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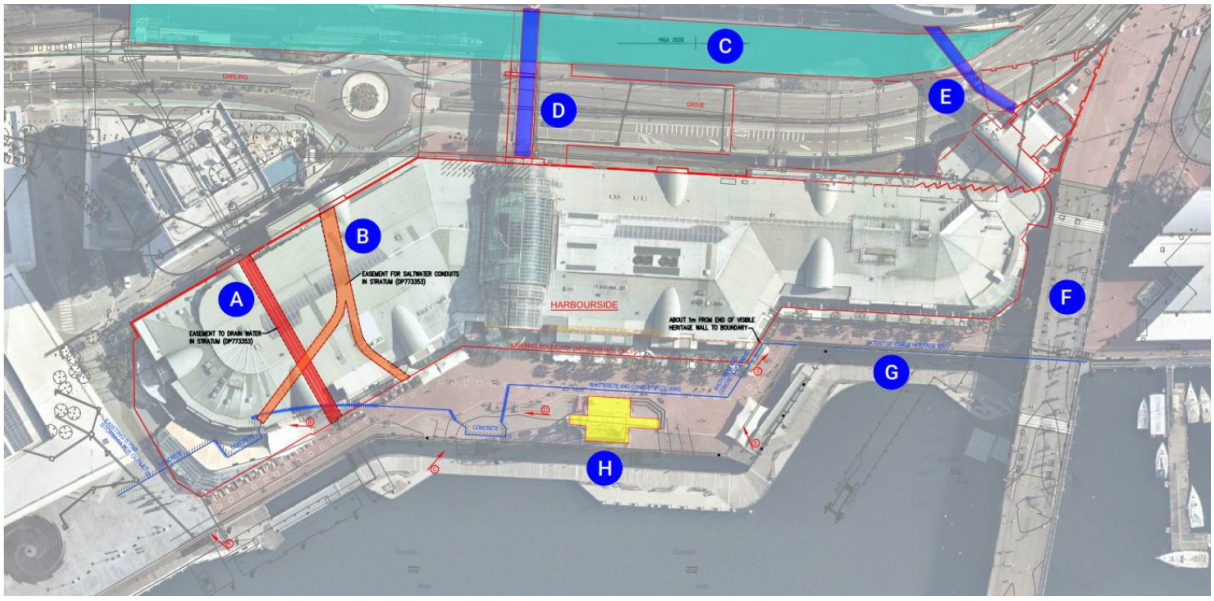
Harbourside Development



Maritime Heritage

Dilapidation Survey Report

Darling Harbour

NSW

July 2022

Harbourside Redevelopment
Maritime Heritage Dilapidation Survey Report

Prepared for:

Mirvac Retail Sub SPV Pty Ltd

By:

Jane Mitchell

July 2022

Cosmos Archaeology Job Number J22/03

Cover Image: Mirvac Retail Sub SPV Pty Ltd, 2021, Harbourside Scope of Services Part A: General, p. 37.

Revision	Description	Date	Originator	Reviewer	Approver
V1	Dilapidation Survey Report	28/06/2022	JM	TC, CC	CC
V1.1	Updated client entity	05/07/2022	JM		

EXECUTIVE SUMMARY

Mirvac Retail Sub SPV Pty Ltd (Mirvac) is currently redeveloping Harbourside, an existing retail centre located in Darling Harbour, Sydney. The existing building was constructed in 1988 and will be demolished, making way for a new mixed-use development comprising residential, commercial offices, retail and public spaces.

As part of the redevelopment of Harbourside, the consent required dilapidation inspections, reports and photographs to meet conditions for pre-demolition and post-construction phases of the project.

Cosmos Archaeology has been commissioned by Mirvac to undertake the dilapidation survey of the heritage stone sea wall, examine the 1928 saltwater culverts and provide advice on how to proceed with an inspection.

The dilapidation survey was undertaken on the 24th June 2022 with a commercial dive team under the supervision of a maritime archaeologist.

Above water the length of the stone seawall is generally in good condition. There is evidence of some minor repairs and mortar loss underneath the public walkway.

The visible length of the stone seawall underwater is also generally in good condition. There is evidence of undermining at the toe along its length and some areas of mortar loss, but the wall is generally stable.

The dive survey ascertained there is no possibility of surveying the external condition of the 1928 masonry saltwater conduits as they cannot be reached through the extended entrances likely built when the new concrete wall was constructed. The gates and concrete surrounds of the entrances all appear in sound condition, although the uppermost gate from the southern entrance is missing.

As the 1928 masonry saltwater conduits now appear to lie within reclamation, surveying the external condition of the tunnels cannot be achieved through a dive survey.

Due to the visibility, it was deemed too dangerous to send a diver through the entrances to locate and record the internal condition of the masonry tunnels. To achieve an internal condition report for the saltwater conduits, the following is recommended:

- The use of a Remotely Operated Vehicle (ROV) with the ability to record video and still images to be sent through the tunnels to record their physical condition. The ROV will require a tether to carry the data and power so entering the tunnels through the underwater discharge tunnel would be the most advantageous option, especially as one of the gates is missing.

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Abbreviations

LGA	Local Government Area
PMNSW	Place Managament New South Wales
ROV	Remotely Operated Vehicle
SSBA	Surface-supplied Breathing Apparatus
SGS	Subsea Global Solutions

1 INTRODUCTION

1.1 Background

Mirvac Retail Sub SPV Pty Ltd (Mirvac) is currently redeveloping Harbourside, an existing retail centre located in Darling Harbour, Sydney (Figure 1). The existing building was built in 1988 and will be demolished, making way for a new mixed-use development comprising of residential, commercial offices, retail uses and public space.

