



Rhyl Harbour: Pre-Dredging survey and monitoring

York Archaeology and MSDS Marine 2023

Rhyl Harbour:
Pre-Dredging Survey and Monitoring

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Abstract

This report presents the results of a pre-dredge survey and archaeological monitoring carried out by York Archaeology and MSDS Marine at Rhyl Harbour between 24th February and 23rd March 2023. The fieldwork was commissioned by KM Construction as part of a Marine Licence to carry out channel improvements to the harbour.

The pre-dredge survey identified and recorded the remains of two existing post-medieval shipwrecks; The Alice and The City of Ottawa, on opposing sides of the harbour. Using a combination of GNSS, total station, and Small Unmanned Aircraft (SUA) survey, these remains were captured in 3D and compared with past photographic records to determine their level of survival.

Further remains previously identified within the centre of the channel were not encountered and are presumed to be either completely buried or, more likely, removed after decades of dredging activity.

The archaeological monitoring of the dredging excavation took place towards the mouth of the harbour on the western side, c. 0.20km northeast from the Harbourmaster's office. The monitoring recorded the excavation of sand, gravel, and cobbles, in places up to c. 6.00m thick. These deposits are likely to have accumulated over the past year since the last phase of dredging. In places, the surface of laminated dark grey-black waterlogged silt and clay was exposed, thought to represent earlier, undated tidal flat deposits.

No archaeological deposits were identified during the three days of monitoring. The works have confirmed the presence of an accumulating, rather than eroding, depositional environment. The regime at the site is one which provides a suitable environment for the burial and preservation in-situ of any archaeological remains lying underneath the dredged sandbank.

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1. INTRODUCTION

- 1.1.1. In January 2023, York Archaeology were commissioned by KM Construction to undertake a pre-dredging survey as part of channel improvements to Rhyl Harbour, Denbighshire, Wales (NGR SH 99569 80871; Figure 01). The channel improvements were carried out under Marine Licence DML2164.
- 1.1.2. The work took place in accordance with a Method Statement produced by York Archaeology (2023), which was underpinned by a desk-based assessment and subsequent Written Scheme of Investigation produced by Mott McDonald (2022a; 2022b).
- 1.1.3. This report aims to summarise and discuss the results of the pre-dredging survey and archaeological monitoring for the 2023 dredging season at Rhyl harbour.

2. PLANNING CONDITIONS/CONTEXT

- 2.1.1. As part of the Marine Licence DML2164 an Environmental Report was produced by Denbighshire County Council (DCC), which provides a summary of the development history of the harbour area and describes the proposed dredging operations. The details most relevant to this project are summarised below;
- 2.1.2. The development of the Rhyl Harbour area, including the West Rhyl Coastal Defence Scheme and the sustainable transport bridge (Pont y Ddraig) is part of DCC's long term plans to stimulate investment and growth in the west Rhyl area. Since the development of the Rhyl Harbour was completed in 2014, the harbour has been subject to maintenance dredging.
- 2.1.3. The first Marine Licence (BUML 1472) for dredging the harbour was issued in 2014 for the dredging of 22,000 tonnes of sediment a year. This was renewed in 2018 (DML 1840) for 17,000 tonnes per year. The existing Marine Licence (DML2164) anticipates that approximately 16,000 tonnes 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 reduction in volume is likely due to changes in the flow of sediment through the harbour.
- 2.1.4. The proposed finished levels for the area have not been altered from the original 2011 ES. These are:
 - In the vicinity of the quay wall, the finished level is to be +0.5m ODN (Ordnance Datum Newlyn) to allow for the exposure of mud habitat at low tide;
 - In the area of the outer channel adjacent to the training wall, the finished level is to be -1.8m ODN;
 - In the inner area between the floating pontoon and West Rhyl Defences it is to be at -1.5m ODN;
 - In the vicinity of the slipways and the inner harbour the finished level is to be -0.5m ODN; 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.

- 2.1.5. The works will be undertaken at low tide using a 360° tracked excavator which will track onto the dredge area and remove material. The excavated material will be loaded into 10-tonne dumper trucks which will access the harbour via the beach adjacent to the quay wall. 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.
- 2.1.6. The works were dependant on the height and timing of low tide and up to 1000 tonne of sediment were removed per day with works lasting 10 days.
- 2.1.7. A number of specific conditions form part of the Marine Licence and those pertaining to the Historic Environment include:

Condition 3.18 Historic Environment

The Licence Holder must submit a Written Scheme of Investigation (WSI) to the Licensing Authority for written approval at least 6 weeks prior to commencement of the Licensed Activities. No works may be undertaken prior to written approval from the Licensing Authority.

The Licence Holder must ensure that any actions outlined in the documents detailed in condition 3.18.1 are implemented as approved in writing by the Licensing Authority. Any proposed changes to the actions outlined in the documents must be submitted to and approved in writing by the Licensing Authority prior to any changes being enacted.

- 2.1.8. Following consultation with Dr Julian Whitewright (Royal Commission on the Ancient and Historical Monuments of Wales, RCAHMW) and Mark Walters (Clywd-Powys Archaeological Trust, CPAT) an updated methodology was agreed upon. The pre-dredge survey included the recording by photogrammetry and GNSS of up to two wrecks and any other features exposed at low tide on the day of the survey in order to enhance the Historic Environment Record (HER) of the site (Figure 01). A second site visit will be made 6 months after the dredging has been carried out to supplement the record of the wreck sites using photography. The reports, data and archive will be deposited with RCAHMW as well as the HER.
- 2.1.9. In addition, given the short duration of the dredging, archaeological monitoring of the works to record any archaeological remains that may be encountered. The central part of the channel was not monitored as this has been subject to consistent dredging over a number of decades.

3. SITE DESCRIPTION

3.1 Location

- 3.1.1 The area of dredging is located along the northern foreshore of Rhyl Harbour (Figure 02). Rhyl Harbour (formerly known as Foryd Harbour) lies at the mouth of the estuary of the Afon Clwyd.

