4.3 Maritime Archaeological Underwater Survey (2012)

An additional underwater survey was conducted in October 2012 on the potential anomalies identified in the side scan sonar survey. This survey was conducted by Chris Lewczak (Senior Archaeologist) Cosmos Archaeology Pty Ltd, David Nutley (Maritime Archaeologist) and commercial dive company Gray Diving Services.

Seven anomalies were identified to need a visual inspection. These were:

- Three anomalies located in the middle of the river (anomalies Mid River 1, 2 and 3); and
- Anomalies near the northern bank of the river, downstream from the current bridge, requiring at least three circular searches (anomalies North Bank 1, 2 and 3);
- One anomaly identified to the northeast of the known remains of the former wharf, possibly being a ballast or rock deposit (known as South River 1).

Once on site, it was determined that anomaly Mid River 2 was a modern mooring and would not require inspection.

It was also decided to undertake two underwater transects in the approximate location of the southern punt landing, located on the southern side of the river, approximately 20 m upstream from the current bridge.

4.3.1 Recording Process

David Nutley (Maritime Archaeologist with commercial diving qualifications) carried out the investigation and the commercial dive team under the direction of Chris Lewczak. Diving was conducted with Surface Supplied Breathing Apparatus (SSBA) from a dive boat. The inspection complied with OH&S requirements.

The following constraints were considered in the investigation methodology:

- Water visibility was expected to be close to 0 m and so it was not guaranteed that photography or video could be obtained.
- Poor water visibility would limit the information obtained from archaeological remains.
- Vessels operating in the area may have an influence on the conduct of the investigation.

The investigation was conducted under two separate survey methodologies. The first was to undertake seven underwater circular surveys on the known location of each anomaly identified from the side scan sonar search. Circular searches are carried out in deep water or areas where visibility is low. Circular searches were carried out to a radius distance of 10 m. The diving vessel anchored within 2 m of the known recorded location of the anomaly, with the diver attached a survey line that had 2 m increments marked out on it to weight the line down onto the seabed. The survey line would snag any features protruding from the seabed, resulting in the diver circling back onto the survey line and then onto the features that was snagged. The diver could then record the distance from the centre of the search area (anchor position) and the compass bearing.

The diver also carried out a series of circular searches at every 2 m around the centre point (i.e. at a distance of 2 m, 4 m, 6 m, etc.) to conduct a visual and physical inspection of the area in an attempt to locate the anomaly.

The second type of underwater survey methodology were underwater survey transects. These surveys used 20 m weighted survey line. A transect was formed by attaching a 20 m weighted line from a nominated location on the edge of the riverbank. The line was reeled out on the riverbed its full distance. The diver swam along the line noting artefacts observed/felt on the

surface as well as riverbed composition. The survey line had lead weights attached every 2 m that were numbered so the diver knew the distance along the transect if any features were to be recorded.

4.3.2 Findings

Circular Search 1 (Mid River 1)

Recorder: Chris Lewczak

Location: 56 H N6279750 E0297979

Time in: 9:34am *Time Out*: 9:42 *Total Time*: 10 min

Max Depth: 4.2 m Vis: 0.3m

This circular search was undertaken on Middle River 1 anomaly (Figure 51). The riverbed in this location consisted of a sandy bed, and was relatively flat. The diver conducted the search starting at 2 m and heading out. No evidence of the anomaly was present, or any evidence of local scouring or other features that may attribute to the anomaly identified in the side scan sonar survey. It is possible this anomaly may have been a tree branch, or similar material, that has since moved further down river.

Circular Search 2 (Mid River 3)

Recorder: Chris Lewczak

Location: 56 H N6279771 E0298027

Time in: 9:45 am *Time Out*: 9:56 *Total Time*: 11 min

Max Depth: 2.4 m Vis: 0.3m

This circular search was undertaken on Mid River anomaly 3 (Figure 51). The location of this anomaly was on a localised sand bar within the river, with the depth of water only 2.4 m at the centre point of the survey. The river bed was very sandy and was undulating, with sand ripples present along the riverbed of a height up to 0.5 m from the peak to the trough.

The diver located localised scouring occurring around a boulder outcrop. Inspection of the boulder identified the feature to be natural, with no evidence that the boulder had previously been used as mooring or other feature. No other features or cultural material were identified during this survey.

Circular Search 3 (North River 3)

Recorder: Chris Lewczak

Location: 56 H N6279808 E0298007

Time in: 10:04 am *Time Out*: 10:18 *Total Time*: 14 min

Max Depth: 2.4 m Vis: 0.3m

This circular search was the first survey undertaken along the northern bank of the river, downstream from the current bridge (Figure 52). The diver noted a lot of debris, consisting mostly of tree branches and other vegetation remains. Heading away from the bank of the river there was a steep batter, approximately 1 m deep, leading from the bank towards the middle of

the river. The riverbed at the top of the batter consisted of a silty clay composition, with the riverbed composition changing to a sandy material at the bottom of the batter and away to the centre of the river.

A dense deposit of tree branches and other vegetation material was present. The diver inspected the material to identify any cultural material or other worked timer remains that may have been present. No cultural material was identified during this survey. The anomalies detected by the side scan sonar survey in this area were likely the tree debris noted by the diver.

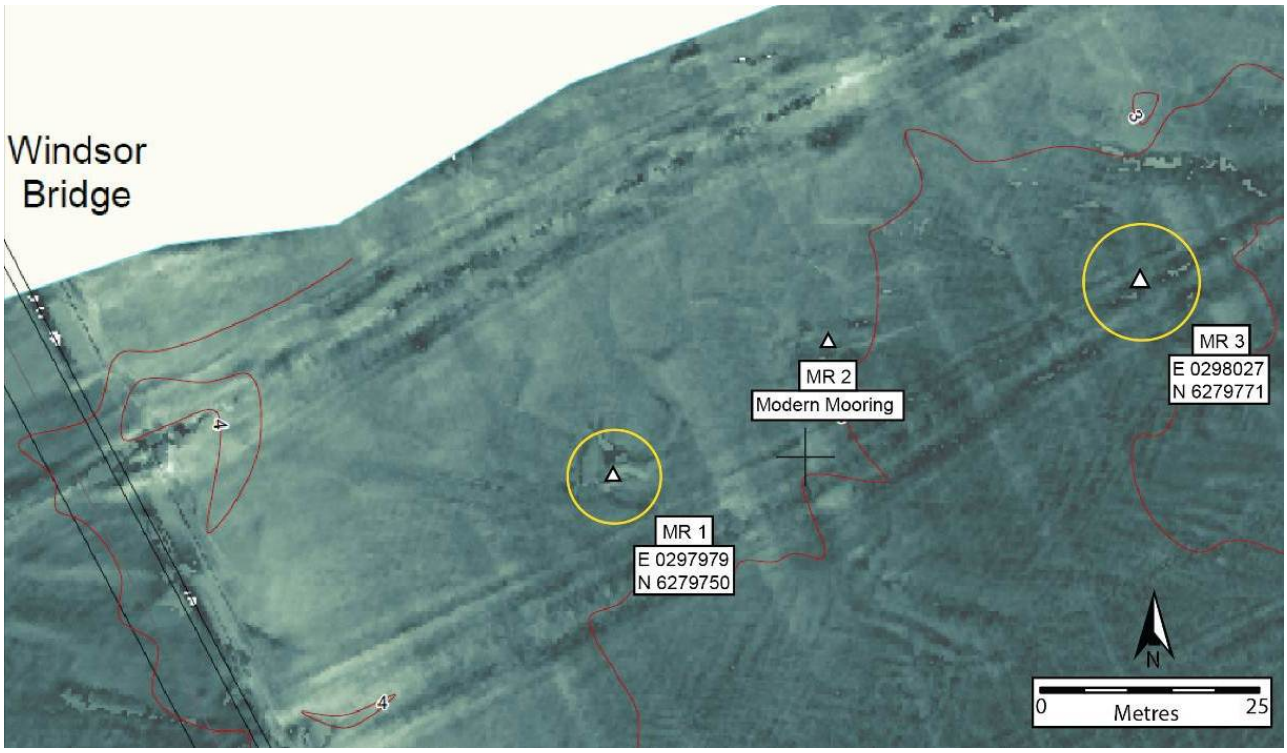

Figure 51: Location of the anomalies Mid River 1 (MR 1), Mid River 2 (MR 2) and Mid River 3 (MR 3) circular searches (white triangles) and the area covered in each search (yellow circle).

Circular Search 4 (North River 2)

Recorder: Chris Lewczak

Location: 56 H N6279795 E0297992

Time in: 10:22 am *Time Out*: 10:36 *Total Time*: 14 min

Max Depth: 2.1 m Vis: 0.3m

This search was conducted 15 m to the west of Circular Search 4, conducted near to the northern bank of the river, downstream from the current bridge (Figure 52). The diver found tree and other vegetation debris remains in the area, similar to the previous circular search.

The diver located a timber beam exposed out of the riverbed. Approximately 0.5 m of the timber beam was protruding from a step batter located away from the riverbank. The timber beam was approximately 0.2 m thick. A second timber beam was located protruding approximately 0.2 m out from the steep batter on the riverbank on an angle.

More timber sections were identified on the riverbed at the bottom of the steep bank, including timber planks joined by bolts to a post. The diver was not able to move the section located as it had been covered over and continued back into the steep batter below the riverbank.

The location of the timber remains, the tree branch and other vegetation debris is likely to have been the anomaly detected by the side scan sonar in this location.

