risk of spreading INNS is very low: there are regular vessel movements between these water bodies daily, as well as tidal exchange.</i>

Record the findings for INNS and go to the summary section.

## Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	
Biology: habitats	Yes	<i>The dredge area is within 500m of the higher sensitivity saltmarsh habitat</i>
Biology: fish	No	
Water quality	Yes	<i>Sediment sampling reveals marginal exceedances above Cefas Action Level 1.</i>
Protected areas	Yes	<i>Menai Strait and Conwy Bay Special Area of Conservation; Llandudno West Shore Bathing Water; Conwy Shellfish Waters</i>
Invasive non-native species	No	

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

.

Appendix B:

Sediment sampling results April 2019

Mark Morgan  
Lakeland Leisure Estates Ltd  
Lakeland Leisure Estates Ltd  
The Studio  
Station Road  
Staveley  
Cumbria  
LA8 9NB

Dear Mark

Please find attached the results for the batch of 4 samples described below.

Samples Registered on:	01-May-2019
Analysis Started on:	01-May-2019
Analysis Completed on:	30-May-2019
Results for Batch Number	20130933
Your Purchase Order Number:	1246

You will be invoiced shortly by our accounts department.

If we can be of further assistance then please do not hesitate to contact us.

Yours sincerely



**Lawrence Green**  
Customer Services Team Manager  
Tel: 0800 092 0786  
[nls@environment-agency.gov.uk](mailto:nls@environment-agency.gov.uk)

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation. Details of analytical procedures and performance data are available on request. The date of sample analysis is available on request.

The Environment Agency carries out analytical work to high standards and within the scope of its UKAS accreditation, but has no knowledge of whether the circumstances or the validity of the procedures used to obtain the samples provided to the laboratory were representative of the need for which the information was required.

The Environment Agency and/or its staff does not therefore accept any liability for the consequences of any acts or omissions made on the basis of the analysis or advice or interpretation provided.

Client: Lakeland Leisure Estates Ltd Project: Sediment analysis  
Quote Description: Deganwy Marina - Sediment analysis  
Folder No: 004363742 Sampled on: 26-Apr-19 @ 11:53  
Comments: Site A - 0m  
Quote No: 15544 Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	322	mg/kg		0.9	None	LE	402
Mercury : Dry Wt	0.145	mg/kg	DC	0.01	UKAS	LE	1042
Arsenic : Dry Wt	16.3	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	0.563	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	56.9	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	25.3	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	46.4	mg/kg		2	UKAS	LE	1041
Nickel : Dry Wt	30.6	mg/kg		1	UKAS	LE	1041
Zinc : Dry Wt	228	mg/kg		2.5	UKAS	LE	1041
Dibutyl Tin : Dry Wt as Cation	<9	ug/kg		3	UKAS	LE	897
ELEVATED_MRV : Dry weight calculation							
Tributyl Tin : Dry Wt as Cation	3.13	ug/kg		1	UKAS	LE	897
Dry Solids @ 30°C	30.2	%		0.5	None	LE	1130
Accreditation Assessment	2	No.			None	LE	924
Additional Material Present	Report	Text			None	LE	924
No additional material							
Drying Method	Report	Text			None	LE	924
Air dried at 30°C							
Rejected Matter Description	Report	Text			None	LE	924
No material removed							
Sample Colour	Report	Text			None	LE	924
Brown							
Sample Matrix	Report	Text			None	LE	924
Clay Sediment							
Sample Preparation	Report	Text			None	LE	924
Homogenised, Ball Milled & Sieved to <2mm							



Client: Lakeland Leisure Estates Ltd Project: Sediment analysis  
Quote Description: Deganwy Marina - Sediment analysis  
Folder No: 004363743 Sampled on: 26-Apr-19 @ 11:55  
Comments: Site A- 1.5m  
Quote No: 15544 Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	254	mg/kg		0.9	None	LE	402
Mercury : Dry Wt	0.159	mg/kg	DC	0.01	UKAS	LE	1042
Arsenic : Dry Wt	18.4	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	0.642	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	66.1	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	29.0	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	49.7	mg/kg		2	UKAS	LE	1041
Nickel : Dry Wt	35.0	mg/kg		1	UKAS	LE	1041
Zinc : Dry Wt	246	mg/kg		2.5	UKAS	LE	1041
Dibutyl Tin : Dry Wt as Cation	<8	ug/kg		3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tributyl Tin : Dry Wt as Cation	<3	ug/kg		1	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation					
Dry Solids @ 30°C	33.1	%		0.5	None	LE	1130
Accreditation Assessment	2	No.			None	LE	924
Additional Material Present	Report	Text			None	LE	924
	No additional material						
Drying Method	Report	Text			None	LE	924
	Air dried at 30°C						
Rejected Matter Description	Report	Text			None	LE	924
	No material removed						
Sample Colour	Report	Text			None	LE	924
	Brown						
Sample Matrix	Report	Text			None	LE	924
	Clay Sediment						
Sample Preparation	Report	Text			None	LE	924
	Homogenised, Ball Milled & Sieved to <2mm						