3.1.2 The northern boundary of the harbour area comprises the Rhyl Yacht Club, the Rhyl Harbour boat yard, car park and quay wall, the completed harbour building and public square and the extended quay wall. The southern boundary is formed by the inner and outer sea walls, and the training wall guiding the navigable channel out to the north-east. Rhyl harbour bridge (the Blue Bridge) forms the western boundary of the harbour basin and spanning the harbour from public square to the junction of West Parade is a recently constructed sustainable transport bridge, known as Pont y Ddraig.

3.2 Geology and Topography

3.2.1. The bedrock geology of the study area comprises the Kinnerton Sandstone Formation (BGS 2023). This sedimentary bedrock was formed approximately 247 to 252 million years ago during the Triassic Period.

3.2.2. Four superficial geology types are located within the study area. These include: Marine Beach and Blown Sand Deposits comprised of sand; Storm Beach deposits comprised of gravel; and Marine Beach Deposits comprising sand; Storm Beach Deposits comprising gravel; and Tidal Flat Deposits comprising clay, silt and sand. These superficial geologies were all formed up to 2 to 3 million years ago in the Quaternary Period. All the deposits are shallow marine in origin and consist of coarse-grained material that forms beaches in a coastal setting.

4. PROJECT AIMS AND OBJECTIVES

4.1.1. The aims of the project were as follows:

- To provide a record of the exposed wrecks and other wooden remains within the harbour and dredge area;
- To enhance the record of known wreck sites within the HER;
- To undertake a post-dredge visit to determine any gross morphological changes to the burial environment at the wreck sites; and
- To determine the presence or absence of archaeological remains within the dredge area.

4.1.2. In order to meet the aims, the following objectives were identified:

- To undertake a purposive photogrammetric and GNSS survey;
- To make a visual record of the wreck and other remains at the time of the survey;
- To record the lithology of any pre-modern deposits; and
- To submit the photogrammetry data with metadata to the HER.

5. RESEARCH AIMS

- 5.1.1. The West Coast Palaeolandscapes survey identified the area around Rhyl as having a high potential for preserving archaeological deposits (Fitch & Gaffney 2011).

6. ARCHAEOLOGICAL & HISTORICAL BACKGROUND

- 6.1.1. A detailed archaeological background was compiled for a desk-based assessment carried out by Mott MacDonald (2022a). The assessment recorded nine designated heritage assets within the area of study including seven Grade II Listed Buildings and two Conservation Areas. 46 non-designated heritage assets were also recorded in the study area comprising 35 archaeological remains and 11 historic buildings.

- 6.1.2. The following overview of the archaeological background to the site is summarised from the desk-based assessment:

6.2. Prehistoric

- 6.2.1. There is evidence for the presence of submerged landscapes within the study area along Rhyl foreshore. These include an exposure of a submerged forest and pocket of peat and a large piece of fossilised timber identified during the 2022 walkover survey.

- 6.2.2. Previous archaeological investigations demonstrated that there is potential for paleoenvironmental remains to have been preserved beneath the sand and shingle along the foreshore at Rhyl. Prehistoric artefacts have also been recovered indicating human exploitation of these landscapes.

- 6.2.3. No prehistoric remains have been recorded within the area. This is likely a result of the development of Rhyl Harbour throughout the post-medieval and modern periods, alongside more recent West Rhyl Coastal Defence Scheme works and maintenance dredging which is likely to have truncated and/or removed deposits which may have been present. However, there is still some potential for deeply stratified deposits to survive within the area.

6.3. Roman

- 6.3.1. There is very little evidence of Roman activity within the study area, except for two isolated findspots of Roman coins.

- 6.3.2. Evidence for Roman activity is scarce and where evidence is recorded this takes the form of isolated findspots which represent casual loss rather than evidence of settlement.

6.4. Medieval

- 6.4.1. There is no evidence of Medieval activity within the study area.

6.4.2. Until the 19th century, settlement activity was scarce across the study area. The area may have been used for small scale fishing activity, which would have provided income for the small population recorded at Rhyl. However, no assets of medieval date are recorded within the HER or NMRW.

6.5. Post-Medieval

6.5.1. Evidence for Post-Medieval activity can be largely associated with the development and operation of Rhyl Harbour, also referred to as Foyd Harbour. These include: terrestrial non-designated heritage assets such as the sites of former harbour buildings alongside extant harbour structures; and maritime assets such as non-designated wreck sites.

6.5.2. Within the area a number of non-designated heritage assets associated with Foyd Harbour are recorded on the HER, which include the Foyd Breakwater, the site of Foyd Timber Yard and Wharf, the site of Foyd 1828 Telegraph Station, and site of the schooner *Frithjog*.

6.5.3. The level of survival of these assets is unknown. Recent West Rhyl Coastal Defence Scheme works and maintenance dredging which have taken place within the harbour may have truncated and/or removed some of these archaeological remains.

6.6. Modern

6.6.1. Evidence for Modern activity within the study area can be largely attributed to the development and operation of Rhyl Harbour (also referred to as Foyd Harbour) and Rhyl's 20th century growth in tourism as evidenced by assets such as Foyrd Bridge Holiday camp.

6.6.2. The HER records the site of one modern wreck, referred to as the Foyd Harbour Wreck, within the area. The level of survival of these assets is unknown. Previous episodes of maintenance dredging which have taken place within the harbour may have truncated and/or removed some of these archaeological remains.

6.7. Maritime Archaeology

6.7.1. Five non-designated shipwrecks are recorded by the RCAHMW as lying within the harbour:

City of Ottawa (NPRN 442)

The *City of Ottawa* was a square-rigged three-master constructed at the Gingra Yard on the St. Lawrence River, Quebec, Canada in 1860 and sold in Liverpool 1861 with a tonnage of 884.21 tons. The ship was constructed from American larch with the main keel, keelson, stem and stern post of oak and external planking a mixture of elm, larch and pine. Detailed records survive of 36 voyages between 1863 and 1889, during this time it travelled widely, visiting Bombay, Genoa, Aden, Canada, Pensacola and Rio de Janeiro, sailing from a variety of ports including Cardiff,

Swansea, Barrow, Plymouth, London, Portsmouth and Newcastle. Lloyd's records show that it was made into a hulk for storage in 1897 and probably berthed in Portsmouth.