As part of the redevelopment of Harbourside, the consent required dilapidation inspections, reports and photographs to meet conditions for pre-demolition and post-construction phases of the project.[1]

Cosmos Archaeology has been commissioned by Mirvac Retail Sub SPV Pty Ltd to undertake the dilapidation survey of the heritage stone sea wall and to examine the 1928 saltwater culverts and provide advice as to how best to proceed with an inspection.

1.2 Study Area

The Harbourside site is located within the Darling Harbour Precinct in the City of Sydney (Local Government Area [LGA]). Darling Harbour is a 60-hectare waterfront precinct located on the south-western edge of the Sydney CBD, and to the east of the Pyrmont Peninsula.

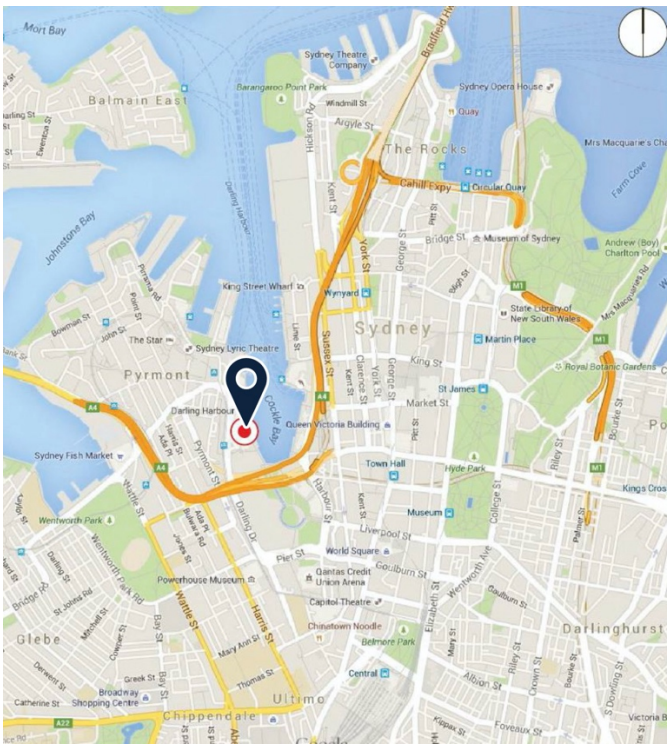

Figure 1: Site location at Darling Harbour.[2]

[1] **Mirvac Retail Sub SPV Pty Ltd, 2021,** *Harbourside Scope of Services Part B – Non AEO Dilapidation Works.*
[2] **Mirvac Retail Sub SPV Pty Ltd, 2021,** *Harbourside Scope of Services Part A: General*, p. 27.

1.3 Scope

The aim of this investigation is to conduct an initial recording of the current condition of two items of maritime heritage:

These items are labelled and described in the Scope of Services: Part A as:

- Masonry saltwater conduits pass through and below ground to harbour discharge/intake (Item B).

  "The existing saltwater conduit was completed in circa 1928. This conduit provided cooling water from Darling Harbour to the Ultimo Powerhouse (now known as the Powerhouse Museum). This item is included in the Place Management New South Wales (PMNSW) Heritage and Conservation Register.

  The intake channel comprises twin 1800 mm diameter pipes which run parallel until approximately 50 m prior to the Harbour where they diverge. It is alleged that this infrastructure does not provide any cooling benefit to any development and that this system is currently redundant." [3]

- Stone seawall, partially visible, generally below public domain ground level (Item G) [Figure 2].

  "Along the north-eastern edge of the public domain promenade is an existing heritage sandstone seawall. This wall is exposed at its northern end and extends south below the public promenade deck. Further detailed survey is required to accurately locate this heritage item to ensure it remains intact and undisturbed."

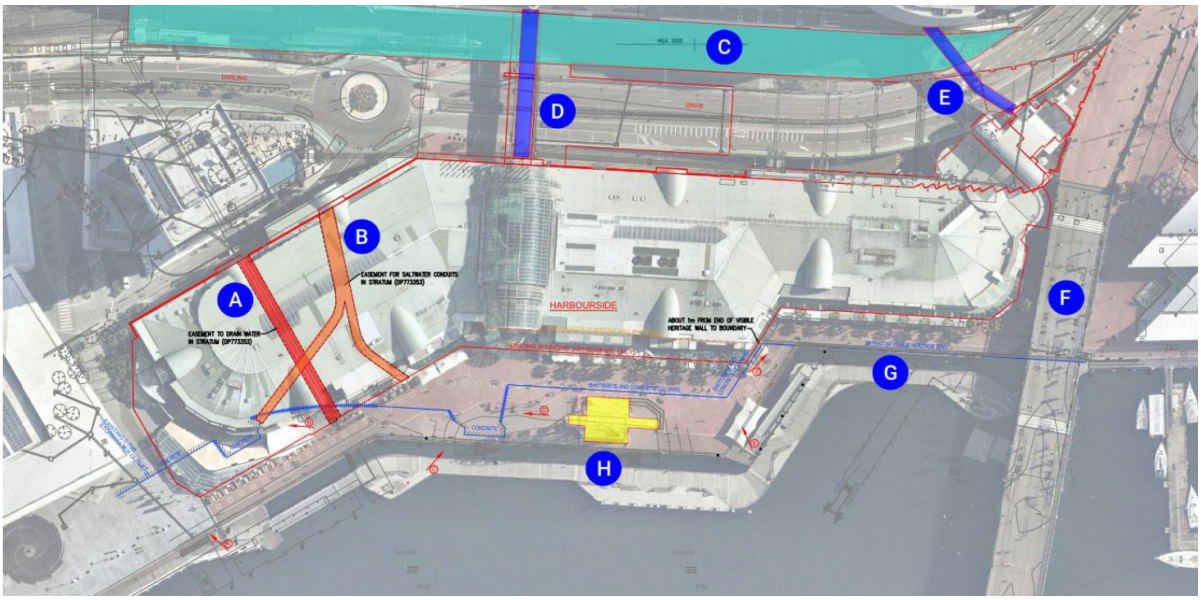

Figure 2: Harbourside redevelopment study area; Item B: Sydney Brick Culvert, Item G: Stone seawall. [4]

The scope of this investigation covers the external elements of the stone seawall and the saltwater intake.