Client: Lakeland Leisure Estates Ltd Project: Sediment analysis  
Quote Description: Deganwy Marina - Sediment analysis  
Folder No: 004363744 Sampled on: 26-Apr-19 @ 11:46  
Comments: Site B - 0m  
Quote No: 15544 Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	234	mg/kg		0.9	None	LE	402
Mercury : Dry Wt	0.0763	mg/kg	DC	0.01	UKAS	LE	1042
Arsenic : Dry Wt	12.0	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	0.603	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	36.5	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	15.7	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	32.8	mg/kg		2	UKAS	LE	1041
Nickel : Dry Wt	20.3	mg/kg		1	UKAS	LE	1041
Zinc : Dry Wt	185	mg/kg		2.5	UKAS	LE	1041
Dibutyl Tin : Dry Wt as Cation	<6	ug/kg		3	UKAS	LE	897
ELEVATED_MRV : Dry weight calculation							
Tributyl Tin : Dry Wt as Cation	4.33	ug/kg		1	UKAS	LE	897
Dry Solids @ 30°C	45.7	%		0.5	None	LE	1130
Accreditation Assessment	2	No.			None	LE	924
Additional Material Present	Report	Text			None	LE	924
No additional material							
Drying Method	Report	Text			None	LE	924
Air dried at 30°C							
Rejected Matter Description	Report	Text			None	LE	924
No material removed							
Sample Colour	Report	Text			None	LE	924
Brown							
Sample Matrix	Report	Text			None	LE	924
Clay Sediment							
Sample Preparation	Report	Text			None	LE	924
Homogenised, Ball Milled & Sieved to <2mm							

Client: Lakeland Leisure Estates Ltd Project: Sediment analysis  
Quote Description: Deganwy Marina - Sediment analysis  
Folder No: 004363745 Sampled on: 26-Apr-19 @ 11:48  
Comments: Site B -1.5m  
Quote No: 15544 Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	169	mg/kg		0.9	None	LE	402
Mercury : Dry Wt	0.114	mg/kg	DC	0.01	UKAS	LE	1042
Arsenic : Dry Wt	11.9	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	0.493	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	42.1	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	17.5	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	30.7	mg/kg		2	UKAS	LE	1041
Nickel : Dry Wt	21.5	mg/kg		1	UKAS	LE	1041
Zinc : Dry Wt	169	mg/kg		2.5	UKAS	LE	1041
Dibutyl Tin : Dry Wt as Cation	<7	ug/kg		3	UKAS	LE	897
ELEVATED_MRV : Dry weight calculation							
Tributyl Tin : Dry Wt as Cation	2.98	ug/kg		1	UKAS	LE	897
Dry Solids @ 30°C	45.2	%		0.5	None	LE	1130
Accreditation Assessment	2	No.			None	LE	924
Additional Material Present	Report	Text			None	LE	924
No additional material							
Drying Method	Report	Text			None	LE	924
Air dried at 30°C							
Rejected Matter Description	Report	Text			None	LE	924
No material removed							
Sample Colour	Report	Text			None	LE	924
Brown							
Sample Matrix	Report	Text			None	LE	924
Clay Sediment							
Sample Preparation	Report	Text			None	LE	924
Homogenised, Ball Milled & Sieved to <2mm							

**Method Description Summary for all samples in batch Number 20130933**

- 402 LE I Hydrocarbons by fluorescence
- 897 LE O Organotins (GCMS) 01 - acetic acid/methanol extracted; derivatised; determined GCMS (SIM); from "as received" sample
- 924 Sample Preparation; Dry Solids (30°C); from "as received" sample
- 1041 LE M Metals ICP-MS Sediment - microwave aqua regia digested, determined by ICPMS, samples are sieved to <2000µm.
- 1042 LE M Mercury CSEMP - microwave aqua regia digested, acidic SnCl<sub>2</sub> reduced, determined by CV-AFS. Samples are sieved to <2000µm.
- 1130 LE P Soil Preparation 01: The sample is air-dried at <30°C in a controlled environment until a constant weight is achieved.



**Steve Moss**  
Laboratory Site Manager

'The results in this Certificate of Analysis are the definitive test results. Any accompanying results are provided for ease of use by the customer and should be used with caution.

All reporting limits quoted are those achievable for clean samples of the relevant matrix. No allowance is made for instances when dilutions are necessary owing to the nature of the sample or insufficient volume of the sample being available. In these cases higher reporting limits may be quoted and will be above the MRV.

Minimum Reporting Value (MRV). A minimum concentration selected for reporting purposes (i.e. the less than value), which is higher than the statistically derived method limit of detection.

Solid sample results are determined on a "dried" sample fraction except for parameters where the method description identifies that "as received" sample was used.

Uncertainty of Measurement information relating to sample results is supplied upon request. Uncertainty is estimated from the performance of routine quality control standards, using the calculation  $2 \times \text{Relative Standard Deviation} + \text{Bias}$ . This is based on the guidance issued by the UKTAG Chemistry task team - Guidance on the implementation of the Quality Assurance/Quality Control requirements' associated with Commission Directive 2009/90/EC, Article 4 (UoM =  $2 \times \%RSD$ ), with a contribution added for the bias.

**Key to Results Flags:**

DC Analysis started outside of specified stability time. It is possible that the results may be compromised.

The analysis start date specified is the date of the first test, dates for other analysis are available on request.

Please note all samples will be retained for 10 working days for aqueous samples and 30 working days for solid samples after reporting unless otherwise agreed with Customer Services

Key to Accreditation: UKAS = Methodology accredited to ISO/IEC 17025:2005, MCertS = Methodology accredited to MCertS Performance Standard for testing of soils, none = Methodology not accredited

Key to Lab ID: LE = Leeds, NM = Nottingham, SX = Starcross, SC = Sub-Contracted outside NLS, FI = Field Data - outside NLS, NLS = Calculated

Any subsequent version of this report denoted with a higher version number will supersede this and any previous versions

**END OF TEST REPORT**