Circular Search 5 (North River 1)

Recorder: Chris Lewczak

Location: 56 H N6279790 E0297980

Time in: 10:41 am *Time Out*: 10:50 *Total Time*: 9 min

Max Depth: 2.0 m Vis: 0.3m

This circular search was the third search conducted below the northern bank of the river downstream from the current bridge directly across from the known remains of the ca.1814 wharf (Figure 52). The area was littered with tree branches and other vegetation debris, with a similar steep slope present away from the riverbank leading down towards the middle of the river. The riverbed at the top of the batter consisted of a very silty sand, with a stiff sand riverbed.

A single timber post was located sticking directly out of the riverbed at the base of the batter, 4 m to the west from the centre point. The post was approximately 0.2 m thick and protruding 0.4 m out from the riverbed.

No other timber remains or other cultural remains were present within the survey area. The single timber post present in this area was different to that recorded in circular search 4.

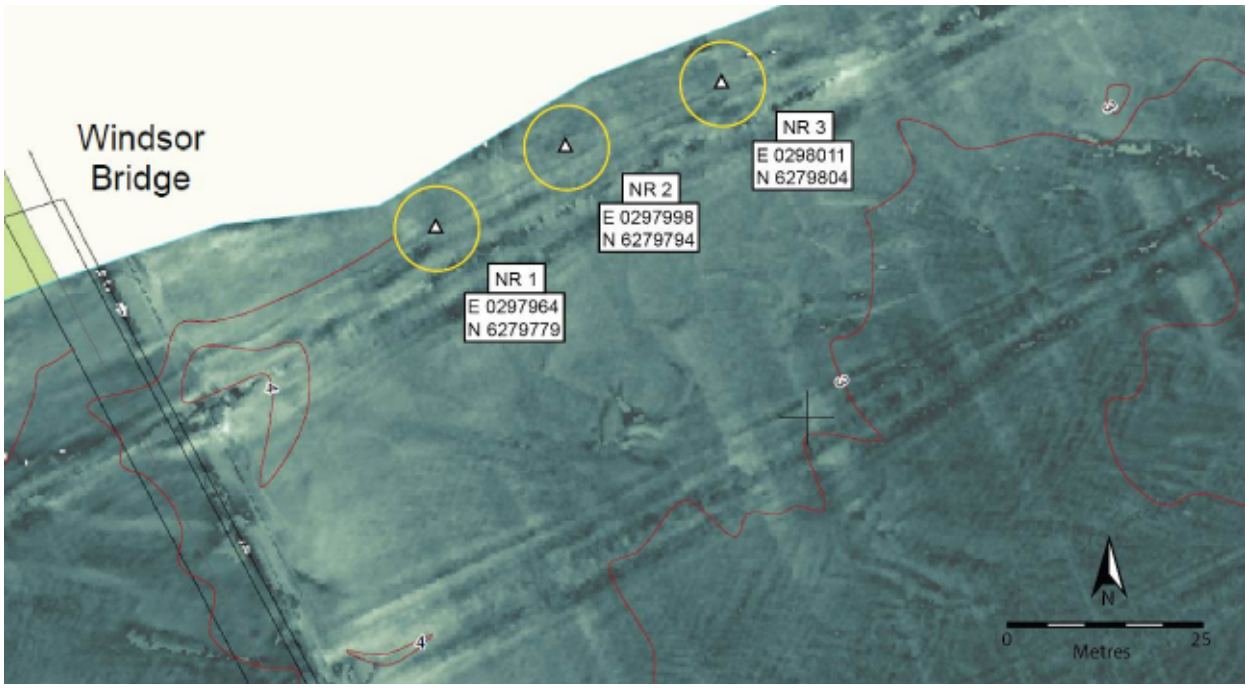

Figure 52: Location of the anomalies North River 1 (NR 1), North River 2 (NR 2) and North River 3 (NR 3) circular searches (white triangles) and the area covered in each search (yellow circle).

Circular Search 6 (South River 1)

Recorder: Chris Lewczak

Location: 56 H N6279711 E0298026

Time in: 11:02 am *Time Out*: 11:13 *Total Time*: 11 min

Max Depth: 2.0 m Vis: 0.3m

This search area was located to the northeast from the known remains of the former ca.1814 wharf, located directly north into the centre of the river from the western edge of the current pontoon landing (Figure 53). The riverbed in this section of the river consisted of a sandy bed with undulating sand ripples approximately 0.5 m in height, with the swales leading down river.

The anomaly seen in the side scan sonar was identified as a shopping trolley. No other cultural material was observed in this area.

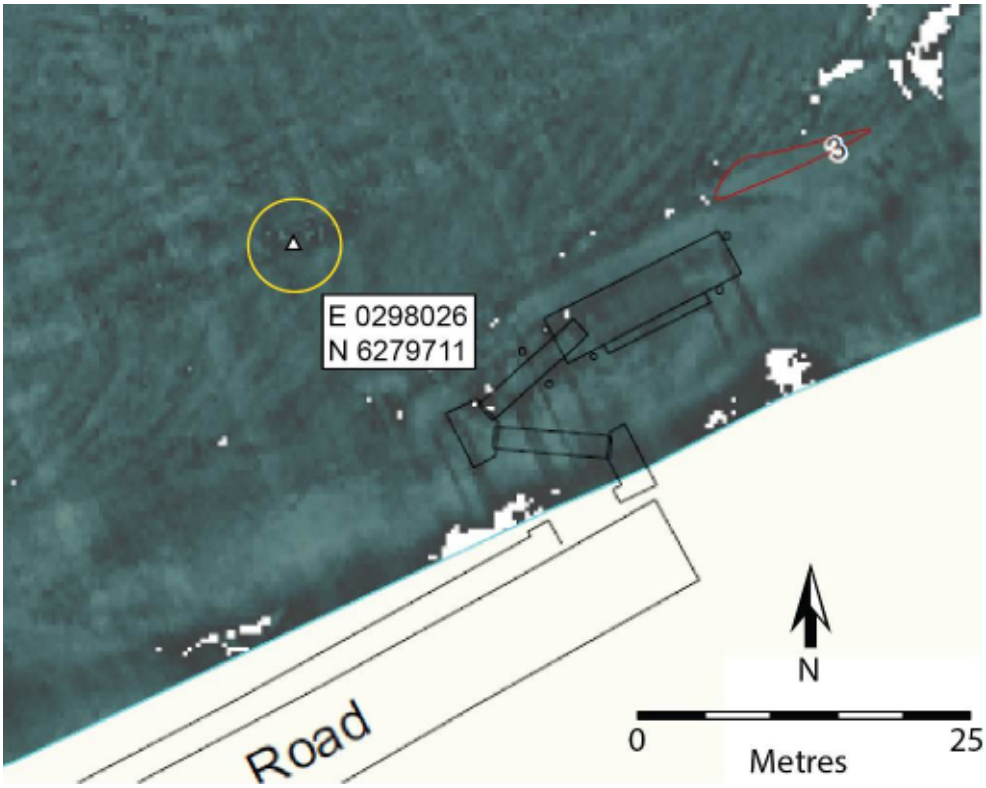

Figure 53: Location of the anomaly South River 1 circular search (white triangle) and the area covered in the search (yellow circle).

Transect 1

Recorder: Chris Lewczak

Location: 56 H N6279665 E0297924

Time in: 12:15 am *Time Out*: 12:31 *Total Time*: 16 min

Max Depth: 2.8 m (@ 20 m) Vis: 0.3m

This transect was placed on the southern side of the river, to the west (upstream) of the current bridge, in the area believed to be where the southern punt landing was located (Figure 54). The side scan sonar results show a platform or ledge present in this area. The transect was

placed at the base of the riverbank in the water (0 m) with the diver beginning at the river end of the transect (20 m). The transect was conducted on a bearing of 160 degrees to the river bank.

The riverbed at 20 m from the bank consisted of a sandy surface that was covered in tree branches and other debris. The riverbed changed closer to the bank, with seagrass and other vegetation growing on the silty sandy riverbed. Closer to the bank the riverbed was covered in debris and silt.

The end of a natural sandstone platform was present at a distance 15 m from the edge of the riverbank. The platform sloped slightly downwards towards the centre of the river, and extended back towards the riverbank, where it was covered by silt and vegetation debris. Another smaller section of sandstone shelving was exposed at a distance of 17 m from the riverbank. The shelving was natural and the diver noted no evidence of the shelve being worked as part of a landing. There was no evidence within the section of the sandstone platform that posts or other features had been embedded into it.

Transect 2

Recorder: Chris Lewczak

Location: 56 H N6279670 E0297940

Time in: 12:42 am *Time Out*: 12:55 *Total Time*: 13 min

Max Depth: 3 m (@ 20 m) Vis: 0.3m

This transect was located 20 m to the east of Transect 1, approximately 20 m away from the current bridge, with the transect on an angle of 160 degrees (Figure 54). The riverbed in this section was similar to that in Transect 1; sandy riverbed with tree debris. The riverbed became siltier with more tree branches and other vegetation debris.

A deposit of cobble stones was located at approximately 12 m out from the riverbank. This was a small isolated deposit of sandstone cobbled, approximately 0.15 m to 0.25 m in diameter.

No cultural material or other remains were noted during this survey.

Figure 54: Location of Transect 1 and Transect 2.

4.3.3 Summary

The maritime archaeological investigation of the seven anomies was able to identify the remains of a timber structure, potential relating to a timber structure or something that has been transported into the area during previous flood events. The timber remains were recorded between 35 and 60 m downstream from the current bridge. There is no historical evidence of a retaining wall being built in this area. An 1890 hydrographic survey of the Hawkesbury River does not show any structure being built in this area, despite the public wharf and a retaining wall on the southern side of the river on the western side of the bridge being depicted (see Figure 12). The 1980 hydrographic survey of the river does show the steep batter slope that was recorded by the divers during this survey (Figure 55). The timber remains were located within or at the base of this slope. The wharf and a retaining wall located on the southern riverbank on the western side of the current bridge were recorded, but no structures on the northern side of the river. It is possible that the remains that are present do not relate before 1890.