The ship was brought into Rhyl Harbour after being damaged in a storm in 1906 and was abandoned shortly afterwards as it was considered too costly to repair (Redknap et al 2019, p171). Items of value were removed at this point and the remaining hulk was left to rot on the foreshore (Redknap et al 2019, p274).

The *Alice* (NPRN 443)

The *Alice* was a hopper barge, built in the late 19th century, constructed of timber, and built with three holds shaped like inverted pyramids. It was bought by Rhyl Town Council in 1913 for use in dredging sand. It was abandoned in the 1920s, postcards from the 1930s show the vessel in its present location (Plate 1). Local memory relates that it was bombed by the military just after WW2.

In 1981 a group of young people were employed by Manpower Services to 'tidy up' the harbour, resulting in the partial destruction and removal of timber from the *Alice* (Anon 1981).

Frithjof (NPRN 271360)

The *Frithjof*, a wooden schooner built at Svelvig, Norway in 1853, is known from documentary sources to have been stranded on the west bank of the river Clwyd near the harbour entrance on the 5th August 1898. However, no physical remains of the vessel have ever been identified. The vessel may have been removed or salvaged since its loss.

Unnamed Wreck (NPRN: 506949)

An unnamed wreck was identified from aerial photographs dating to July 1987. The wreck was reported as lying at an orientation of 030/210 degrees with a length of 44m. The tops of the timbers were noted to be just visible above the sand/mud.

The description of the vessel gives a near-identical location, orientation and length to the *City of Ottawa*, and it may be that this does not constitute a separate vessel.

Rhyl Lifeboat No. 1 (NPRN: 271383)

Rhyl Lifeboat No 1 was a RNLI sailing and pulling lifeboat built in 1888. On the 11th June 1903, it was rundown by the steamship *Rhos Colwyn* whilst moored in Forydd Harbour. The wreck is known from documentary sources only, with no physical remains having been identified. The vessel may have removed or salvaged since its loss.

- 6.7.2. A postcard showing a tinted photograph of the harbour taken shortly after the bridge was opened in 1932, shows the remains of the *City of Ottawa* in the foreground, with the near complete hulk of the recently abandoned *Alice* on the far shore (Plate 1).

- 6.7.3. In 1949 Rhyl Amusements Ltd. commissioned aerial photography of the amusement park and the marine lake to the south east of the harbour (RCAHMW 2023). The photograph shows the near complete hull of the *Alice* and the remains of the *City of Ottawa*. There is no evidence of the supposed bombing of the *Alice* referred to in earlier reports.
- 6.7.4. In 1981, Manpower Services employed a group of young people to ‘tidy up’ the harbour, resulting in the partial destruction and removal of timbers from the *Alice* (Anon 1981; Plate 2). This most likely accounts for the majority of damage to the wreck during the 20th century.
- 6.7.5. Photographs of the harbour from the 1980s show views of both the *Alice* and *City of Ottawa* (Plates 3 and 4).
- 6.7.6. In the late 1990s Mensun Bound and Dr Ian Brown produced a drawn survey of the *City of Ottawa* and of the *Alice* (F Gale 2023, personal communication, 3rd May). A copy of the survey was not available at the time of writing.
- 6.7.7. In the early 2000s Anthony Martin carried out a laser scanning survey of the *City of Ottawa* and visible timbers were marked (F Gale 2023, personal communication, 3rd May). A copy of the survey was not available at the time of writing.
- 6.7.8. In the early 2010s, there was an extensive programme of works to the harbour, including the construction of a new quay wall, footbridge and public square. The works were monitored to assess their archaeological impact (F Gale 2023, personal communication, 3rd May).
- 6.7.9. In 2013 a visit to the site was made by Malvern Archaeological Diving Unit, who took a number of detailed photographs of the *City of Ottawa* from the harbour wall (Plates 5 and 6).
- 6.7.10. An aerial photograph taken in 2015 by the RCAHMW shows both wrecks increasingly engulfed by sediment (RCAHMW 2023b). The northwest side of the hull of the *City of Ottawa* is almost completely buried by this point. The *Alice* appears as a faint line of timbers.

7. FIELDWORK

- 7.1.1 The work was undertaken in accordance with a Method Statement produced by York Archaeology (2023) which was approved by Dr Julian Whitewright on behalf of RCAHMW, and Mark Walters, Denbighshire County Council Planning Archaeologist, and to standards defined by the Chartered Institute of Archaeologists (CIfA 2019; 2020a; 2020b).

7.2 Pre-Dredge Survey

- 7.2.1 The pre-dredge survey was conducted during low tide on the 15th of February 2023.

- 7.2.2 A visual inspection of the supposed locations of the *Frithjof*, *Rhyl Lifeboat No. 1* and the unnamed wreck (NPRN 506949) was carried out and revealed no evidence of any structure or timbers.
- 7.2.3 Due to the nature and depth of the foreshore deposits, access to the site of the *Alice* was limited to the landward side, while the entire area of foreshore around the *City of Ottawa* was inaccessible on foot.
- 7.2.4 After consultation with the RCAHMW Archaeologist, the decision was made to record the *Alice* and the *City of Ottawa* using a combination of terrestrial photogrammetry and Small Unmanned Aircraft (SUA) survey.
- 7.2.5 The terrestrial photogrammetry survey was carried out using a digital SLR with files saved in both RAW and jpeg format. Imagery from the SUA survey was captured in 1080p MP4 format, with individual frames later exported to jpeg format for creation of the photogrammetric model.
- 7.2.6 In order to georeference the survey, photogrammetry targets were placed around the site of the *Alice* and located using a Leica GS18 GNSS to an accuracy of $\leq 0.3\text{m}$.
- 7.2.7 Due to the inaccessibility of the foreshore around the site of the *City of Ottawa*, it was not possible to place photogrammetry targets. In order to georeference the survey, a second visit was made on the 24th February 2023 to capture the position of key features on the wreck using a combination of TST and GNSS survey. These points were then used to scale and align the photogrammetric model of the *City of Ottawa*.
- 7.2.8 The optional laser scan, mentioned within the Method Statement (YA 2023), was not deemed possible due to the inaccessibility of the foreshore. However, the relatively low number of timbers exposed and their morphology meant that the survey was achievable using photogrammetry.