The scope of this proposal does not cover the internal condition of the saltwater intake, any remaining elements of the stone seawall within reclamation or any heritage-related impacts above the waterline.

[3] *Op. cit.,* **Mirvac Retail Sub SPV Pty Ltd, 2021,** p. 37.
[4] *Op. cit.,* **Mirvac Retail Sub SPV Pty Ltd, 2021,** p. 36.

2 DILAPIDATION DIVE SURVEY

2.1 Dates and Personnel

The dive inspection was carried out on 24th June 2022. Jane Mitchell, from Cosmos Archaeology was the maritime archaeologist supervising the inspections. Dive support was provided by Subsea Global Solutions Sydney (SGS Sydney) in the form of the supply of three divers, surface-supplied breathing apparatus (SSBA) and a dive platform. Diving operations were run and supervised by SGS Sydney. Personnel involved during the inspection are listed in Table 1.

Table 1. Dilapidation Dive Personnel.

Name	Title	Company
Jane Mitchell	Maritime Archaeologist	Cosmos Archaeology
Dan Quilter	Dive Supervisor	SGS Sydney
Anton Pankov	Diver	SGS Sydney
Rick O'Connell	Diver	SGS Sydney

2.2 Weather and Tide Conditions

Darling Harbour conditions are not greatly affected by the minimal changes in tide, but these were taken into consideration for diving depths and visibility of the items at the time of survey (Table 2). As Darling Harbour is relatively sheltered, wind and rain are not usually an issue affecting the outcomes of dive surveys in the area. As a record, weather conditions for the survey and days prior are outlined in Table 3.

Table 2. Tides for the days of survey.[5]

24-06-2022	Time	0439	1040	1716	2351
	Height (m LAT)	1.36	0.59	1.63	0.67

Table 3. Rain and wind conditions for the three days prior to the dive inspection and the day of the inspection.[6]

Date	Rain (mm)	Wind 09:00 (km/h)	Wind 15:00 (km/h)
21-06-2022	0.0	7 W	2 ENE
22-06-2022	0.0	24 W	24 WNW
23-06-2022	0.0	13 W	17 WSW
24-06-2022	0.0	15 W	7 NW

[5] **Bureau of Meteorology, Australian Government, 2021,** *NSW Tides 2021 - 2022*, available https://www.nsw.gov.au/sites/default/files/2021-07/tide-tables-2021-2022.pdf
[6] **Bureau of Meteorology, Australian Government, 2021,** *Sydney, June 2022 Daily Weather Observations*, available at http://www.bom.gov.au/climate/dwo/202206/pdf/IDCJDW2124.202206.pdf

2.3 Conduct of Survey

The underwater survey was conducted with the use of a commercial dive crew under the direction of a maritime archaeologist. The inspections were conducted in accordance with AS/NZS 2299.1: 2015 diving operational standards with the use of SSBA, recorded voice communications and helmet video. Additional footage was taken with a GoPro Hero 8 camera hand-held by the diver. Dive log information can be found in Table 4.

Table 4: Dive log information

Dive information		
Date: 24th June 2022	**Method:** SSBA	**Tide:** Flood to Ebb
Distance and direction: ~ 60 m from Pyrmont Bridge south / southern end of study area for saltwater conduits		**Diver**: Anton Pankov
Swim start (min): 0925	**Swim end (min):** 1151	**Total time (min):** 146
Depth: 100 mm – 8 m	**Water visibility:** 5 m – 6 m	**Seabed visibility:** Very Good

2.3.1 *Heritage Stone Seawall*

Due to the tide, the heritage stone seawall was surveyed by the diver from the southern side of the Pyrmont Bridge to where the heritage stone wall disappeared behind the modern concrete seawall underneath the promenade (Figure 3). For the section of stone seawall underneath the bridge, GoPro footage was taken of the stone seawall, as the toe of the wall was at the water's edge and could be seen from the surface.

The dive platform was moored just to the south of the bridge and to the east of the pedestrian walkway. From this position the diver could survey the seawall to the public promenade before the boat was moved for the diver to complete the final section of stone wall.

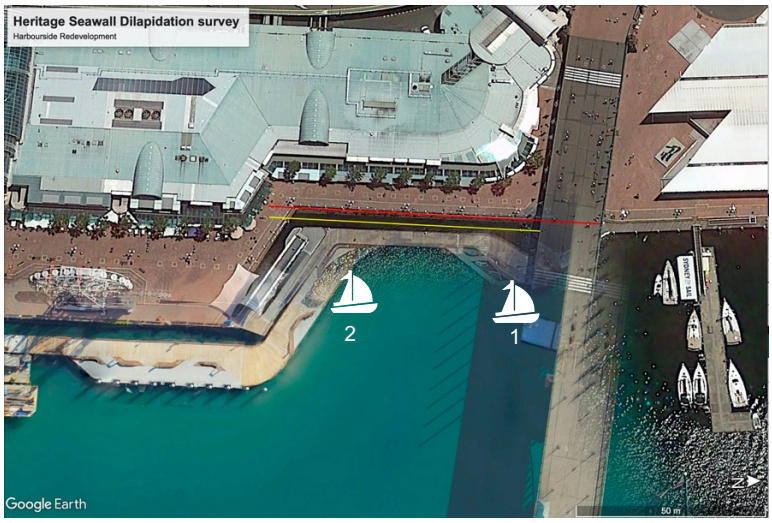

Figure 3: Location of dive survey for heritage stone seawall. Red line is extant stone wall within the study area and the yellow line is the length of stone wall the diver surveyed. Boat icons indicate approximate locations of dive vessel.