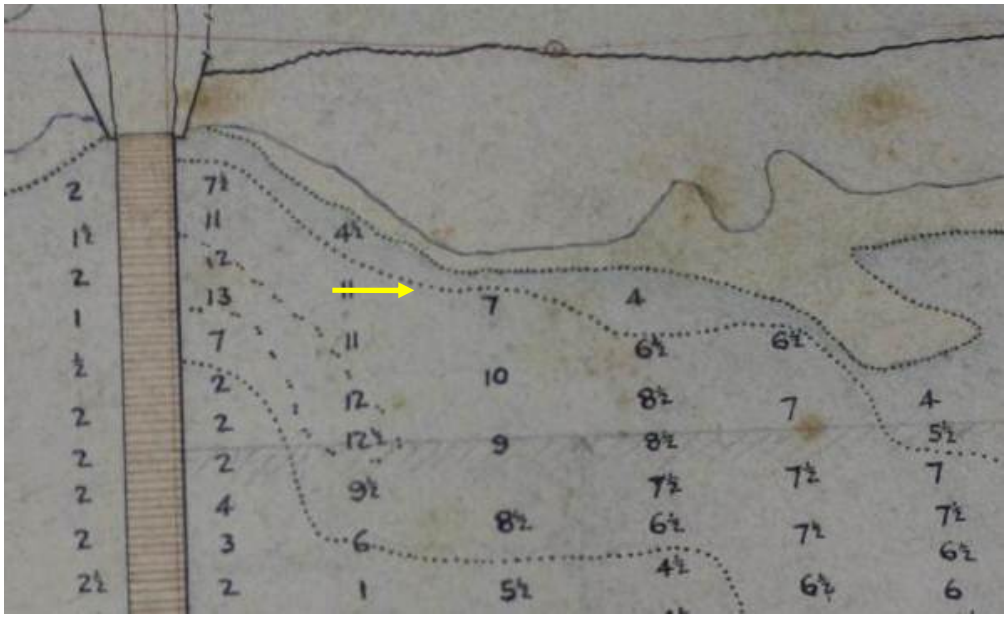

Figure 55: Section of the 1890 survey of the Hawkesbury River (as seen in Figure 12) showing the steep slope (outlined in yellow) as recorded in the 2012 maritime archaeological survey, and no indication of any structure being built in this area.

The 1955 aerial photograph shows a line of moorings, or similar structures, along the northern bank of the river in the vicinity of where the timber remains were recorded (Figure 56). No details can be seen of these possible mooring structures, whether they relate to singular mooring lines, or mooring posts in the river. It is also possible the timber remains were transported into this area from a previous flood event, and then covered with silt and other debris, creating the steep slope that was recorded by the divers in this area.

Two transects in the proposed location of the southern landing for the post 1832 punt operation located a sandstone bench where and side scan sonar anomaly was located. There was no evidence that the sandstone bench had been modified for use in the punt landing, which was most likely as the bench was located 15 m from the current riverbank. The area has silted over closer to the bank, and the sandstone bench could not be seen. No evidence was seen of any posts or other cultural remains that may have been associated with the former punt landing. This area is located close to the western side of the current bridge abutment, and is not expected to be impacted from the construction of the new bridge crossing.

The remaining anomalies identified within the side scan sonar survey were natural localised souring, modern mooring foundations or modern material (trolley).

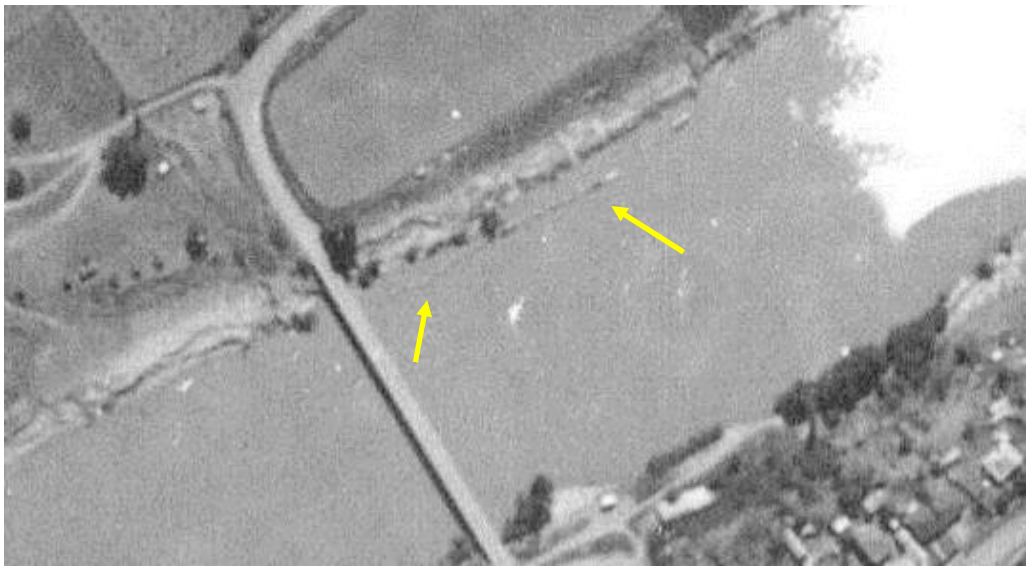

Figure 56: Section of the 1955 aerial photograph (as seen in Figure 22) showing possible moorings along the northern side of the Hawkesbury River in the vicinity.

5.0 Archaeological Potential

In an attempt to understand the archaeological potential associated with the former wharves built at Windsor and the punt crossing, an understanding of the changing formation of the river and geology is required before summarising the archaeological potential that exists for the former maritime infrastructure sites.

5.1 Historical and Present River Depths and Geology

5.1.1 River Depths

Information relating to historical depths of the river and previous dredging or sand mining has been limited and difficult to locate to date. It is known from historical documentation that the Hawkesbury River at Windsor had not been dredged before 1897, with locals in 1897 petitioning the government for dredging to occur.

A hydrographical survey of the Hawkesbury River in 1890 was the earliest known depth recordings of the river. It is likely that earlier depths were taken for the construction of the original bridge crossing in 1874; however, if undertaken, these depth measurements could not be located at the time of this assessment. In the vicinity of the new bridge crossing the depths of the river are given in feet as Spring Low Water adjusted depths. The chart shows the southern side of the river, on an alignment from the middle of the wharf present on the 1890 chart is between 4 ft and 6tf. The water depth becomes shallower in the middle of the river, between 2 ft and 4 ft, before approaching the northern side of the river where there is a deep scour and water depths of 8.5 ft and upwards (see Figure 12).

Geo-technical investigations along an early possible alignment route across the Hawkesbury River at Windsor were undertaken in 2008, 35 m downstream (east) of the current river.[41] The location of these boreholes is approximately halfway between the existing bridge and the current proposed alignment for the new bridge crossing. The seabed depths taken at the time of the geo-technical work show the riverbed being approximately 3 m deep across the river (Figure 57).

Comparing the riverbed depths between the two surveys shows there is a difference in riverbed depths of between 0.7 m and 1.6 m (see Figure 58 and (Table 1). It should be noted that there is a difference between the depths of the riverbed readings, with the1890s hydrographical survey represented as Mean Spring Low depths, and the 2008 geotechnical survey given as Australian Height Datum (AHD) figures. The height of the Mean Spring Low height is known to be 0.7 m AHD. The depths of the riverbed taken during the geo-technical investigation are given as AHD, therefore an adjusted approximate riverbed depth can be deduced by reducing the AHD levels by 0.7 m AHD. The comparison between the two depth readings will use the adjusted AHD heights to provide for an equal comparison.

The difference between the 1890s water depths and the 2008 water depths at the southern (Windsor) section of the river is 1.6 m (deeper than in 1890) in the location of borehole 3 and 1.04 m (deeper than in 1890) at Borehole 4. The difference in the depth of the riverbed at the centre of the river is between 1.54 m (deeper than in 1890) at borehole 5, 0.75 m at borehole 6 and 1.24 m (deeper than in 1890) at Borehole 7. At the northern, Wilberforce, side of the river, the difference between depths of the riverbed are closer together, 0.34 m (deeper than in 1890) at Borehole 8 and only 0. 4 m (deeper than in 1890) at Borehole 9 (see Figure 58 and Table 1).

[41] RTA April 2008, MR182. Bridge over Hawkesbury River at Windsor. Geotechnical investigation for replacement bridge (Report No. G3892).