7.3. Archaeological Monitoring

- 7.3.1. Archaeological monitoring of the dredge excavation was carried at the end of the western side of the harbour wall. The monitoring was carried out during low tide, primarily from the harbour path located above the area of excavation. The work was recorded using digital photography taken before, during, and after the dredge excavation.
- 7.3.2. Archaeological monitoring was primarily restricted to views from the harbour path, with limited access down to the foreshore whilst excavation commenced. Access to the stable parts of the foreshore only occurred during breaks in excavation due to safety constraints.
- 7.3.3. The deposits were recorded using the Troels-Smith (1955) system of sediment classification (Appendix 1). This scheme breaks down a sediment sample into four main components and allows the inclusion of extra components that are also present, but that are not dominant. Key physical properties of the sediment layers

are darkness (Da), stratification (St), elasticity (El), dryness of the sediment (Sicc) and the sharpness of the upper sediment boundary (UB). A summary of the sedimentary and physical properties classified by Troels-Smith (1955) and a stratigraphic breakdown of the deposits were recorded on proforma log sheets. The logs were supplemented by digital photography.

8. RESULTS

8.1. Pre-Dredge Survey

8.1.1. The survey confirmed the presence of the remains of the *City of Ottawa* (NPRN 422) on the eastern bank of the harbour and the *Alice* (NPRN 443) on the western bank (Figure 02, Plates 7 and 8). There was no evidence of any wrecks or timbers at the recorded locations of the *Frithjof*, *Rhyl Lifeboat No. 1* or the unnamed wreck (NPRN 506949).

8.1.2. The pre-dredge survey captured a three-dimensional record of the *Alice* and *City of Ottawa*. The 3D point clouds were produced from the DSLR photography and SUA footage (Figures 03 and 04). The homogenous texture and colour of the sand bank caused discrepancies in the quality of photo alignment, generating a model with a high amount of noise and a lower resolution texture. However height and geo-spatial data was of an acceptable quality (<0.05m error).

8.1.3. The *City of Ottawa* is almost completely buried within sediments adjacent to the harbour wall along right bank of the River Clywd. The wreck is identifiable by several exposed hull frames rising above the sediment to a maximum height of 0.8m. The row of exposed frames is 14m in length and rises to 2.48m ODN at their highest. The remainder of the wreck is buried under sediment.

8.1.4. The *Alice* is located on the left bank of the River Clywd. Several exposed hull frames and a hull plank are visible on the eastern edge of the wreck (Plates 9 and 10). The remains only just breach the bank sediments (<0.3m) and vary in height between 1.66 – 0.5 ODN. The exposed remains have a length of 13.5m. Further timber remains are present across the surrounding area (c.20m x 10m), making it extremely difficult to distinguish between the wreck, other intertidal structures and debris.

8.2. Dredge excavation monitoring

8.2.1. The monitoring of the dredge excavation recorded the removal of a mixed deposit composed of fine sand and gravel and cobbles. This represents the modern tidal deposition since the last phase of dredging excavation. At its greatest extent along the edge of the harbour wall, a c. 6.00m thickness of this unit was removed.

8.2.2. Only in very occasional and discrete places did the excavation expose the surface of laminated dark grey-black silt-clay. This may represent an earlier tidal flat unit which has been sealed by modern tidal deposition. This unit is likely to remain in constant waterlogged conditions at or below the level of the tidal changes.

8.2.3. No archaeological finds, deposits, or structures were witnessed during the three days of monitoring.

8.3 Archiving

8.3.1 The digital archive is currently held by York Archaeology and will be deposited with the RCAHMW at the completion of the project.

8.3.2 The contents of the archive are as follows:

Pre-Dredge Survey

- SUA footage in video (.mp4) format and still frame (.jpg)
- Georeferenced point clouds (.e57)
- Aligned models (.obj with associated .mtl and .jpg)
- GNSS and TST survey data (.txt)

Dredge Excavation Monitoring

- Watching brief forms (pdf scans) x3
- Digital photographs x 195

8.3.3. The digital archive will be deposited according to guidance issued by the RCAHMW (RCAHMW 2016), and conform with standards issued by the Archaeological Data Service (ADS 2020) and Welsh Archaeological Trusts (2018). All data will be accompanied with the appropriate metadata.

8.3.4. A digital copy of the report will be deposited with the HER at CPAT (<https://cpat.org.uk/heddos.html>) and the RCAHMW. An OASIS form will be completed for the project.

9. DISCUSSION AND CONCLUSIONS

9.1 Overview of survey and dredge monitoring

9.1.1. Despite limited access to areas of the foreshore at Rhyl Harbour, the survey allowed for the production of georeferenced point cloud models of two existing shipwrecks, the *Alice* and the *City of Ottawa*. This data can be compared to previous and future surveys to ascertain the rate of survival/burial.

9.1.2. The archaeological monitoring of the dredge excavation successfully recorded the deposits which were recent in date and likely relate to the movement of sediment along the coast as a result of beach replenishment. No archaeological remains were encountered within the three days of monitoring. The deposits recorded at the site also suggest an accumulating rather than an eroding environment.