2.3.2 *Masonry Saltwater Conduits*

As the exact location of the saltwater conduits was unknown, the boat was moored to the east of the walkway, in a position approximately between the intake and discharge tunnels of the masonry conduit (Figure 4). The diver then proceeded west to reach the concrete seawall and located the large drain in the wall. The diver then moved south and located and recorded the intake tunnel before heading north to locate and record the discharge tunnel.

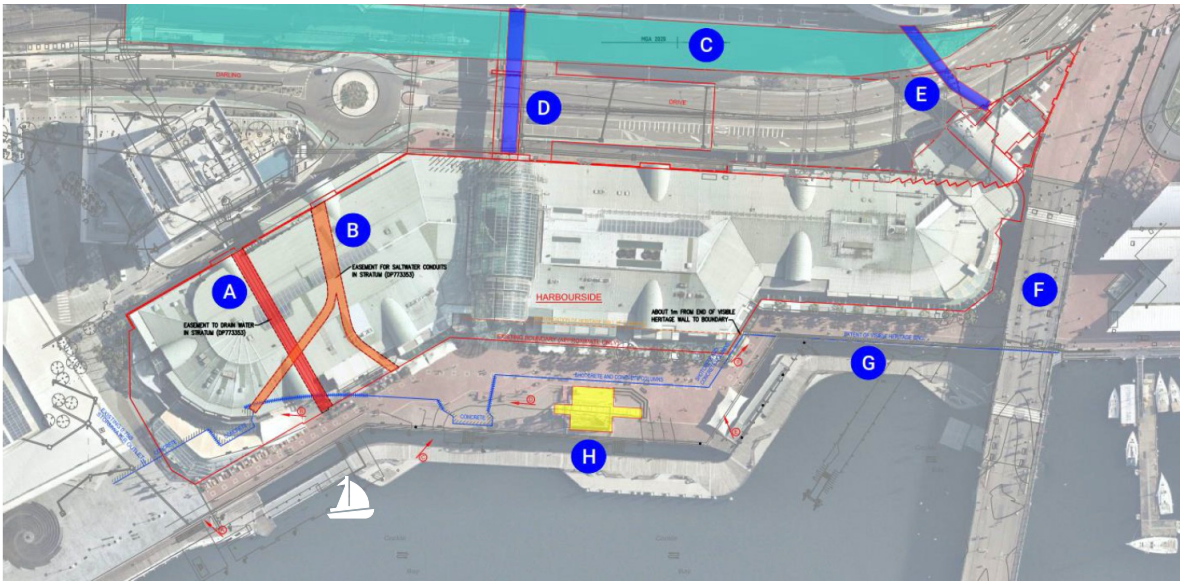

Figure 4: Boat mooring location for the saltwater conduit search. Twin conduits are displayed in orange. [7]

2.3.3 *Survey Bias and Accuracy*

The marine growth, predominantly molluscs and some seaweed on the heritage seawall made visibility difficult in parts. Some smaller patches of mortar loss and undermining may have been missed.

[7] *Op. cit.,* **Mirvac Retail Sub SPV Pty Ltd, 2021,** p. 36.

3 DILAPIDATION REPORT

3.1 Heritage Stone Seawall

The surveyed length of stone seawall was 93 m. It was noted that the seawall extended further north past the Pyrmont Bridge but as this was outside the study area, it was not examined.

The stone seawall was recorded above the water using a GoPro Hero 8 for the first 20 m. The beginning of the survey began on the northern side of the Pyrmont Bridge. Approximately 1 metre south there appears to be the remains of a landing or wharf footing immediately adjacent to a stone block carrying a modern cable conduit (Figure 5). Moving southward, the section of stone seawall underneath the Bridge appears to have a more modern section of sandstone built on a base of older, larger, more rounded stone blocks (Figure 6). Drain outlets have been built into the wall at various points along its length (Figure 7). There is evidence of 'quickfix' repairs such as a hole fixed using house bricks (Figure 8) and some evidence of mortar loss, lower down the wall in the splash zone (Figure 9). The tide levels are indicated by the mollusc growth on the seawall (Figure 10).

Figure 5: Possible wharf footing (Image 220624 Harbourside stone wall above water_ linear, 00:04).

Figure 6: Stone seawall underneath the Pyrmont Bridge. Note mortar loss. (Image 220624 Harbourside stone wall above water_ linear, 00:13).

Figure 7: Stone seawall underneath the Pyrmont Bridge. Underwater survey began at the drain to the left of image (Image 220624 Harbourside stone wall above water_ linear, 00:25).

Figure 8: Some evidence of a repair using bricks. (Image 220624 Harbourside stone wall above water_ linear, 01:28).

Figure 9: Example of mortar loss above water. (Image 220624 Harbourside stone wall above water_ linear, 01:41).

Figure 10: Stone seawall at the junction of the public promenade. (Image 220624 Harbourside stone wall above water_ linear, 02:06).

Below water, the seabed against the stone seawall is a silty mud. The lower courses of stone had small gaps consistent with mortar loss along the length of the wall (Figure 11).

Approximately 12 m from the start of the diver survey, a cavity along the base of the seawall was noted. This cavity was 800 mm long, 120 mm wide and 250 mm deep in sections. It appears the seabed has come through this section at the base (Figure 12).

At 16 m along the stone sea wall, there is a section of undermining up to 500 mm in depth, likely up to the course of blocks behind it (Figure 13). The length of undermining is 500 mm up to a height of 80 mm. Another cavity was found at 22.5 m from the northern corner measuring 450 mm long by 50 mm high and 500 mm deep (Figure 14). Another area of undermining was noted at 24 m, measuring 400 mm long, 250 mm wide and up to 800 mm deep in sections. At 25 m some material loss at the base of the stone wall was noted measuring 300 mm long x 250 mm high and 250 mm deep. More undermining at 31.3 m of 1000 mm in length and up to 1000 mm deep and 250 mm high.