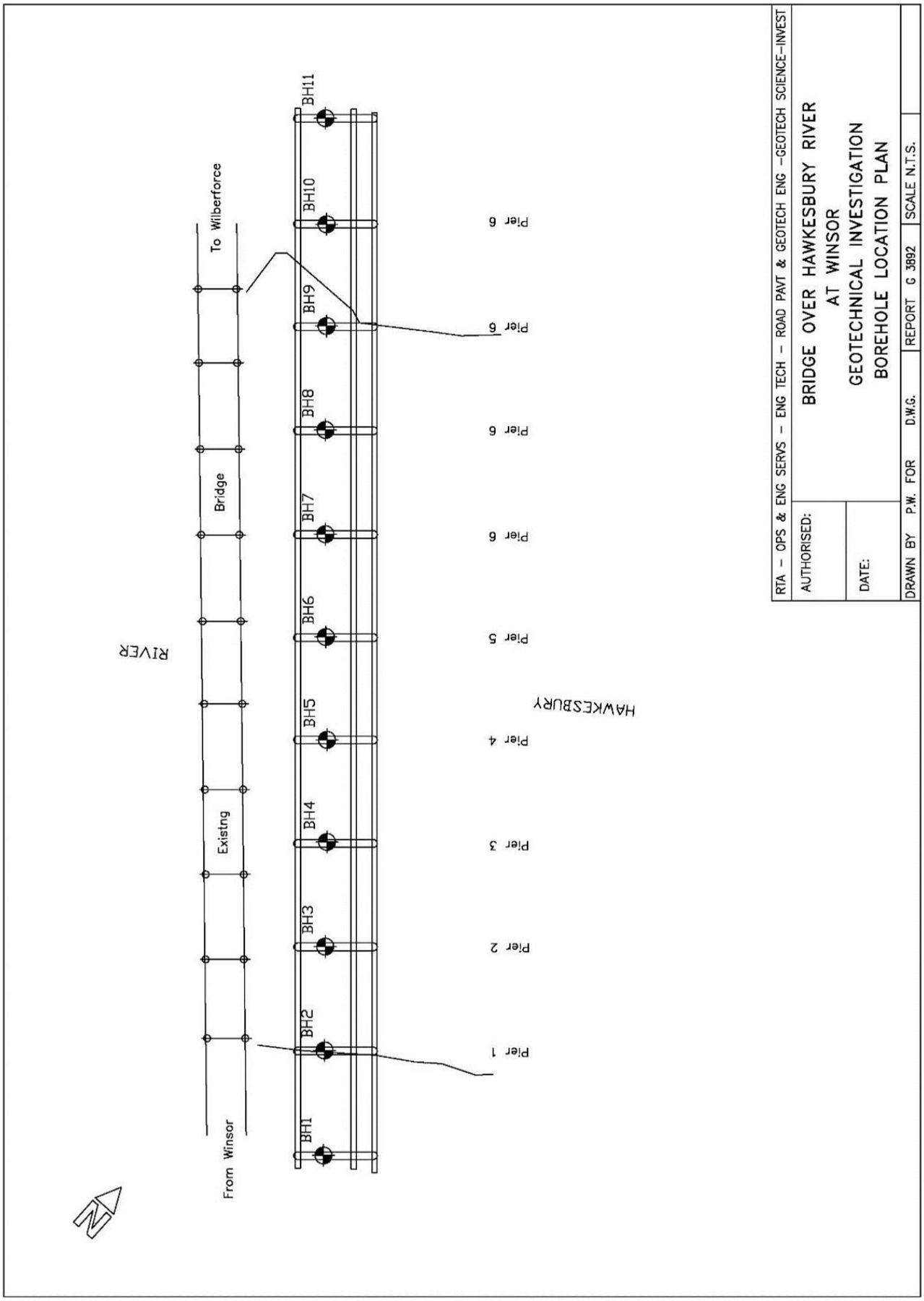

Figure 57: Location of Geotechnical boreholes investigated by RTA in 2008 (Source: RTA 2008:6).

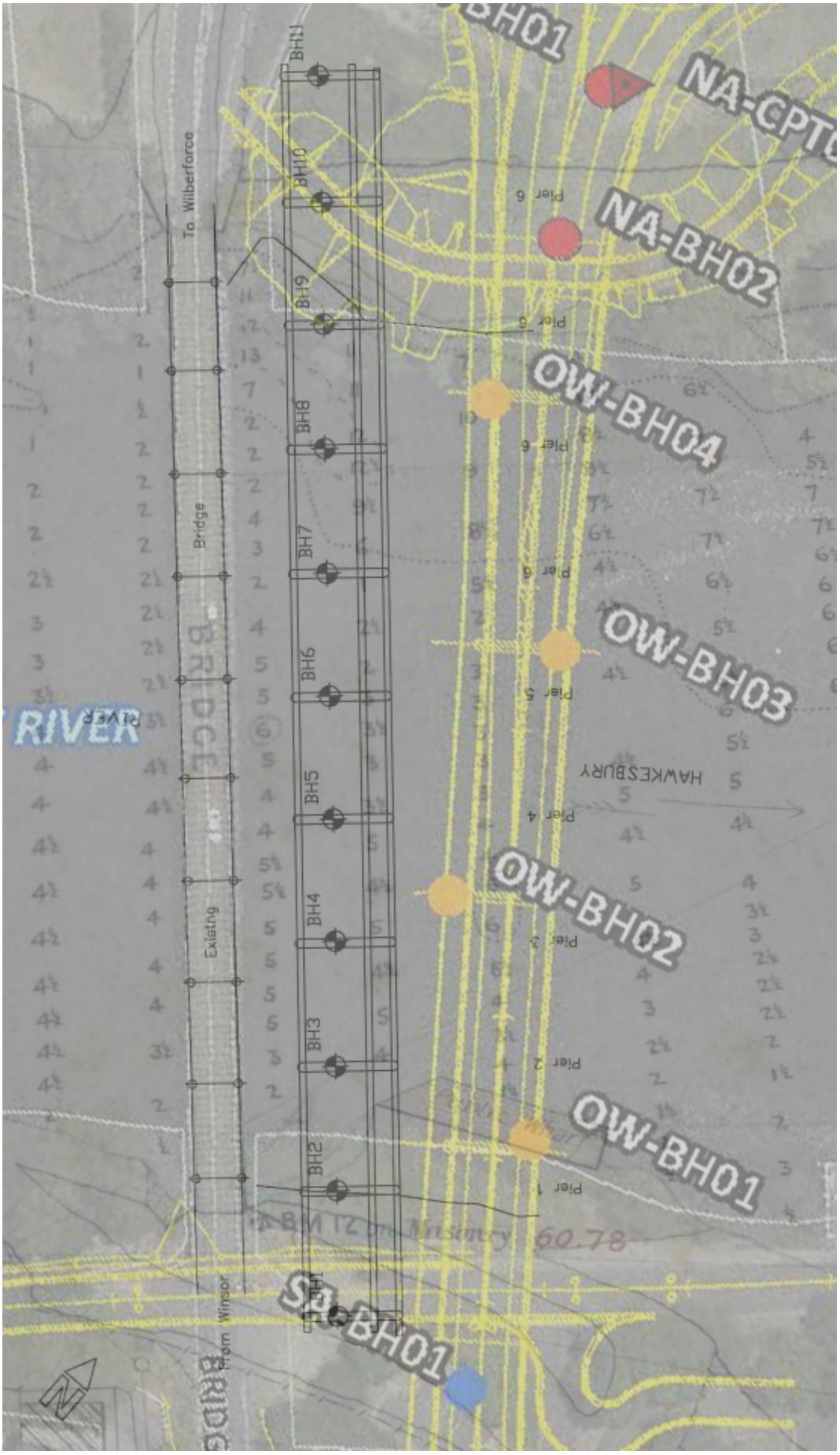

Figure 58: Location of the 2008 borehole (Black and White Boreholes) and the 2012 Boreholes (OW-BH# in colour) overlayed on the 1890 hydrographical survey plan of the Hawkesbury River at Windsor showing the location of the second wharf and 1890 riverbed depths

Geo Tech water depth	1890 water depth	Adjusted MSL difference (minus 0.7 m AHD)
Borehole 3 = 3.5 m (11.4 ft)	4 ft (1.2 m)	+1.6 m
Borehole 4 = 3.24 (10.6 ft)	5 ft (1.5 m)	+1.04 m
Borehole 5 = 3.44 (11.2 ft)	4 ft (1.2 m)	+1.54 m
Borehole 6 = 2.95 (9.6 ft)	5 ft (1.5 m)	+0.75 m
Borehole 7 = 3.14 (10.3 ft)	2 ft (0.6 m)	+1.24 m
Borehole 8 = 4.64 (15.22 ft)	12 ft (3.6 m)	+0.34 m
Borehole 9 = 2.04 (6.7 ft)	4 ft (1.2 m)	+0.14 m

Table 1: Water depth comparison table showing the depth of water during the 2008 geotechnical investigation, the recorded depth of water from the 1890 hydrographical survey, and the change in water depth between the two readings after adjusting the 2008 recording to the Mean Spring Low level (minus 0.7 m).

5.1.2 Geo-technical Data

Two sets of geo-technical borehole data has been collected for this project. The first was in 2008, with more recent borehole data collected in the location of the over water piers more recently in June 2012. The results of the geo-technical borehole data is also useful in determining the nature of the riverbed, as well as providing information on the sediments present for an understanding of the archaeological potential within the area. This analysis will only use the results of the boreholes done within the river during both geo-technical investigations, being boreholes 3 to 9 in the 2008 collected data, and the four overwater boreholes collected in June 2012.

5.1.2.1 2008 Geo-tech data

Seven boreholes were undertaken over the water approximately 35 m downstream of the current bridge, boreholes 3 to 9. The boreholes ran from south to north, from Borehole 3 taken on the southern side of the river, and Borehole 9 immediately adjacent to the northern bank of the river.