9.2 Feature survival and existing impacts

- 9.2.1. A comparison with earlier photographs of the *City of Ottawa* and the *Alice* indicate that both wrecks appear to be slowly being buried by an accretion of sediment on the sides of the channel.
- 9.2.2. Only the southwest portion of the *City of Ottawa* wreck is now exposed which shows the slight curvature of the starboard side stern of the ship (Plates 4 and 5). The northwest side of the wreck has been completely buried since 2015. The addition of the new quay wall in the early 2010s, directly to the southeast of the wreck has undoubtedly contributed to the accumulation of sediment around the wreck.
- 9.2.3. The outline of the *Alice* can just be discerned above the sediment, with the three interior square shaped holds can just be discerned, with the two sides of the hull seeming to have splayed outwards (Plates 6 and 7). The debris and refuse surrounding the *Alice* makes it difficult to distinguish its actual extent. A number of the surrounding the wreck seem to form structural features such as moorings or wharfage not associated with shipwreck. Furthermore, there is evidence of dumping material in the area with a bicycle present to the north of the wreck which may suggest some of the timber is also refuse.
- 9.2.4. No remains of the *Frithjof* (NPRN 271360), the unnamed wreck (NPRN 506949) or *Rhyl Lifeboat No. 1* (NPRN 271383) were identified during the survey.
- 9.2.5. The locations of the *Alice* and the *City of Ottawa* within accreting sediments to either side of the main channel of the harbour are likely to offer a degree of protection during future dredging programmes.
- 9.2.6. The debris accumulating around the *Alice* presents a potential risk to the wreck, its location at the end of an accessible slipway has made it more susceptible to more anthropogenic impacts such as fly-tipping.

9.3 Discussion of survey and dredge monitoring

- 9.3.1 This survey has compiled a detailed photographic record of the two identified wrecks in the harbour, the *Alice* and the *City of Ottawa*, providing both high resolution imagery and accurate location data of the remains.
- 9.3.2 Topographic profiles produced from the point cloud data show both wreck sites have a gradual, near straight, bank as would be expected from the sediment deposition. The survey was limited to areas of the foreshore exposed at low tide and as such a full topographic profile of the harbour was beyond the scope of this survey. Future surveys could consider the use of complementary bathymetric survey to establish the long-term cycle of dredging and sediment accumulation and its potential impact on the archaeological remains.
- 9.3.3 Monitoring of the dredging demonstrated that the excavation almost wholly removed sand, gravel, and cobble deposits (Plate 11) which from the harbourmaster's records, are considered to have accumulated during the previous year. This demonstrates that this part of the harbour is experiencing accumulation

of sediment rather than erosion. As a result, any potential archaeological remains are likely to remain preserved in-situ and buried within this accumulating environment.

- 9.3.4 No archaeological finds were recovered during the three days of monitoring. Previous dredging activities are likely to have repeatedly removed this sand, gravel, and cobble layer, and so its archaeological potential for preserving structural remains is considered low. There does however, remain a low possibility for small residual archaeological finds to move and become buried in this material as it accretes between dredging phases.
- 9.3.5 The dredging occasionally skimmed the surface of laminated grey-black silts and clays (Plate 12). These deposits are likely to represent permanently waterlogged tidal flat deposits of unknown age. Their waterlogged nature provides good conditions for the preservation of structural (i.e. wooden) archaeological remains should any remains be preserved within this unit. Nevertheless, the current depth of dredging showed minimal disturbance to these deposits (Plate 13), and so should further dredging excavations be required in future, excavating to the similar depth would not excessively truncate these deposits and therefore allow for any potential archaeology preserving within it to remain preserved in-situ.

9.4 Consideration of research aims

- 9.4.1 Despite the high potential for archaeological deposits outlined by the West Coast Palaeolandscapes survey (Fitch & Gaffney 2011) no deposits were encountered within the harbour mouth during either the survey or the dredge monitoring. Any archaeological deposits within the area have likely been removed during earlier dredging or modern construction, or are buried under the earlier tidal flats at depth.

9.5 Conclusions

- 9.5.1. In conclusion, the two wrecks identified within the harbour, the *Alice* and the *City of Ottawa*, have been slowly buried by sediment during the last 10-20 years, which offers a degree of protection from current and future dredging plans. This survey has enhanced the historic record through the production of point-in-time photogrammetric models which can be used as a baseline to measure any further changes.
- 9.5.2. This survey illustrates the value of SUA survey for capturing archaeological remains on the foreshore with a high level of detail and efficiency.
- 9.5.3. The archaeological monitoring of the dredging allowed for an inspection of the dredged area for the potential of revealing archaeological remains, including, but not limited to, preserved metalwork finds and preserved wooden structures including those from wreck sites and fish traps. However, no archaeological remains were subsequently identified.