A longer section of undermining at 39 m was recorded measuring approximately 1500 mm long, 200 mm high and 900 mm deep (Figure 15).

At 45 m, there appeared to be a potential damaged drainage pipe with broken bricks and jumbled rocks. The length of damage in the seawall measured 1000 mm wide, 800 mm high and at least 1000 mm deep (Figure 16).

Just to the north of the public walkway (at 63 m), a cut-off timber pile was located, measuring 250 mm in diameter and 650 mm high. This is likely part of an old wharf structure (Figure 17).

Underneath the public walkway, the stone seawall is in good condition. The stone blocks above the water line have experienced some mortar loss (Figure 18). While the blocks below the water line show some minor cavities and material loss. The silt has built up underneath the walkway making it difficult to determine if there is any significant undermining in this area.

For a digital representation of the areas of undermining and other damage see Figure 19.

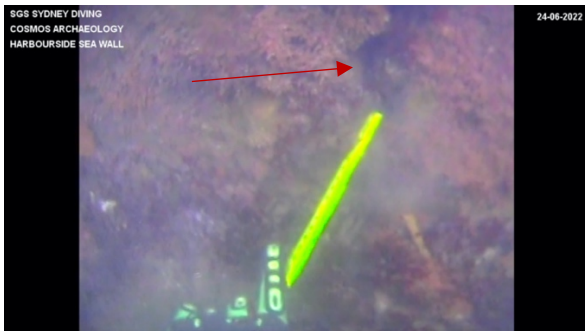

Figure 11: Example of gaps between blocks indicating mortar loss. (Image 220624_Stone seawall dilapidation_1, 04:18)

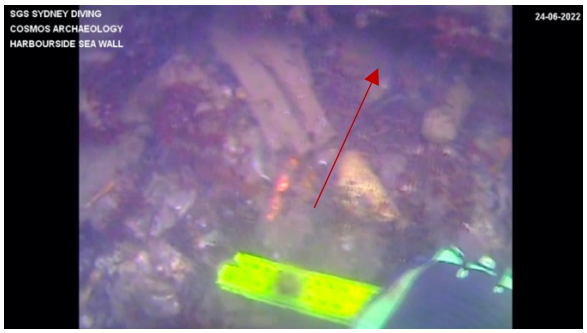

Figure 12: Cavity at base of stone wall 12 m along survey line, indicated by red arrow. (Image 220624_Stone seawall dilapidation_1, 04:18)

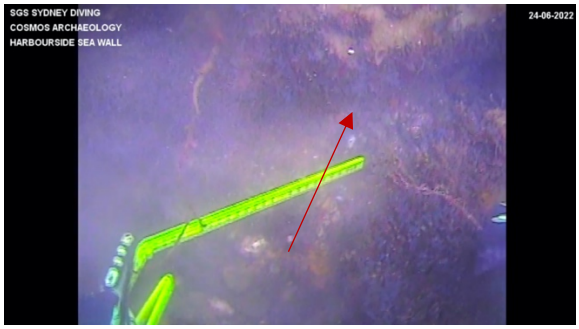

Figure 13: Section of undermining at base of stone wall 16 m along survey line, indicated by red arrow. (Image 220624_Stone seawall dilapidation_1, 06:43)

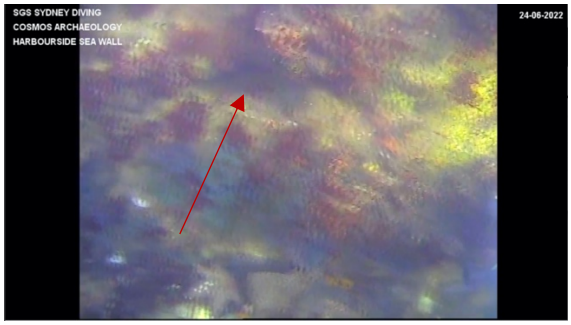

Figure 14: Section of undermining at base of stone wall 22.5 m along survey line, indicated by red arrow. (Image 220624_Stone seawall dilapidation_2, 00:52)

Figure 15: Section of undermining at base of stone wall 39 m along survey line. (Image 220624_Stone seawall dilapidation_3, 00.03)

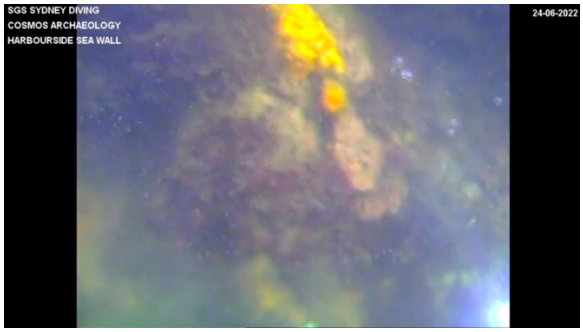

Figure 16: Possible damaged drainage pipe. (Image 220624_Stone seawall dilapidation_4, 02.49)

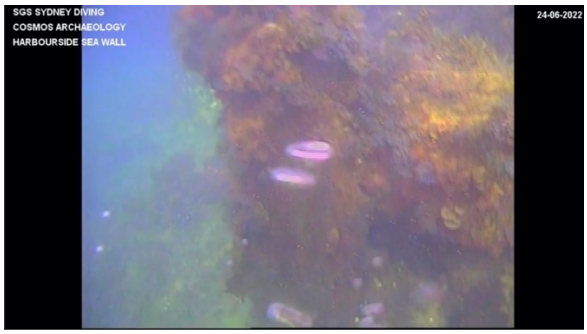

Figure 17: Cut-off timber pile, located 1 m north of steel pile of public walkway. (Image 220624_Stone seawall dilapidation_4, 02.49)