The riverbed sediments at Borehole 3 (southern side of the river) show the riverbed to be made up of coarse gravelly sand that has inclusions of fine and medium gravels to a depth of 1.1 m. Below this strata is a fine to coarse sandy gravel to a depth of 2.15 m. At the base of this strata was a 'tree root' or 'timber log'. This was followed by sandstone and siltstone that is described as bedrock.[42]

The riverbed at Borehole 4 is a coarse sand strata that continues to a depth of 2.3 m where the deposit changes to a sandy clay down to a depth of 4.0 m. At this depth coarse gravel is present that sits on top of the bedrock at a depth of 7.3 m.[43]

Boreholes 5, 6 and 7, which make up the three boreholes in the middle of the river, are similar and include pale yellow sand that continues to a depth of 4.05 m below the riverbed. Below

[42] RTA *op.cit*. Borehole Log 3.
[43] *Ibid*, Borehole Log 4.

this strata a gravel and coarse sandy gravel strata is present to a depth of 7.2 m where bedrock is present.[44]

Borehole 8, located near the northern bank of the river, revealed the presence of dark grey to grey clayey sand to a depth of 2.95 m, where a 0.15 m lens of gravel was present. Below this gravel, between 3.10 m and 3.8 m below the riverbed light grey clayey sand is present above sandy gravels to a depth of 7.0 m. At this depth the sandstone and siltstone bedrock is present. [45]

In Borehole 9, located immediately adjacent to the river bank, the riverbed consists of 2.0 m of dark grey clayey sand followed by 2.5 m of sandy gravel strata. At this depth, 4.5 m below the riverbed, a 5.2 m strata deposit of gravel and cobbles is present. This strata is immediately above the sandstone and siltstone bedrock at 9.7 m.[46]

5.1.2.2 2012 Geo-tech data

Four overwater boreholes were undertaken in early June 2012. A borehole was undertaken in the location of each of the piers associated with the new bridge crossing. The boreholes were undertaken from south to north, with overwater Borehole 1 (OW-BH01) in the location of the first in water pier on the southern side of the bridge (Figure 59).

In the location of OW-BH01 approximately 1.60 m of alluvium is present in the area. The first 0.5 m of the deposit consists of dark grey and bottled brown/black fine to coarse grain gravel with traces of organics that is considered to be very loose. This was followed by a deposit of stiff sandy clay that consisted of pale grey and bottled dark grey and orange sand with inclusions of rounded gravel with traces of organics to a depth of 1.60 m. The first bedrock layer is present at 1.60 m

Borehole OW-BH02 was located on the second in water pier from the southern bank. The deposits in this location consist of 1.80 m of very loose brown-grey sandy gravel and sand with some inclusions of gravels. This deposit was preceded by brown-grey sandy gravel that was slightly denser than the top layer. This deposit continued to a depth of 4.2 m where the same material was present only becoming more compacted at 4.2 m, and again at 5.2 m. Bedrock was present at 6.7 m below the river bed.

Borehole OW-BH03, the second of the two central river piers was similar to the deposits found in borehole OW-BH02, however, a sand and gravel deposit was present at 5.9 m extending to bedrock at a depth of 7.5 m below the riverbed.

The borehole closest to the northern side of the river, OW-BH-04, consisted of 2.4 m of very loose and fine dark grey sand, followed by a dark grey and mottled brown soft clay to a depth of 3.7 m. From a depth of 3.7 m to a depth of 8.7 m the deposit consisted of dense sandy gravel with inclusions of cobbles/boulders. Bedrock was present at a depth of 8.7 m.

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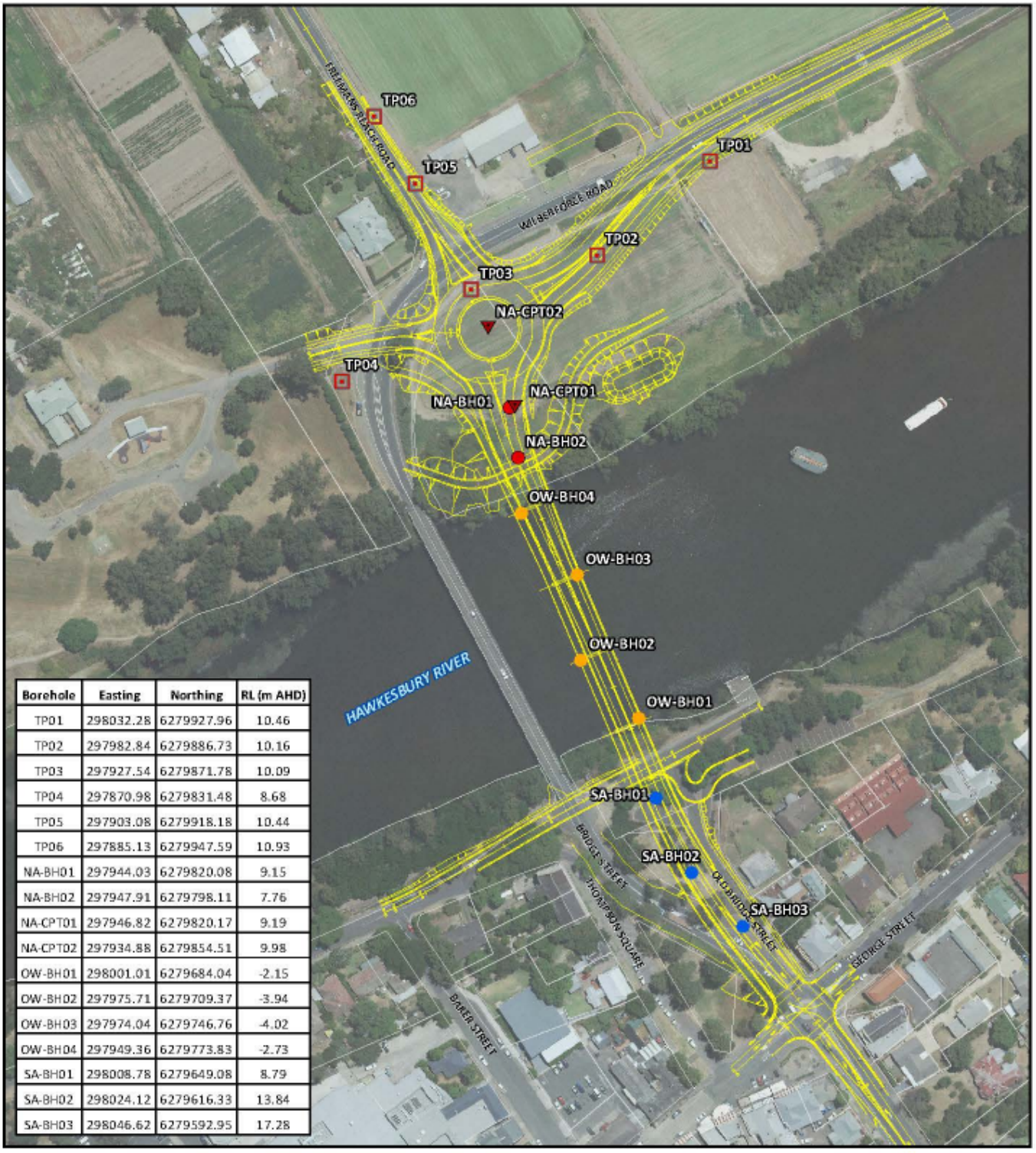
[44] *Ibid*, Borehole Log 5, 6 & 7.

[45] RTA *opp*. cit, *Ibid*, Borehole Log 8

[46] RTA *opp*. cit, *Ibid*, Borehole Log 9



Borehole	Easting	Northing	RL (m AHD)
TP01	298032.28	6279927.96	10.46
TP02	297982.84	6279886.73	10.16
TP03	297927.54	6279871.78	10.09
TP04	297870.98	6279831.48	8.68
TP05	297903.08	6279918.18	10.44
TP06	297885.13	6279947.59	10.93
NA-BH01	297944.03	6279820.08	9.15
NA-BH02	297947.91	6279798.11	7.76
NA-CPT01	297946.82	6279820.17	9.19
NA-CPT02	297934.88	6279854.51	9.98
OW-BH01	298001.01	6279684.04	-2.15
OW-BH02	297975.71	6279709.37	-3.94
OW-BH03	297974.04	6279746.76	-4.02
OW-BH04	297949.36	6279773.83	-2.73
SA-BH01	298008.78	6279649.08	8.79
SA-BH02	298024.12	6279616.33	13.84
SA-BH03	298046.62	6279592.95	17.28

Figure 59: Location of the Geo-technical Boreholes undertaken in June 2012. The boreholes completed within the river are shown in orange and are numbered (OW-BH#) (Source SKM).

5.2 Comparative Analysis

Cosmos Archaeology has undertaken survey and excavation works alongside wharf sites similar in design and landscape setting to the on the Hawkesbury River site at Windsor. A summary and analysis of the findings of the Bremer River (Ipswich, QLD), and Echuca Wharf (Echuca, Victoria) will be used as they are comparable to the Hawkesbury River site at Windsor. The Bremer River and Murray River sites are historically known to flood and be high current rivers at times, similar to the Hawkesbury River. The Bremer River site is also comparable as the site contained a rock rubble layer, possibly a ballast area, similar to the remains found within the current study area in 2008-9, where artefacts were recorded as being present.