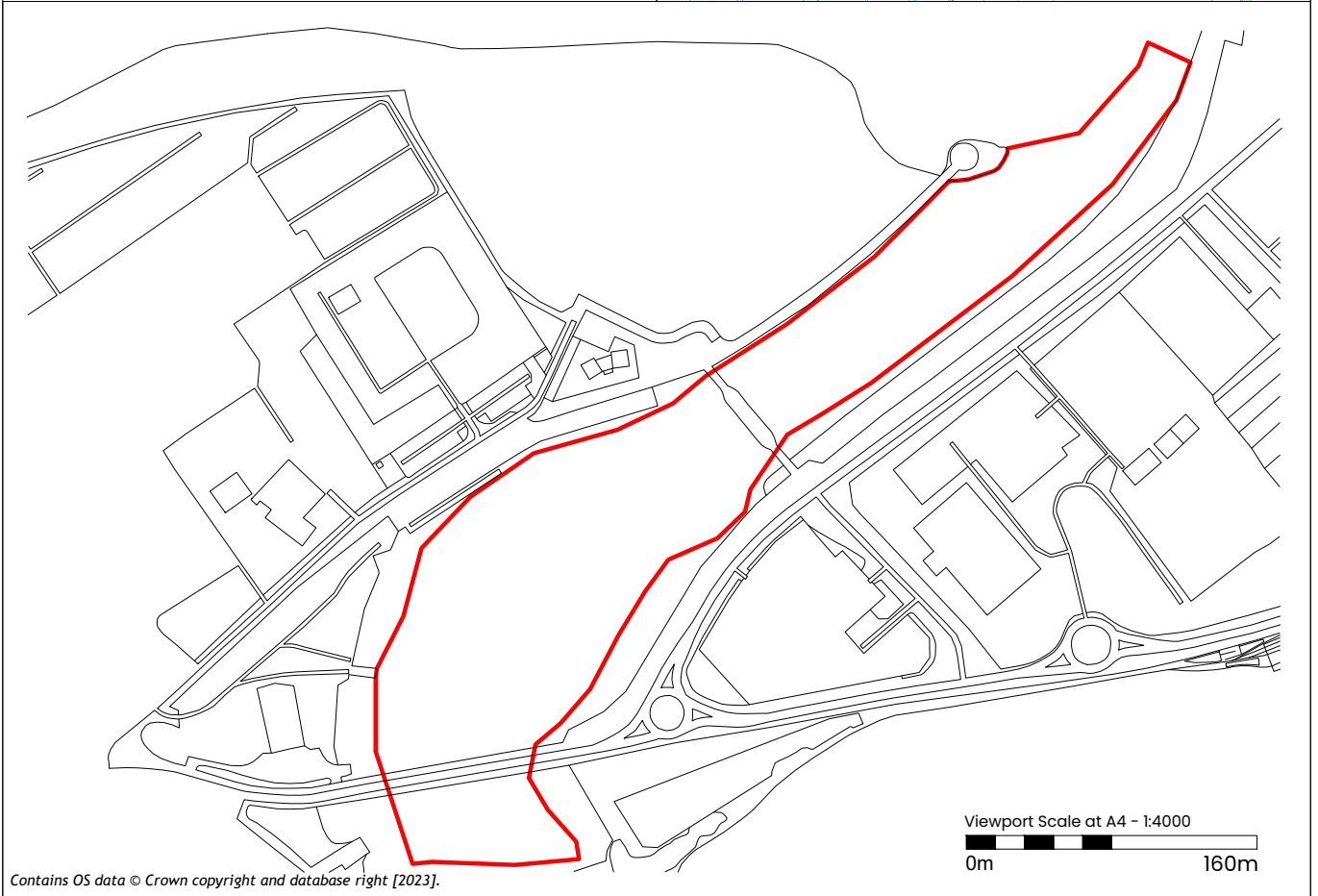
9.5.4. The monitoring has enabled a record to be made of the deposits and an understanding of the depositional regime which is one of accretion rather than erosion.


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 **Figure 01 - Location Map**
RHW - Rhyll Harbour: Pre-Dredging Survey and Monitoring

Scale at A4 - varies
Drawn by MH

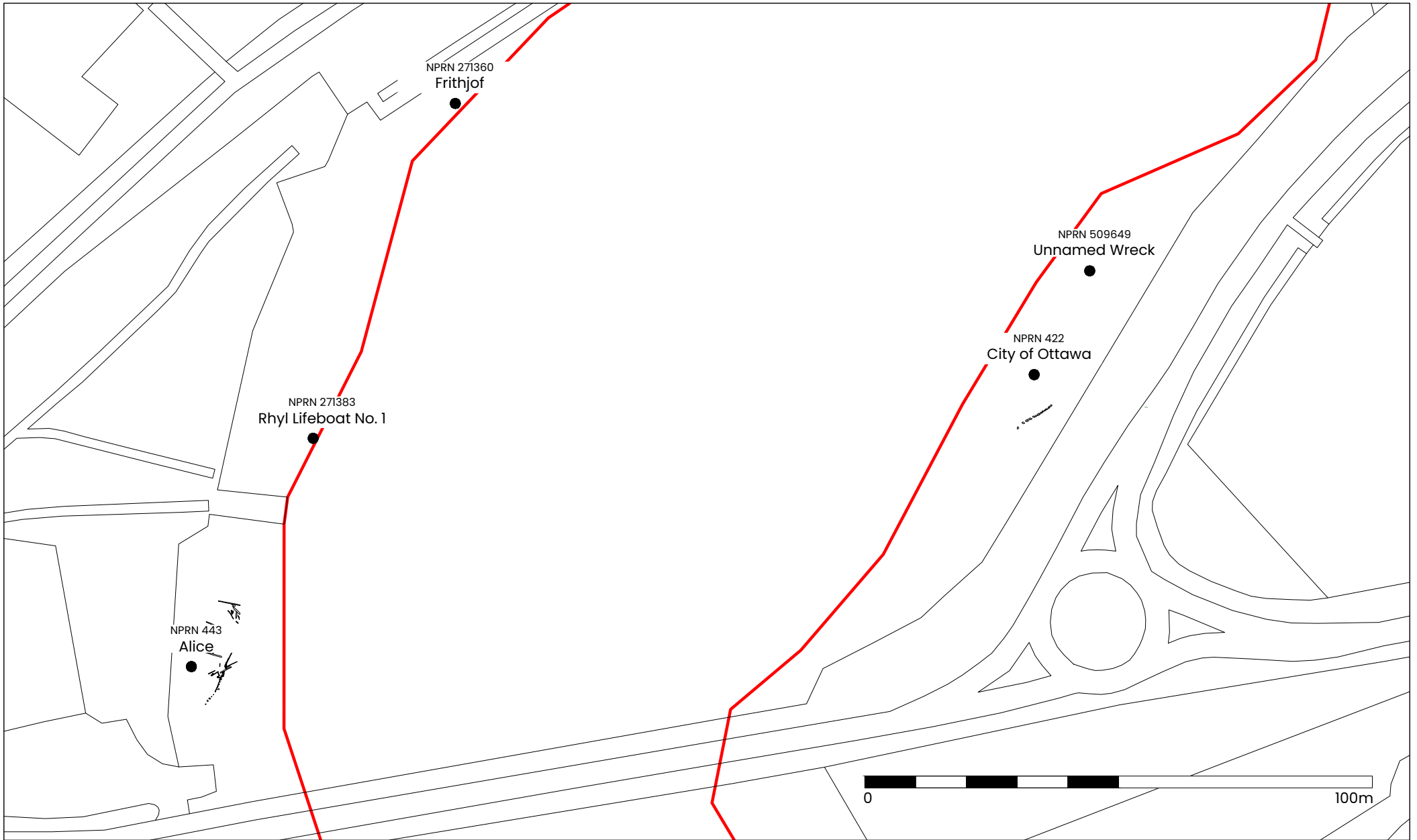


Figure 02 - Site Plan showing Shipwreck Locations
RHW - Rhyl Harbour: Pre-Dredging Survey and Monitoring