Figure 18: Underneath public walkway, the stones have experienced mortar loss above water. (Image 220624_Stone seawall dilapidation_S_walkway, 00.44)

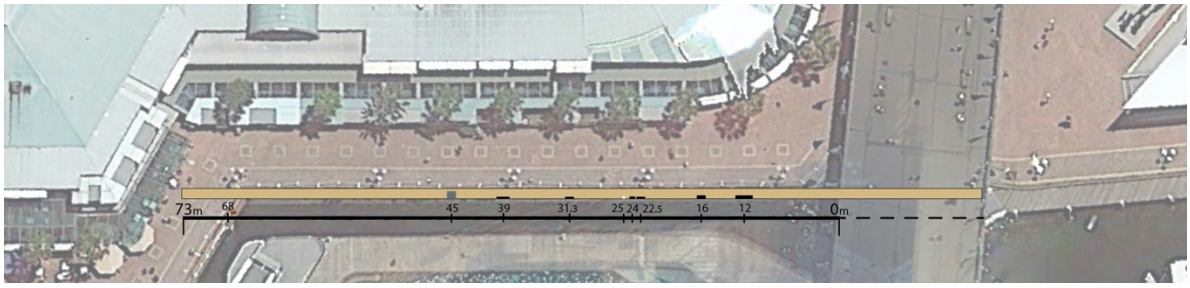

Figure 19: Digital representation of locations of areas of undermining.

The visible section of the heritage stone wall ends where the new concrete section of seawall has been erected. The concrete wall angles east towards the centre of the harbour so it is possible the stone seawall extends into reclamation behind the concrete wall.

Figure 20: Junction of modern concrete seawall to the left of image and stone seawall to the right. (Image from 220624_Stone seawall dilapidation_S_walkway, 01:48).

3.1.1 *Overall Condition*

Above water the length of the stone seawall is generally in good condition. There is evidence of some minor repairs and some mortar loss underneath the public walkway.

The visible length of the stone seawall underwater is also generally in good condition. There is evidence of undermining at the toe along its length and some areas of mortar loss, but the wall is generally stable.

3.2 Masonry Saltwater Conduits

The masonry saltwater conduits were not visible during the survey. These are assumed to be within reclamation behind the existing concrete seawall.

However, it does appear that when the current concrete seawall was built, new outlets were built into the concrete wall (Figure 21). It was not possible to ascertain what the extension conduits were made of, or indeed if they were extended.

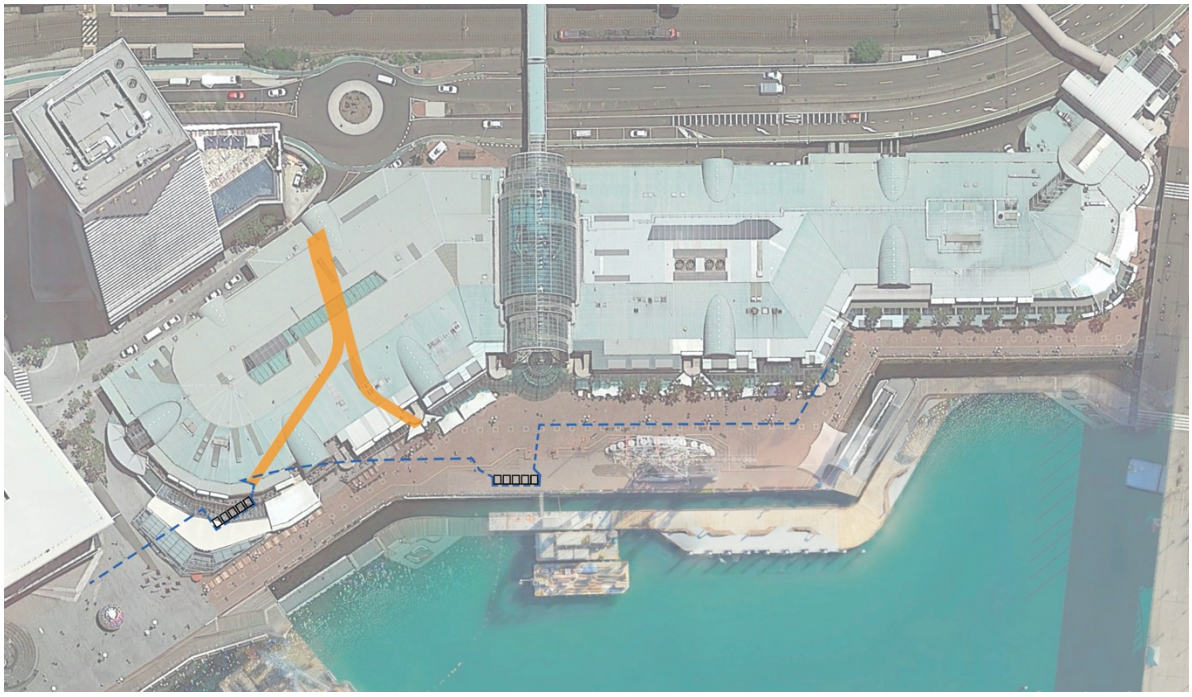

Figure 21: Overlay showing tunnel outlets location within the concrete seawall. The saltwater conduits in orange and the concrete seawall (the dashed blue line) are overlayed onto a Google Earth image while the new outlets have been added in black.[8]

The visible entrances for both intake and discharge tunnels consist of a concrete surround with five ‘entrances’ each blocked by two gates which opened horizontally. Each opening measured 1,850 mm wide x 3,000 mm high, with the total width of the entrance being 11,500 mm. The gates were located 17,00 mm behind the rim of the opening, with a horizontal opening between gates. It would appear that these gates can be opened with mechanisms on the top of both the top and bottom gates. This was not attempted during the dive survey for safety reasons.