5.2.1 Heart of the River, Bremer River, Ipswich Queensland (2006)[47]

Cosmos Archaeology was commissioned to undertake a maritime archaeological investigation in April 2006 for a proposed riverbank redevelopment along the Bremer River in Ipswich, Queensland. A previous cultural heritage study had identified a number of mid-19th century wharves and associated storehouses on the banks of the river within the boundary of the project area. The site was continued to be used for commercial shipping and ferry activities well into the 20th century. Three wharves were located within the study area including the J and G Harris wharf, the Australian Steam Navigation Company's wharf and the Railway wharf.[48]

A maritime archaeological survey was carried out in January 2006 by Oceania Maritime Consultants in the vicinity of the three former wharves. The results of the preliminary survey found that:

> "…*clear evidence that the Town Reach precinct is rich in archaeological evidence from the mid 19th century that will yield information that contributes to an understanding of Queensland's history, particularly the early development of Ipswich, the Darling Downs and Brisbane Valley*".[49]

Specifically the preliminary survey found:

> "…*a contiguous artefact field that extends 63.5 m along the river on the southern bank incorporating the site of the Harris and ASN wharves, and extending 12m - 17.8m into the river channel. The qualitative density assessment based on surface artefacts estimated that the zone of highest surface artefact concentration occurred within 5m of the riverbank*".[50]

The survey also identified the timber remains of the ASN and J and G Harris wharves. Figure 60shows the extent of the artefact field recorded within the river in relation to the location of the 19th century wharves within the River Terraces development area.

Based on the information obtained in the preliminary assessment, Cosmos Archaeology was engaged to undertake a maritime archaeological survey where the development was to impact on the riverbed.

The survey was undertaken in the location of piling works associated with the proposed development. The locations of the piles were marked with iron rods prior to the maritime

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[47] Cosmos Archaeology (June 2006) *River Heart Phase 1: Maritime Archaeological Investigation*. Report prepared for Ipswich City Council.
[48] *Ibid*:6-7
[49] Oceanic Maritime Consultants, January 2006 *A Preliminary Survey of Three Historic Wharf Sites at Town Reach, Bremer River, Ipswich*. Prepared for the Heritage Branch of the EPA, Queensland:16
[50] *Ibid*

survey being undertaken to concentrate the survey in the impact area. In total 11 piles were located in the river in the location of the former wharf sites. An underwater inspection was undertaken on each proposed pile location, with underwater probing and hand fanning used to identify and excavate artefacts from each pile location. A separate underwater transect was also undertaken to the east of the 11 in-water pile locations to pass through the site of the former Collins Wharf.[51]

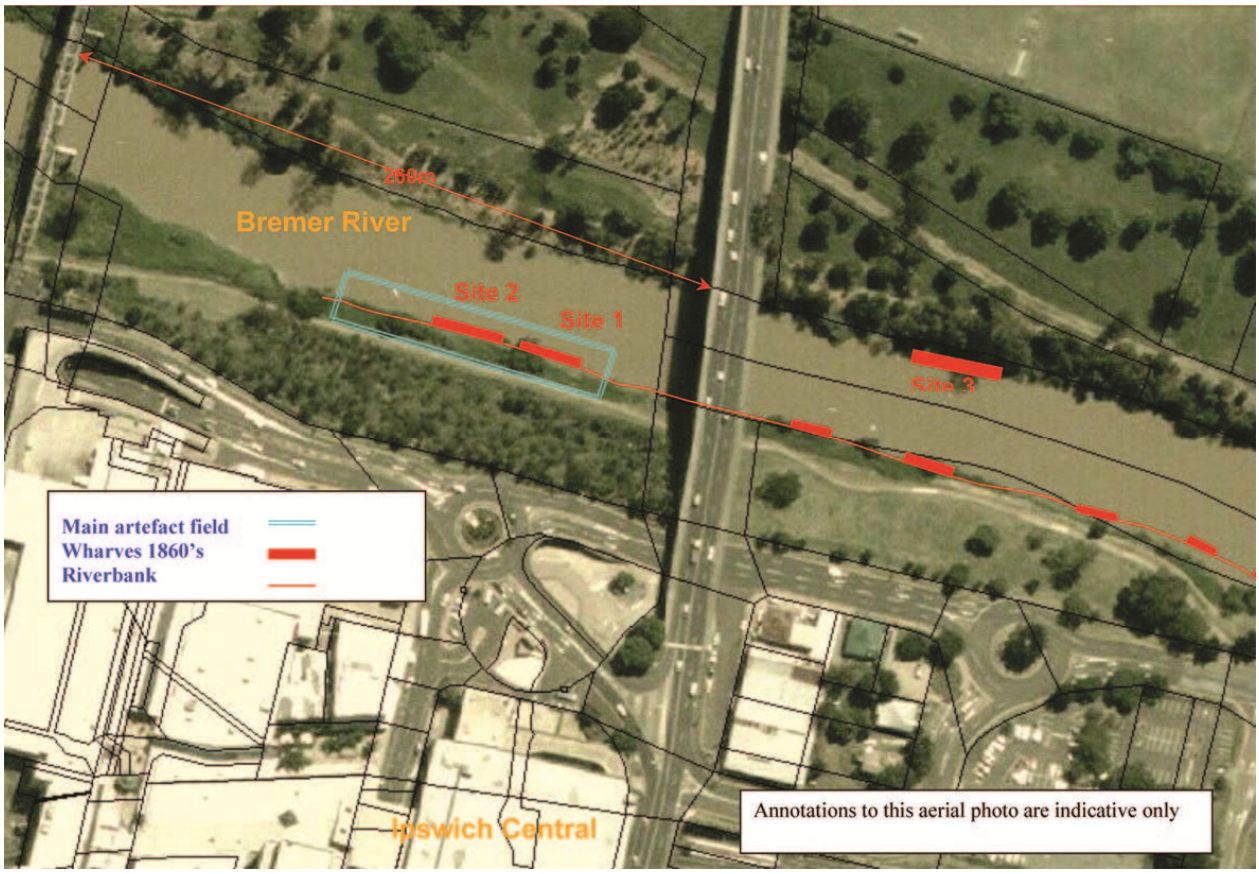

Figure 60: Artefact field from January 2006 preliminary in relation to Harris (Site 1) and ASN (Site 2) wharves (L. Rogers email: 20/3/2006).

The underwater survey in the location of the 11 piles identified rubble sandstone across the riverbed, as well as artefact remains. The rubble sandstone was located below a shallow deposit of silt across the site extending out from the base of the bank. The original function of the rock rubble on the site was unknown, however, it was speculated the source could have been from a formal retaining wall or fill material that had collapsed and deflated across the site, or deliberately in the river and used as ballast between the piles. The size of the rocks are such that they can be lifted by one or two individuals. The assessment argues the rock is likely to be associated with ballasting for the former wharves as similar material was not observed along the riverbank in the vicinity of the other former wharf sites. [52]

Artefacts recorded on the site were present at 10 of the 11 proposed pile locations. The artefacts collected ranged from copper alloy buttons to iron tie rods, and included personal and structural remains. There were a large number of smaller artefacts present within concretions within the rock ballast; including personal items such as copper alloy zipper tag, and a copper alloy broach pin. These items were found at one pile location; however, the report stipulates

[51] *Opp. Cit.,*Cosmos Archaeology (2006):14-16
[52] *Opp. Cit.,* Cosmos Archaeology (2006): 18-30

further personal material may be present in the study area if more accurate excavation techniques were employed.[53]

Heavier structural material recorded on the site included handmade and machine pressed bricks, lead flashing, roofing slate and square shanked nails. This material was attributed to either dropped cargo, remains of demolished nearby buildings or mixed fill. Two wrought iron rods, on large with an eyelet and the other smaller, were also recovered, and were believed to have been structural remains of the former wharf.

The artefacts recovered from the site were not associated with a specific date range – analysis identified a range from prior to 1850 through to the present. No stratification was found within the deposits on the site, and the investigation could not identify if deposits directly occurred onto the site or were redeposited from further upstream or from on land.[54]

The analysis of the site formation process for the study area attributed the collection of artefacts present within the study area to the presence of the rock rubble field. The Bremer River has flooded in its history and is known to be become a fast flowing river. Artefacts were able to fall between the rocks and be held in place, even during times of floods or during other strong currents. The report also assumed with the presence of artefacts on the surface between the rock rubble, there is the potential for artefacts to be present within the rock rubble matrix.[55]

The date the rock rubble was deposited on the site was also considered in the report as having bearing on the archaeological potential for the site. If deposited during the earliest wharf on the site, artefacts from that early period were considered likely to be present, and include artefacts from vessels docked at the wharf and items dropped from the wharf. If the rubble was deposited at a later date, such as from the collapse of a retaining wall, then only artefacts relating from that time, or later, would be captured by the rubble.[56]

5.2.2 Echuca Wharf Maritime Archaeological Test Excavation, Echuca Victoria (2011)[57]

Cosmos Archaeology is currently involved with the proposed redevelopment of the Echuca heritage precinct that includes dredging sections of the river in the vicinity of the current wharf and wet dock area. A maritime archaeological test excavation was required to test for potential artefact remains associated with the former working life of the wharf and or wet dock area. The sediment deposits in the river were identified as being of soft silt sitting on stiff clay. The test excavation was to determine the likelihood for archaeological remains within the softer sediments, and determine the potential for archaeological remains to be present on top of the stiff clay deposit deeper down. It was anticipated that artefacts were likely to have travelled through the softer silts to the more compact stiff clay.[58]

Three underwater trenches were excavated as part of the test excavation work, two trenches within NSW and one trench within Victoria (Figure 61). The trenches were designed to be 2 m x 2 m in size and excavated in 40 cm spits. The deposits of silts over the site were greater than anticipated, the riverbed having been surveyed and probed in late 2010. Of the three trenches,

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53 *Ibid: 31-32.*

54 *Opp. Cit.,* Cosmos Archaeology (2006): 31.

55 *Ibid: 34-37.*

56 *Ibid.*

57 Cosmos Archaeology (December 2011) Underwater Archaeological Investigations at Port of Echuca: Preliminary excavation report. Report prepare for Shire of Campaspe.