Scale at A4 - 1:1000
Drawn by MH

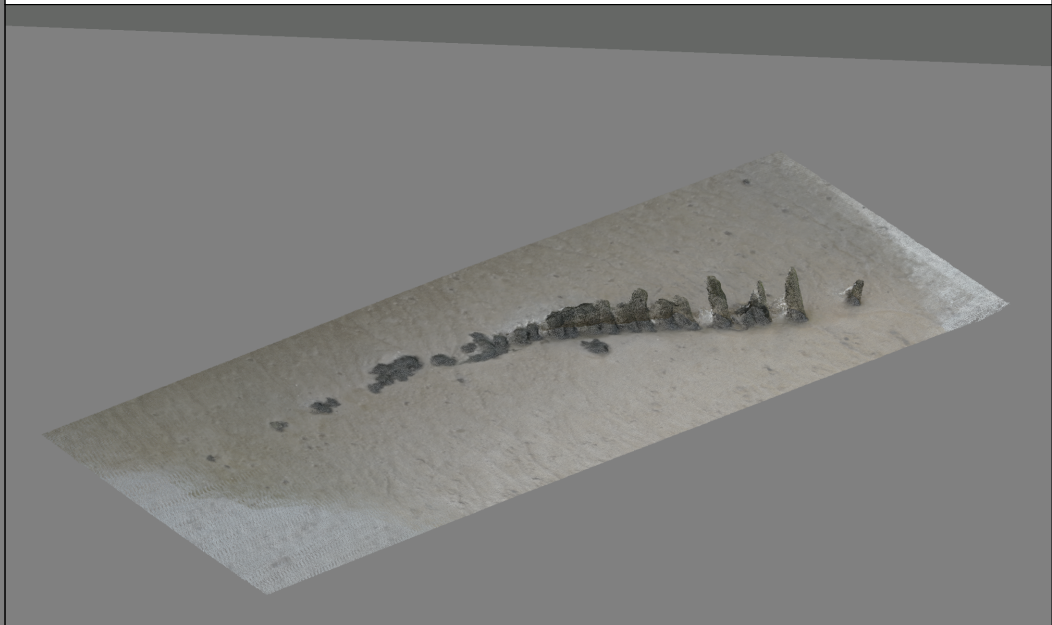
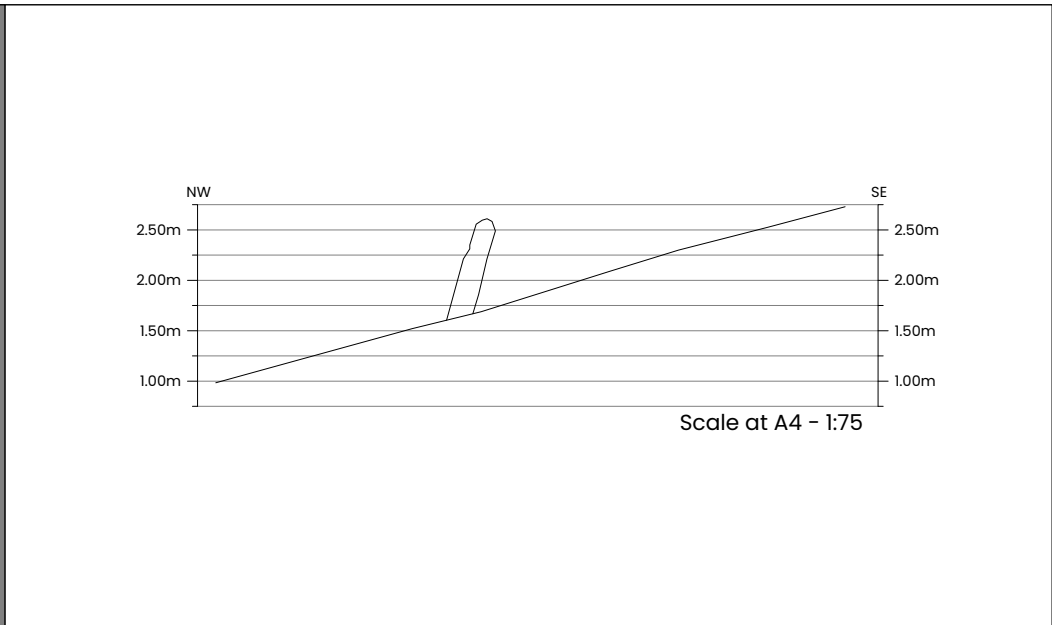


Figure 03 - 'The City of Ottawa' Point Cloud Views and Topographic Profile
 RHW - Rhyl Harbour Pre-Dredging Survey and Monitoring