[8] Image adapted from *Op. cit.,* **Mirvac Retail Sub SPV Pty Ltd 2021,** p. 36.

For a digital representation, see Figure 22.

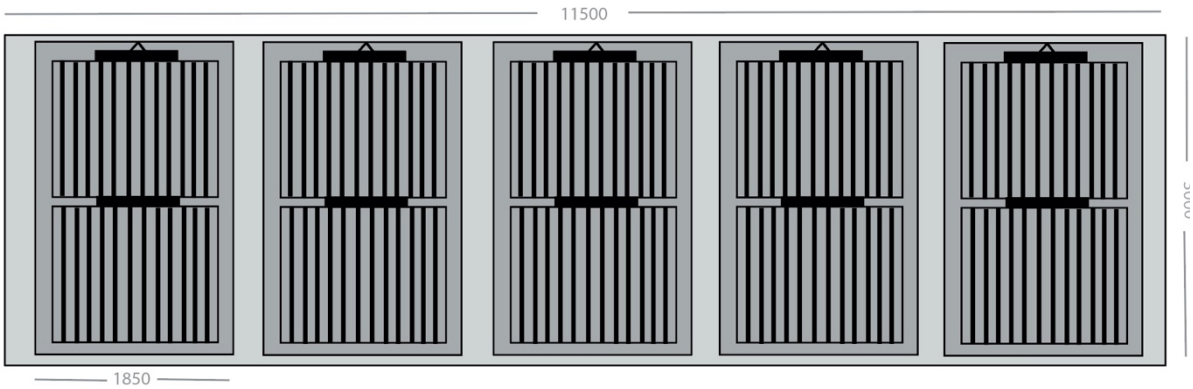

Figure 22: Digital representation of tunnel entrances in concrete seawall. Not to scale.

3.2.1 *Intake Tunnel*

The intake (southern) tunnel entrance was located at -33.872569°, 151.199438° (datum WGS84).

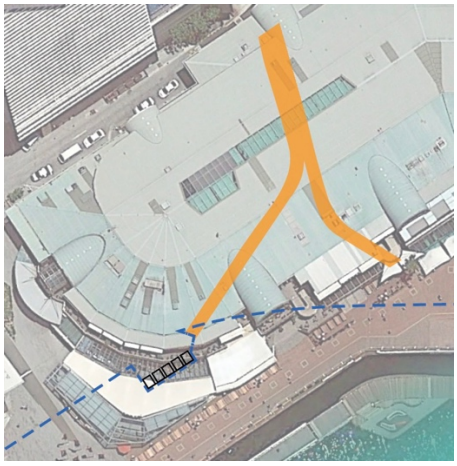

Figure 23: Overlay showing intake entrance in relation to plan of conduit.

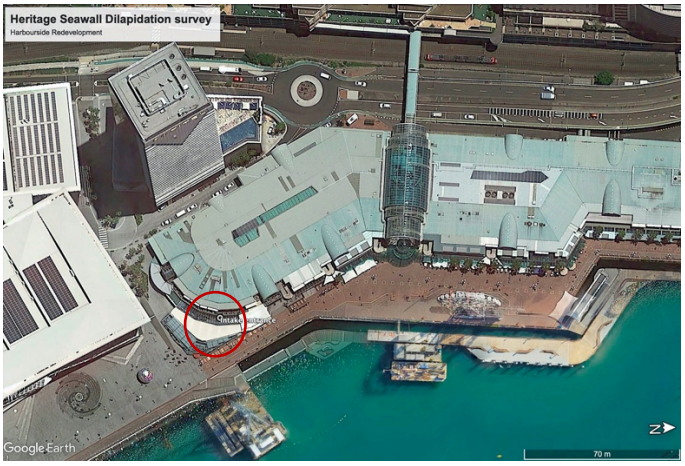

Figure 24: Google Earth map showing location of the intake entrance.

The intake entrance has a square profile entrance made of concrete (Figure 25). Where visible, this concrete appeared in good condition. At the northern entrance gate there was what appeared to be construction debris that had fallen partway into the entrance (Figure 26). This was not touched or examined due to safety concerns of it falling on the diver. There was a build-up of silt and marine growth on the gates within each of the 'entrances' (Figure 27) and the silty seabed had build-up in front of each bottom gate to a level just below the opening mechanism (Figure 28). This silt build-up is likely due to the pull of the water as it is sucked into the intake entrance.

Figure 25: External concrete wall of intake entrance. (Image 220624_Intake conduit, 00:11).

Figure 26: Construction debris at base of northern entrance. (Image 220624_Intake conduit, 00:18).

Figure 27: Example of growth build-up on intake gates. (Image 220624_Intake conduit, 03:34).

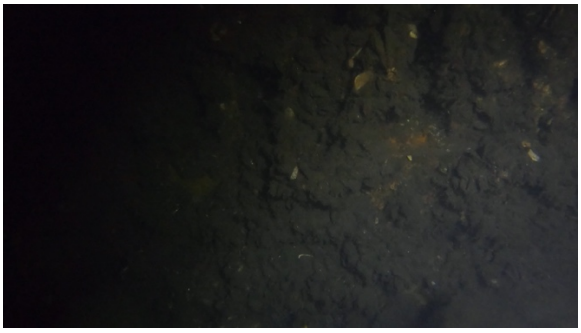

Figure 28: Example of silt build-up to the top of the bottom gate. (Image 220624_Intake conduit, 03:44).

3.2.2 *Discharge Tunnel*

The discharge (northern) tunnel entrance was located at -33.871893°, 151.199411° (WGS84).