58 *Ibid:1-2.*

the two NSW trenches (NSW01 and NSW02) had 3.5 m of silt sitting over the stiff clay deposit, and not the expected 1.75 m. This was similar with the trench located within Victoria (VIC01) which had a further 1 m of silt on top of the site.[59]

Victorian trench, VIC01, was excavated to a depth of 1.44 m. The first 400 mm of the trench consisted of soft silt and other organic material. The excavation continued to a depth of 1 m where the trench was reduced in size to a 1 x 1 m trench as the silt deposit was becoming stiff, and to attempt to reach the stiff clay substrate. At a depth of 1.44 m a blue painted timber planking fastened with copper alloy boat nails was recovered. These were later identified as the remains of the wrecking of the "*Oigle*", which sank at the wharf in the early 1990s and was later damaged beyond repair during dredging. The presence of remains of this wreck were stipulated in the report that this section of the riverbed was not dredged in the mid-1990s, and therefore, it is more likely that artefacts associated with the functioning of the wharf are present below the depth of the wreck. Probing was undertaken at this depth to determine the depth of the stiff clay strata. It was found that this layer was another 2 m below the base of the excavated area, and the excavation in this trench stopped.

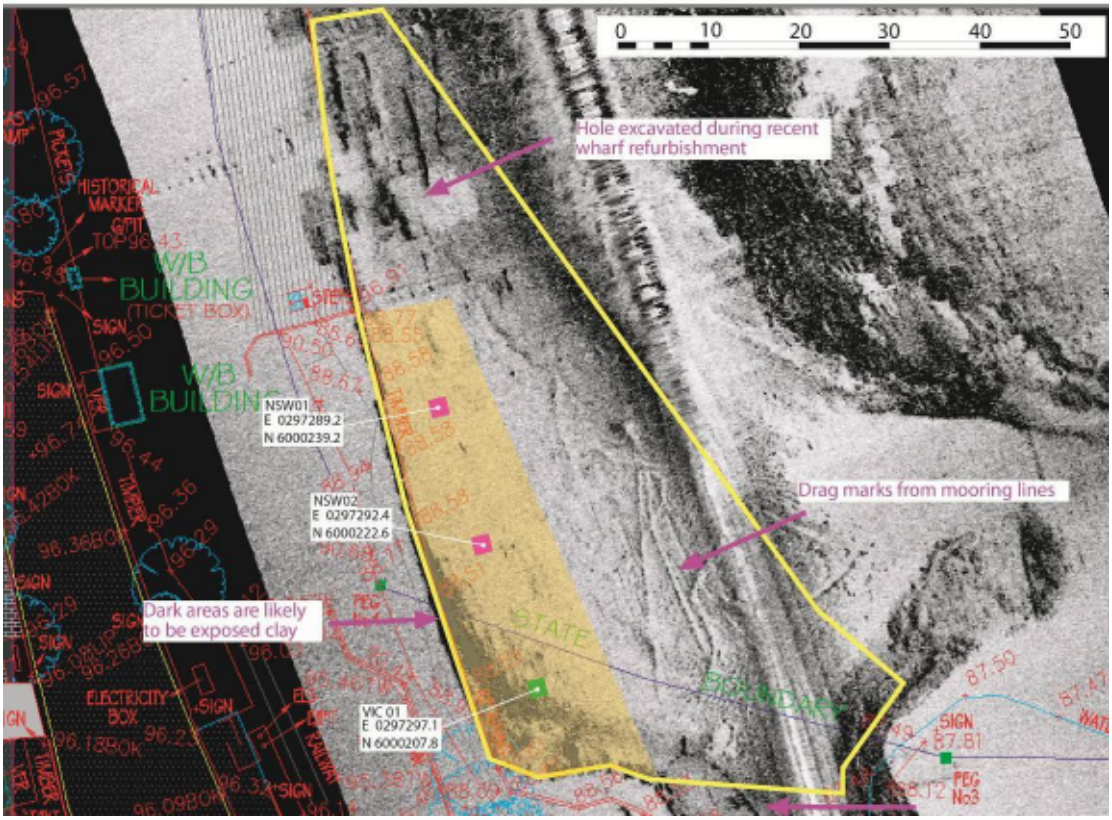

Figure 61: Location of the three test trenches excavated in the vicinity of Echuca Wharf (Source: Cosmos Archaeology).

The first two spits in trench NSW01 contained soft silts to a depth of 800 mm. The next 400 mm spit found the silt became more compact and the size of the trench was also reduced to a 1 m x 1 m trench. Timber cut offs and a heavily corroded bolt were excavated at the base of Spit 3 (120 cm), and a nut also located in Spit 4 (depth between 1.20 and 1.60 m). The excavation continued to the base of Spit 5, at a depth of 2 m below the riverbed. Probing at the base of the trench found the stiff clay - where artefacts were predicted to move through the silts and

59 *Ibid*

rest at - was located a further 1.5 m down. This was at a depth below where the proposed dredging would occur, and as such, the predicted archaeological remains at the depth of the stiff clay would not be impacted.[60]

The third trench, NSW02, was excavated as a 2 m x 2 m trench to a depth of 800 mm (spits 1 and 2). At this stage the trench was reduced in size to a 1 x 1 m trench. The sediments were considered to be sterile until the base of Spit 5 (2 m below the riverbed), where a large cut timber block, 820 mm across and 330 mm wide, with fastenings was recovered which very likely was once part of the Wharf (Figure 62). The sediment at this point was compact sandy silt. The excavation continued to a depth of 2.69 m below the riverbed when very compact gravelly sand was reached. It was considered that no artefacts would penetrate through this strata. Resting on this substrate was a section of ferrous pipe, 30 mm in diameter. Both the timber and ferrous remains indicated the likelihood these sections of the river were not previously dredged to these depths.[61]

The results of the test excavation found there were likely to be archaeological deposits within the proposed dredge footprint of the project area at the level of the stiff clay or gravel base, and these deposits were likely associated with the functioning of the wharf.[62]

Figure 62: Timber block recovered from Spit 5 of test excavation trench NSW02 (Photograph: Cosmos Archaeology Pty. Ltd.).

5.2.3 Summary

The Bremer River maritime archaeological survey identified that archaeological remains are likely to be present between the cobbles that make up the rubble field. The artefacts that were present between them were generally small artefacts, but were protected by the rubble field during flood events or other times when strong currents were present across the site. The date range of the artefacts were from the 1850s to the present, however, the site formation

60 *Ibid:3-4.*
61 *Ibid:3-4.*
62 *Ibid:4.*

processes on the site were largely dependent on when the rock rubble was laid on the site. Artefacts deposited in the river prior to the rock rubble would have been exposed to the flood and other strong current events where artefacts could have feasibly been transported further down the river. The presence of other structural/building remains, such as bricks, roofing slate and wrought iron ties, also suggests that heavier items are less likely to have been removed from the site.

The Bremer River maritime archaeological site is similar to the maritime archaeological site recorded in the vicinity of the second Windsor Wharf. The specific environmental conditions on both rivers are similar, with high historical frequencies of flooding, with the Bremer site revealing the archaeological potential that can exist within a rubble ballast field underneath a wharf site.

The maritime archaeological test excavations at Echuca were able to show archaeological deposits at a considerable depth below the current riverbed, where the riverbed consisted of a soft silt strata. The excavation located archaeological remains 2 m below the current riverbed level, where archaeological deposits may have travelled through the softer silt deposits and settled on the stiffer clay deposits. Despite the area being previously dredged, the artefact deposits were likely to have either travelled further through the deposits, or were located lower in the river prior to the river silting up.

The river strata at Echuca, compact stiff silt underlying soft silt, is similar to that present underneath and immediately around the known location of the second wharf site at Windsor. The Echuca site shows the potential cultural material that exists in similar riverbed strata. Cultural material at this depth is also somewhat protected from the erosional conditions that may remove the soft silt from the site, as seen on the Murray River site. The presence of soft silt below the rubble ballast layer on the Windsor site may also suggest that artefacts that have penetrated the rubble ballast layer may have also worked their way down the top of the stiff silt layer.

5.3 Archaeological Potential

Based on an understanding of the historical development of Windsor, the former and current riverbed depths, geology, and archaeological surveys conducted in 2008 and 2012, an assessment on the archaeological potential present within the river can be prepared. The archaeological potential will be separated into four categories, submerged wharf remains, terrestrial wharf remains, the punt landing and crossing, and the remains identified on the northern side of the river downstream of the current bridge.

5.3.1 Wharf (Submerged)

The survival of artefacts and other archaeological deposits in a marine/riverine environment is subject to the natural and cultural processes that have occurred on the site. Natural processes, in the case of the Hawkesbury River, such as flooding and tidal movement, have the ability to cause sedimentation or erosion activity. Cultural influences can also have a dramatic effect on deposits. It is not known when or how the wharf was removed from the site; however, the activity of demolition can impact on the archaeological potential of the site.

The presence of rock ballast, very likely associated with the earliest forms of the wharf, is a positive indication of the high archaeological potential in this area despite major flooding events. This has been the case with other archaeological sites discussed in this report, such as the Bremer River project. Archaeological material would consist of structural elements and artefacts relating to the working life of the wharf. Structural remains would consist of remains associated with the construction, repair and maintenance of the wharf. This would include pile remains below the ballast layer. The potential for structural remains associated with the former

wharves built in this location is considered to be ***high***. The potential for non-structural maritime archaeological deposits to be present within this ballasted area is also considered ***high*** (see Figure 63).

The potential for archaeological deposits associated with the shipping and transportation of cargo in front of the current wharf is affected by site formation processes that have occurred during and after the lifespan of the wharf. Typically, archaeological deposits associated with vessels berthed at a wharf are located immediately between the wharf and the vessel, or on the opposite side of the vessel toward the middle of the river. The limit of these deposits is based on the width of the vessels berthed at the wharf. It is known that the wharf was built for vessels weighing up to 100 tonnes – with a width of approximately 15 ft (5 m).