Scale at A4 - Varies
 Drawn by MH

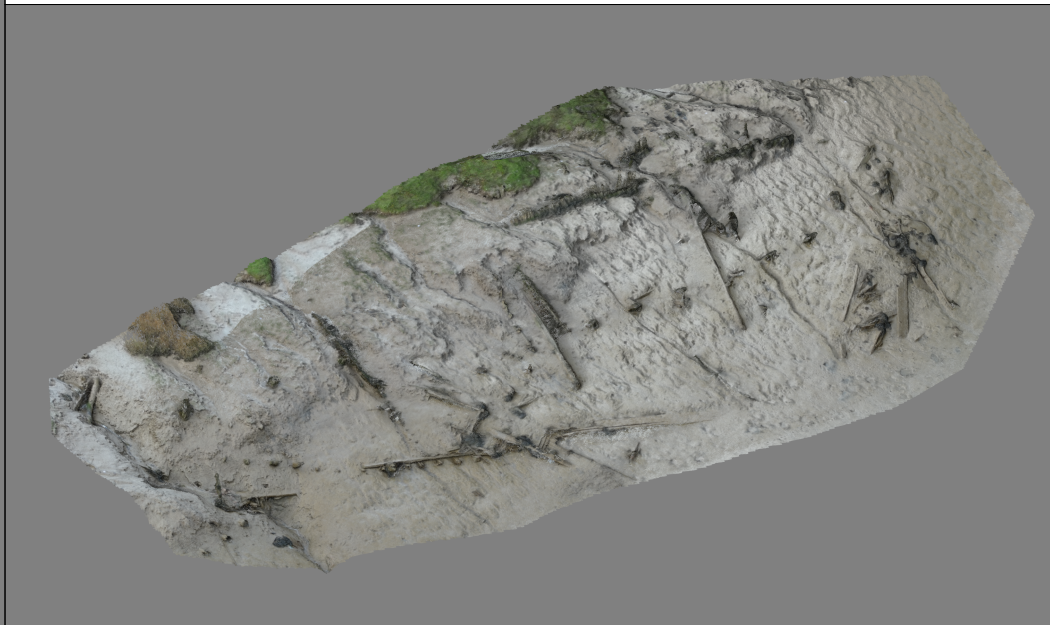
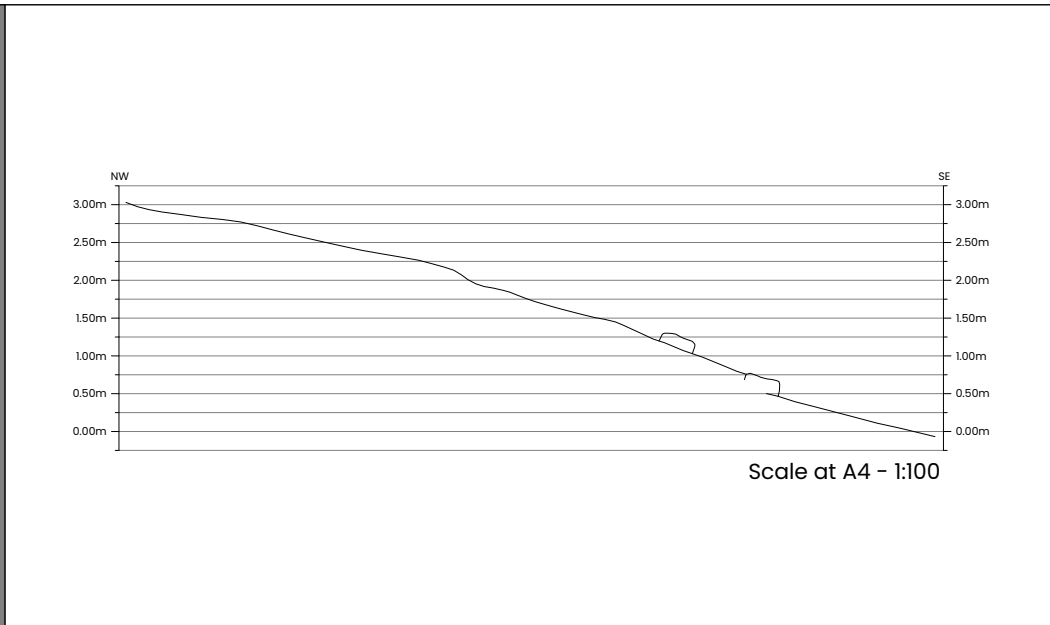


Figure 04 - 'The Alice' Point Cloud Views and Topographic Profile
 RHW - Rhyl Harbour Pre-Dredging Survey and Monitoring

Scale at A4 - Varies
 Drawn by MH



Plate 1 - Postcard showing a tinted photograph of the harbour taken shortly after the bridge was opened in 1932



Youngsters at work on recovering the hulk

Mystery harbour wreck unearthed

A MYSTERY WRECK that could be 50 years old has been unearthed in the deep mud at Rhyl's Foryd Harbour.

A dozen youngsters employed under the Manpower Services scheme have been busy tidying up the harbour over the last year in conjunction with the local Fisherman's Association, motor boat and yacht clubs.

At low tide, pieces of wood were seen protruding from the mud below the yacht club slipway and when the workers dug deeper they uncovered the remains of a heavily con-

structed timber vessel in very good condition.

"No one knows what it is for sure but it could be a flat coastal cargo boat which used to sail into playces like Rhyl," says John Povah, vice chairman of the Rhyl Fishermen's Association.

The hull of the 90-ft long, 20ft wide boat is intact but the upper portion has been smashed up over the years.

It will take another week to remove the remaining third of the wreck but after the photographs are taken for posterity, the ship will have to be broken up as the yacht club are clearing the site for sailing boats.

Plate 2 - Article from Welsh News, September 16th, p3



Plate 3 – View of Rhyll Harbour in the 1980s with the remains of the *Alice* in the foreground



Plate 4 - View of Rhyll Harbour in the 1980s with the remains of the *City of Ottawa* in the foreground



Plate 5 – *The City of Ottawa* in 2013 (© Malvern Archaeological Diving Unit)



Plate 6 – Detail of frames and planking on the *City of Ottawa* taken in 2013 (© Malvern Archaeological Diving Unit)



Plate 7 – South east facing drone shot of *The City of Ottawa*



Plate 8 – North east facing drone shot of *The City of Ottawa*



Plate 9 – Southern remains of the *Alice*



Plate 10 – Northern Remains of the *Alice*



Plate 11 – North facing shot of a section of the dredged material



Plate 12 – South facing shot of the laminated dark grey silts at the base of the excavation



Plate 13 – Post excavation shot of the excavation base showing sand and gravel deposits