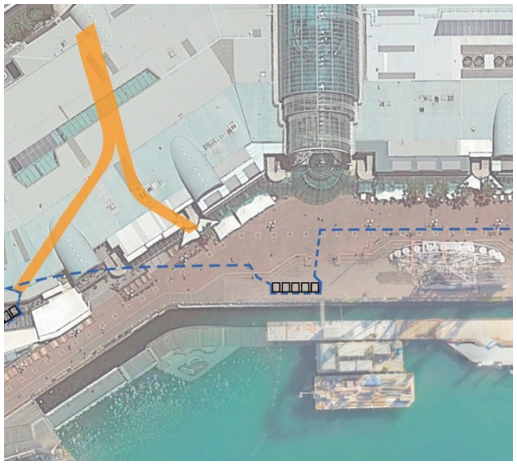

Figure 29: Overlay showing discharge entrance in relation to plan of conduit.

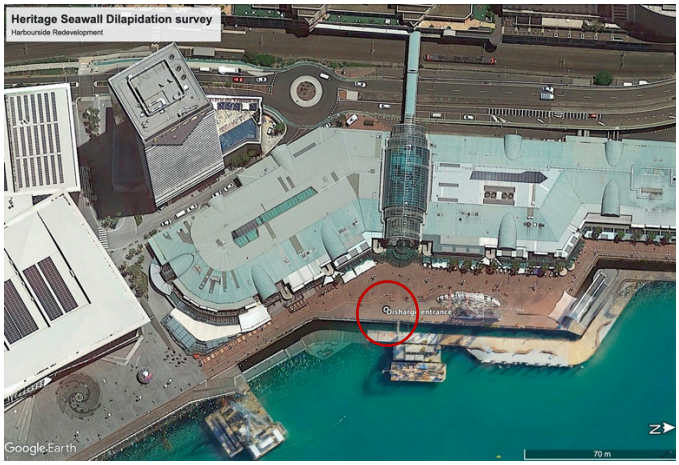

Figure 30: Google Earth map showing location of the discharge entrance.

The discharge entrance appears very similar in construction to the intake entrance, with a square profile concrete surround (Figure 31). The gates within each of the five ‘entrances’

have less marine growth and silt build-up than the intake entrance (Figure 32). The gates appear to be able to open with a mechanism on both the upper and lower gates (Figure 33 and Figure 34). The gates are joined horizontally in the middle of the opening (Figure 35).

Figure 31: Outside concrete surface of discharge entrance showing square profile. (Image 220624_Discharge conduit_2, 00:13).

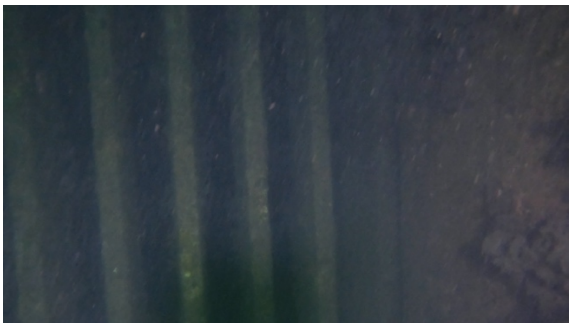

Figure 32: Condition of ferrous gates. (Image 220624_Discharge conduit_2, 01:43).

Figure 33: Example of top gate mechanism. (Image 220624_Discharge conduit_2, 02:39).

Figure 34: Example of bottom gate mechanism. (Image 220624_Discharge conduit_2, 00:59).

Figure 35: Example of join between gates. (Image 220624_Discharge conduit_2, 01:24).

3.2.3 *Overall Condition*

The dive survey ascertained there is no possibility of surveying the condition of the 1928 masonry saltwater conduits as they cannot be reached through the extended entrances likely built when the new concrete wall was constructed. The gates and concrete surrounds of the entrances all appear in sound condition, although the uppermost gate from the southern entrance is missing.

3.3 Recommendations

3.3.1 *Masonry Saltwater Conduits*

As the 1928 masonry saltwater conduits now appear to lie within reclamation, surveying the condition of the tunnels cannot be achieved through a dive survey.

Due to the lack of visibility, it was deemed too dangerous to send a diver through the entrances to locate and record the internal condition of the masonry tunnels. To achieve an internal condition report for the saltwater conduits, the following is recommended:

- The use of a Remotely Operated Vehicle (ROV) with the ability to record video and still images to be sent through the tunnels to record their physical condition. The ROV will require a tether to carry the data and power, so entering the tunnels through the underwater discharge tunnel would be the most advantageous method, especially as one of the gates is missing.

REFERENCES

Mirvac Pty Ltd 2021, *Harbourside Scope of Services Part A – General,* PDM Management System.

Mirvac Pty Ltd 2021, *Harbourside Scope of Services Non AEO Dilapidation Services,* PDM Management System.

ANNEX A – ELECTRONIC FILES

Name	File Type	Size (MB)	Length
220624_Stone Seawall Dilapidation_1	AVI	413.1	00:10:00
220624_Stone Seawall Dilapidation_2	AVI	413.3	00:10:00
220624_Stone Seawall Dilapidation_3	AVI	413.3	00:10:00
220624_Stone Seawall Dilapidation_4	AVI	230.5	00:10:00
220624_Stone Seawall Dilapidation_S_walkway	AVI	151.5	00:05:34
220624_masonry conduit_Intake	AVI	395.3	00:09:34
220624_Harbourside stone seawall above water_Wide	MP4	614.6	00:01:49
220624_Harbourside stone wall above water northern end wide	MP4	225.9	00:00:40
220624 Harbourside stone wall above water_ linear	MP4	714	00:02:06
220624_Stone wall under walkway	MP4	758	00:02:14
220624_Discharge conduit_1	MP4	393.9	00:01:10
220624_Discharge conduit_2	MP4	1150	00:03:23
220624_Intake conduit	MP4	3180	00:09:22