Analysis of the changes in the depth of the riverbed immediately to the northwest of the ballast remains associated with the former wharf show the riverbed is approximately between 1 to 1.5 m deeper than in 1890. The geotechnical investigation found the riverbed consisted of gravel sand to a depth of 1.1 m, that was proceeded by a strata of finer sandy gravel to a depth of 2.15 m. The recent geo-technical investigations over this area found that a soft silt deposit was present to a depth of 0.5 m below the ballast layer, followed by a much stiffer and compacted silt layer.

The presence of a stiffer substrate at a depth of 0.5 m, such as sandy gravel or clay based material may indicate the depth where artefacts may penetrate softer silty strata and accumulate. It is possible this layer is compacted enough to hold artefacts on top of or immediately within this strata. Further into the midsection of the river, from borehole 4 onwards from the 2008 geo-technical investigation found the riverbed to be composed of sand. The gravelly sand observed in the mid-section of the river was not recorded closer to the riverbank. This may be due to sand extraction works undertaken in the 1970s or from the natural erosive nature of the river during flood or faster river flows that may have removed lighter sediments.

Based on this analysis, it is likely that archaeological deposits do exist within where the softer gravelly sand is present on the riverbed immediately around the known location of the current wharf. The extent of this area cannot be determined on the available information, however, a buffer area of 5 m around the ballast remains of the former wharf would be considered to contain maritime archaeological potential (see Figure 63). The archaeological potential within this area is considered to be ***moderate.***

5.3.2 Wharf (Terrestrial)

The archaeological potential of the wharf from the bank of the river back landward is difficult to determine at present. There has been vegetation cover over this area, and an uneven layer of fill up to one metre or so above the remains of the wharf is visible from the water. The deck beam protruding from the current bank of the river is close to the former round surface of the functioning wharf. It is also known from the 1814 contract for the construction of the wharf that it included land (deadman) anchors as part of the construction. This points to the possibility that other basal elements associated with the wharf, such as other timber decking, piles or other bracing components like deadman anchors, may be present. However the installation of the Gabion wall in the 1990s may have required some excavation or modification to the bank, which would have resulted in the limited truncation of the terrestrial archaeological resource associated with the wharf.

The archaeological potential for structural remains relating to the former wharves built in this area, particularly of the ca. 1816 wharf, immediately behind the current bank of the river is considered to be ***high*** (See Figure 63).

5.3.3 Punt

Infrastructure

From the historical research, the original punt landings were in the general location of the current bridge. In 1815 the punt left from the new wharf location to a riverbank landing on the northern side until ca.1835 when the location of the punt was moved. The potential for

archaeological remains prior to 1835 to be present is considered to be ***low***. The only infrastructure that is likely to be present from this time is the cutting in the riverbank on the northern side of the river that appears on the early maps.

After the relocation of the punt in 1835 a cable system was established. From the historical record, particularly from photographic evidence, it is anticipated that archaeological evidence of the punt landings still remain completely buried on the upstream side of the current bridge on both the northern and southern bank. The near-water and in-water remains of the punt would have been very limited – a ramp of hardened earth or sandstone paving with timber posts for tying or hauling up, however archaeological remains further up the bank on the northern side may have survived, such as some of the anchors or rugging lanyards that may have since been buried in reclamation. The archaeological potential within this area is considered to be ***moderate*** (See Figure 63)

Archaeological potential along the route

The archaeological potential along the route of the punt is considered to be ***low***. Archaeological potential around maritime infrastructure sites, such as punt landings, occur where most activity is carried out and where the activity is concentrated, which in this case was during loading and unloading on both sides of the river. There is a potential for cultural material to be dropped, accidently or otherwise, during the river crossing, however, the frequency would be less likely as the punt would have spent less time along the route than at the landings. This would not account for specific individual events where items may have been dropped during the route crossing, however, the frequency or opportunity for this to have occurred is far less than material being dropped or discarded in and around the land areas on both sides of the river where most of the activity occurs.

Taking into consideration the changing profile of the Hawkesbury River, the depths of the river away from either riverbank has changed from between - 0.75 m to -1.54 m deeper than recorded in 1890. The riverbed in the midsection of the river consists of sand and fine gravel sand, which has previously been discussed as likely to hold cultural material on or immediately below the riverbed level. The difference in the river profile also suggests much of the riverbed sediments have been removed. Artefacts deposited within this area are likely to have been transported further down the river during flooding or similar events where the currents in the river are at their strongest. Archaeological deposits may have also been removed via other modern processes that are likely to have occurred on the river, such as dredging and/or sand mining.

5.3.4 Northern Side of the River downstream of Bridge

The 2012 archaeological survey within this area identified structural timber remains, as well as singular timber beams. The historical record does not suggest that any retaining wall or similar structure was built in this area. The 1955 aerial does show the potential for a series of moorings in this location, however, the detail of the structures, whether they are individual moorings on anchors with rope to the surface or they are mooring posts in the riverbed. The size of the posts that were recorded, 0.2 m by 0.2 m, would not suggest that these were used as a retaining wall, or possibly even for mooring posts within the river.

It is possible that the timber remains were deposited during a flood and have since become covered with silt at within the steep batter in front of the river. If deposited in this location from previous flood events, the provenance of the material deposited is unknown and is unlikely to add any additional information to the history of the use of the Hawkesbury River and the settlement at Windsor. If the remains are associated with the ca.1950s moorings or previously unknown retaining wall, the archaeological potential in this area is likely to be ***low*** and have no archaeological research value.

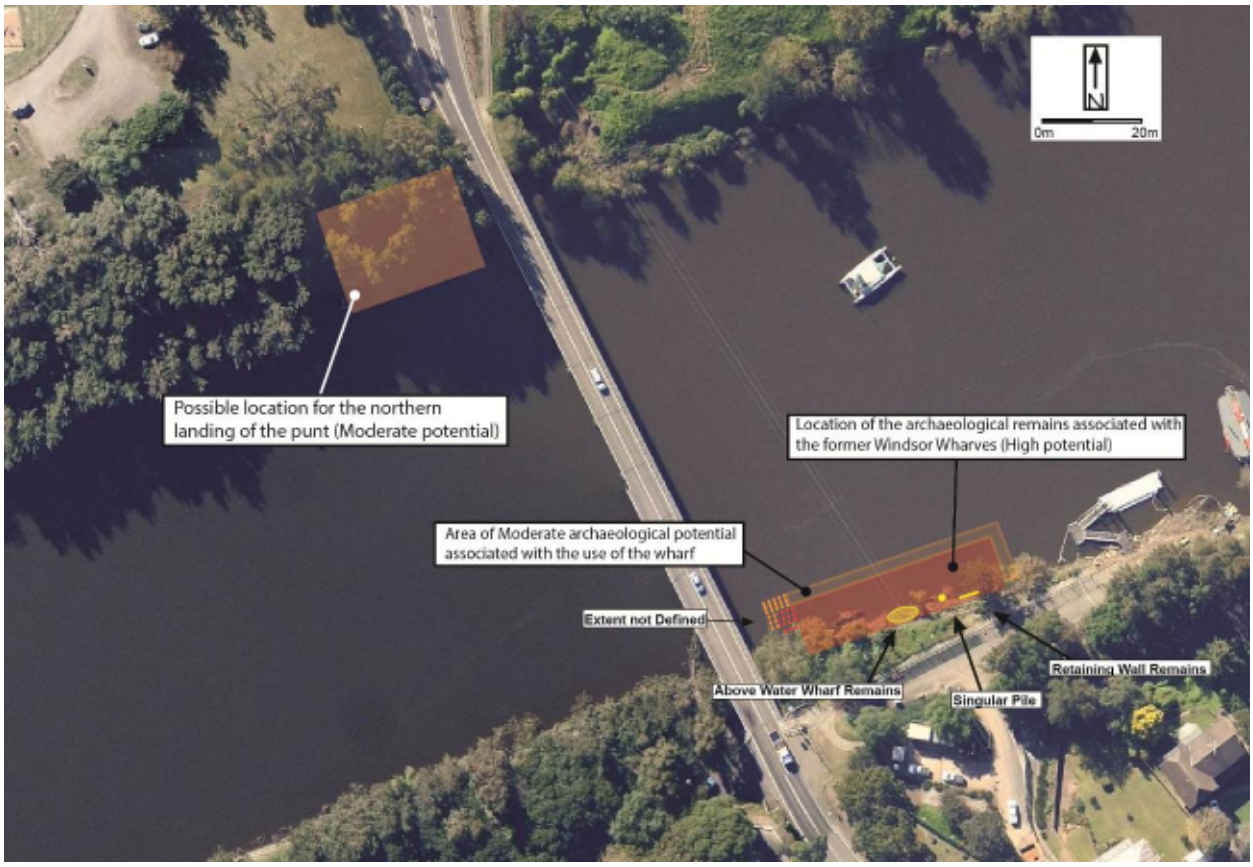

Figure 63: Areas of archaeological potential, showing the location of known remains of the former ca.1814 Windsor wharf and possible northern landing of the punt remains.

Figure 64: 1888 photograph of Windsor Bridge looking onto the south bank. The wharf is clearly shown on the left. To the right of the bridge a separate road can be made out immediately adjacent to it that leads to a beach area, believed to be the southern landing of the former punt (www.council.hawkesbury.nsw.gov.au/gwsSpatial/gws/gwsspatial.htm).